



PROJECT MUSE®

PART III. PATHOGENS

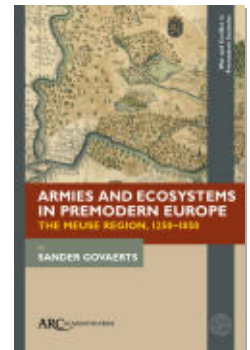
Published by

Govaerts, Sander.

Armies and Ecosystems in Premodern Europe: The Meuse Region, 1250-1850.

New edition ed. Arc Humanities Press, 2021.

Project MUSE. muse.jhu.edu/book/83856.



➔ For additional information about this book

<https://muse.jhu.edu/book/83856>



ARMIES AND ECOSYSTEMS IN PREMODERN EUROPE

THE MEUSE REGION, 1250–1850

by
SANDER GOVAERTS

ARC HUMANITIES PRESS



WAR AND CONFLICT IN PREMODERN SOCIETIES

Series Editors

John D. Hosler, *U.S. Army Command and General Staff College*

Kathryn Hurlock, *Manchester Metropolitan University*

Louisa Taylor, *Universitetet i Oslo*

L. J. Andrew Villalon, *University of Texas, Austin*

Evaluation and Peer Review

The press has every proposal independently evaluated by expert reviews before any formal commitment is made by the press to the author. Further, all submitted manuscripts are subject to peer review by an expert chosen by the press. The press conforms to the peer review best practice guidelines of the Association of University Presses. For further information see arc-humanities.org/our-series/arc/wcp/.

ARMIES AND ECOSYSTEMS IN PREMODERN EUROPE

THE MEUSE REGION, 1250–1850

by
SANDER GOVAERTS

ARC_{HUMANITIES PRESS}

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library.

© 2021, Arc Humanities Press, Leeds



This work is licensed under Creative Commons licence CC-BY-NC-ND 4.0.

The authors assert their moral right to be identified as the authors of their part of this work.

Permission to use brief excerpts from this work in scholarly and educational works is hereby granted provided that the source is acknowledged. Any use of material in this work that is an exception or limitation covered by Article 5 of the European Union's Copyright Directive (2001/29/EC) or would be determined to be "fair use" under Section 107 of the U.S. Copyright Act September 2010 Page 2 or that satisfies the conditions specified in Section 108 of the U.S. Copyright Act (17 USC §108, as revised by P.L. 94-553) does not require the Publisher's permission.

ISBN (hardback): 9781641893985
ISBN (paperback): 9781641894722
e-ISBN (PDF): 9781641893992

www.arc-humanities.org

CONTENTS

List of Illustrations	vi
Preface	ix
Introduction	1

Part One LANDSCAPES

<i>Chapter 1.</i> Frontiers	21
<i>Chapter 2.</i> Fortifications	59

Part Two BIOTIC COMMUNITIES

<i>Chapter 3.</i> Disturbances	105
<i>Chapter 4.</i> Policing	145

Part Three PATHOGENS

<i>Chapter 5.</i> Army Health	183
Conclusion	227

<i>Appendix.</i> Overview of plants found in the fortifications of Maastricht in 1868	232
Bibliography	238
Index	295

LIST OF ILLUSTRATIONS

Maps

Map 1.	Geographical overview of the Meuse Region.....	8
Map 2.	Political overview of the Meuse Region in 1250.....	13
Map 3.	Political overview of the Meuse Region in 1789.....	14

Figures

Figure 1.	Map of the Sint-Pietersberg and Fort Sint-Pieter, late eighteenth century.....	2
Figure 2.	The Leo Belgicus prevents Spanish pigs from entering the “Garden of Holland,” late sixteenth century.....	24
Figure 3.	Itinerary from Luxemburg to Paris, 1544.....	26
Figure 4.	A knight errant enters a forest full of exotic animals, miniature from a Lancelot–Grail manuscript made in Tournai or Hainaut, mid-fourteenth century.....	28
Figure 5.	Detail of a map depicting fords in the Meuse River from Saint-Mihiel to Revin, 1640.	36
Figure 6.	Map of the lordship of Montfort (detail), drawn by the engineer Philippe Taisne in 1625.....	42
Figure 7.	Medieval tournament held in the open fields between two fortresses, Hainaut, early fourteenth century.....	48
Figure 8.	Depiction of Namur and its immediate surroundings, map of the Count de Ferraris, 1777.....	53
Figure 9.	Cavalry patrol in the dunes and drift sands near the Camp of Beverlo, early twentieth century.	55
Figure 10.	A knight errant encounters a hedge made of shrubs and spiked heads, miniature from a <i>Lancelot-Grail</i> manuscript made in Verdun or Metz, late thirteenth century.....	63

Figure 11. Madonna and chancellor Rolin, early fifteenth century (detail). Painting by Jan van Eyck.	67
Figure 12. Two foxes and a wolf assault a fortress built on top of a rabbit warren, and defended by monkeys. Book of Hours made in Liège or Maastricht, early fourteenth century.....	75
Figure 13. Schematic depiction of the planting of trees and a hawthorn hedge on an earthen embankment, 1640.	79
Figure 14. Military map depicting Mézières and Charleville in 1753.	92
Figure 15. Etching of the Dutch siege of 's-Hertogenbosch in 1629 (detail), by Cornelis Danckerts, 1630.	94
Figure 16. The Hoge Fronten in Maastricht, now a nature reserve.....	100
Figure 17. Seventeenth-century pamphlet on the Thirty Years War.....	104
Figure 18. Miniature from a fourteenth-century French Bible depicting warfare disturbances.....	106
Figure 19. Cavalrymen gather <i>fascines</i> and make <i>gabions</i> , late seventeenth century.	108
Figure 20. Plan of the village of Biercée, 1699.....	119
Figure 21. Shepherd killing a wolf and its young, mid-seventeenth century.....	123
Figure 22. Print of a failed Dutch attempt to isolate Spanish troops on an island in the Meuse in December 1585, made by Frans Hogenberg in 1586.	133
Figure 23. Detail of the Shrine of St. Odilia, made in the Meuse valley for the house of the Crosiers ("Crutched Friars") in Huy, late thirteenth century.....	139
Figure 24. Guard post on the fortifications of 's-Hertogenbosch, 1820s. Sketch by captain August von Bonstetten.....	152
Figure 25. Discharge and passport for Gerard Vilansin.	157
Figure 26. Fifteenth-century army on the march.	158

Figure 27. Overview of people prosecuted for foreign military service in the Meijerij of 's-Hertogenbosch, 1393–1550.....	162
Figure 28. Two Ardennes horses in the service of the French horse artillery, drawing by Hippolyte Lalaisse, 1850.....	169
Figure 29. Arrest of a poacher (1813–1839), lithograph based on a painting by Horace Vernet.....	177
Figure 30. The French army crosses the frozen Meuse during the winter of 1794–1795. Painting by Dirk van Langendijk, an eyewitness.	186
Figure 31. Etching of the Dutch army besieging the castle of Namur, 1695, by Jan van Huchtenburg.....	190
Figure 32. Medieval men-at-arms, miniature from the early fourteenth century, made in Liège or Maastricht.....	204
Figure 33. Dutch militiamen (<i>schutters</i>) in their mouse- and flea-infested barracks, 1830s.	209
Figure 34. Fifteenth-century miniature, made in the Burgundian Netherlands, representing the siege of Narbonne by Charlemagne's army.	217
Figure 35. Soldiers gathering forage, late seventeenth century.....	221
Figure 36. Engraving of the killing of a hooded seal in the Meuse/Merwede, by Julius Goltzius, 1600.....	224

PREFACE

THIS BOOK IS the result of a life-long interest in biology as well as military history. Premodern warfare and animals have always fascinated me, but I never thought about examining armed forces from an environmental point of view until the summer of 2009. At that time I visited the military domains known as the “Kamp van Beverlo” with other members of an environmentalist youth movement, the Jeugdbond voor Natuur en Milieu (JNM), and observed to my astonishment that military training exercises made the survival of rare animal and plant species possible.

I started studying history at the Vrije Universiteit Brussel in September of that same year, and initially focused on eighteenth-century military personnel records. It was only in 2013–2014, my final year as a research master’s student at the University of Amsterdam, that I felt ready to undertake a proper historical investigation of armies’ ecological impacts in the medieval and early modern period. I am indebted to the selection committee of the Faculty of Humanities for allowing me to pursue this rather ambitious project in the context of a PhD thesis, to the two anonymous reviewers for their helpful advice and comments, and to Dr. Anna Henderson, Arc Humanities Press’s acquisition editor, for her enthusiastic response to my book proposal, and assistance throughout the publication process.

During my research I have benefitted from the support of many people. I would like to thank Leon Engelen, Paul and Colette Magotteaux-Monier, and Steven Vandewal for sharing their archival research, Jop Mijwaard for making three original maps of the Meuse Region, Gabriël and Remar Eerens for introducing me to the unique grasslands of the Sint-Pietersberg, and the many researchers and teachers at the University of Amsterdam, the Huizinga Institute, and the Research School of Medieval Studies for their suggestions and critical remarks. I am grateful to my supervisors, Prof. Mieke Aerts, Prof. Guy Geltner, and Dr. Mario Damen, for their backing of the initial research proposal, for helping me to bring my PhD thesis to a successful conclusion, and for introducing me to the unique research environment known to the outside world as the History Department of the University of Amsterdam.

I want to express my gratitude to my mother and brother, for their aid, advice, and encouragement on innumerable occasions, for being the best reviewers and strongest supporters I will ever have, and for being just who they are. Without them doing this research would simply not have been possible. I am also thankful for the support I have had throughout the years from my grandparents, Paul and Catherine, and my granduncle and grand-aunt, the late Guillaume and Rosa. Mathieu Kunnen, a passionate researcher and a very good friend, passed away just a few days after submission of the final manuscript. No words can describe how much I appreciated his help and guidance.

INTRODUCTION

AT A HILL named Sint-Pietersberg, just outside Maastricht, around the year 1780 labourers digging out limestone found the skull of a large creature resembling a whale or giant crocodile. It belonged to an animal that measured fifteen to seventeen metres in length. This remarkable specimen, the “Grand Animal de Maastricht,” had reached such fame by 1794 that the *Commissaires des Sciences et des Arts* present with the Army of the Sambre and Meuse, which had invaded the Austrian Netherlands to spread the ideas of the French Revolution, ordered soldiers to search and confiscate it from its rightful owner. They located the skull on November 8, 1794, only four days after the surrender of the Dutch garrison of Maastricht.¹ It was brought to the newly established Muséum national d’histoire naturelle in Paris, where in 1808 the zoologist George Cuvier (1769–1832) identified it as an extinct species of lizard.²

The history of this skull is a well-known event in the history of science, but its seminal nature is somewhat overstated. Dr. Johann Leonhard Hoffmann (1710–1782), director of the military hospital of Maastricht, had already come into the possession of similar fossils around 1770, and made his observations known through correspondence with other scientists.³ It was not until 1829, however, that the mysterious animal was definitively identified: the English geologist Gideon A. Mantell named it *mosasaurus hoffmanni* in honour of the man who made it famous. “Mosasaurus” literally means “lizard of the Meuse.”⁴ The discovery of these fossils is a landmark in the history of science because *mosasaurus hoffmanni* was one of the first extinct species ever identified. The fact that a species could die out implied that the world as it was known in the eighteenth or early nineteenth century was different to the one God created. It therefore challenged the generally accepted worldview at the time and paved the way for the evolutionary theory of Charles Darwin.⁵

The area around Maastricht, and the Sint-Pietersberg in particular, is well known for its layers of limestone, which have continued to provide large quantities of fossils until this very day. Military men had a key role in the discovery of the mosasaur genus, because this landscape had both ecological and strategic value. Officers of both the Dutch and French army expressed considerable interest in the underground network of the Sint-Pietersberg because a besieging army might use it to assault the fort, built on this hill in 1702, from below (see figure 1). During the siege of 1794 Dutch and French

1 Lacour, *La République naturaliste*, 73–80; 105–30; Rompen, “Mosasaurus Hoffmanni,” 37–40; van Schaik, *De Sint-Pietersberg*, 383.

2 Cuvier, “Sur le grand animal fossile.”

3 Faujas de Saint-Fond, *Histoire naturelle*, 59–67, 215–30; Rompen, “Mosasaurus Hoffmanni,” 37–63; van Regteren Altena, “Achttiende-eeuwse verzamelaars”; van Regteren Altena, “Nieuwe gegevens.”

4 Rompen, “Mosasaurus Hoffmanni,” 77–80.

5 Rudwick, *Bursting the Limits of Time*, 68–70.

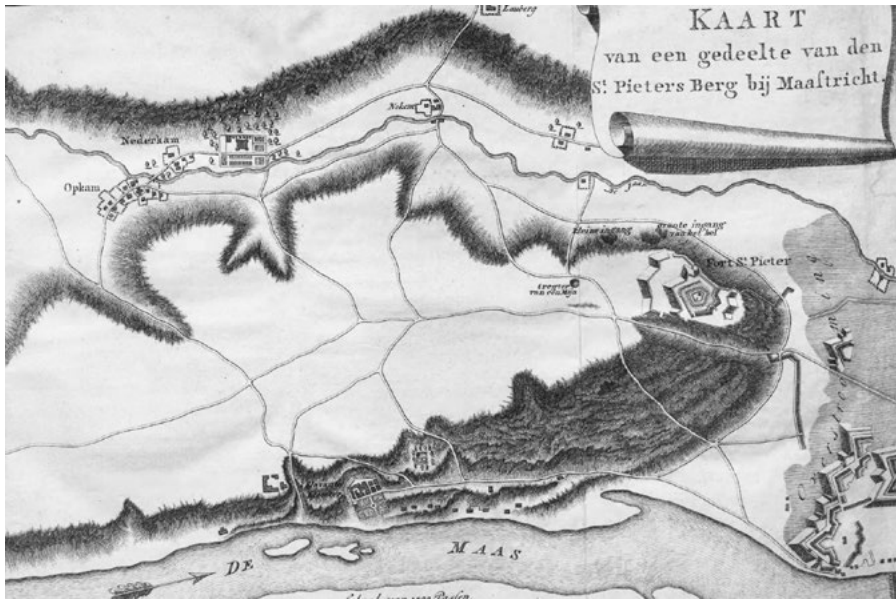


Figure 1. Map of the Sint-Pietersberg and Fort Sint-Pieter, late eighteenth century (Faujas de Saint-Fond, *Natuurlijke historie*).

soldiers actually placed explosives in the quarries to attack their adversaries' positions.⁶ The close connection between military and scientific exploration is also reflected in the oldest publications dedicated to the Sint-Pietersberg, which were all written by soldiers or scientists attached to the military.⁷

The term "mosasaurs" serves as a suitable metaphor for the following analysis, not only for the specific historical circumstances that led to the identification of this genus, but also because it suffers from the same stereotyping as armed forces. Mosasaurs, sea lizards who lived during the Late Cretaceous Era (101 to 66 million years ago), are commonly portrayed as destructive monsters. While this particular species, *mosasaurus hoffmanni*, was in fact a huge and fearsome predator, it is only one member among a genus of over forty species, which had an important and complex role in the functioning of ecological systems in which they lived. While the largest mosasaurs ate almost everything smaller than themselves, others specialized in eating molluscs, sea urchins, gastropods (snails and slugs), or squid. Different species therefore occupied different ecological niches.⁸ In the same way, there is no doubt that armies can adopt the shape of

⁶ Notermans, *Fort Sint-Pieter*, 23–25; van Schaik, *De Sint-Pietersberg*, 380–88; van Regteren Altena, "Achtttiende-eeuwse verzamelaars," 107.

⁷ Bory de Saint-Vincent, *Description*; Faujas de Saint-Fond, *Natuurlijke historie*, vii–viii; Mathieu, "Notice sur les orgues géologiques."

⁸ Schulp, "On Maastricht Mosasaurs," 99–111.

large destructive forces of tens of thousands of armed persons who destroy everything in their wake, but as with the *mosasauridae* genus, this is only one aspect of a multifaceted being.

This book considers interactions between armed forces and their surroundings from a long-term perspective, more specifically the region of the Meuse river (or Maas in Dutch and German) in the period from 1250 to 1850 as the river flows from northern France through modern-day Belgium and the Netherlands into the North Sea at Rotterdam. It argues that armies' conscious and concerted protection and conservation of ecosystems predates the rise of environmentalism by several centuries, and that this supposedly modern behaviour is just one element in a complex web of interconnections between armed forces and ecological systems. In fact, the ecological impacts of armies, past or present, can only be understood when one distinguishes between long- and short-term effects.

Studying the reciprocal impacts between armies and ecosystems means analyzing exchanges between ecosystems in general and one of their specific components. In more practical terms this means highlighting interventions by armed forces, while acknowledging that many factors, natural as well as cultural, contributed to actual ecological results. As this book argues that historical armed forces had a significant impact on ecological systems, it needs to demonstrate that a certain ecological consequence would not have occurred, if armies had not intervened.

By drawing attention to armed forces' historical role in the preservation of ecosystems, this book contributes to current debates about the ecological impact, the "environmental footprint," of military forces. These discussions date back to the 1960s and particularly the Second Indochina or Vietnam War (1955–1975), which saw the massive use of pesticides (the infamous Agent Orange). This fuelled an increasingly powerful peace movement, and also prompted some of the first academic studies on the ecological effects of warfare. Arthur H. Westing, a biologist who saw active service in the U.S. army, played a pioneering role in this regard. He was one of the first researchers to study environmental destruction in wartime and the need to devise measures to prevent, or at least reduce, these effects.⁹

By the late 1980s and early 1990s environmental organizations went a step further and criticized armed forces' role in large-scale pollution and environmental degradation in both war and peace. The continuous connection of such critics with the peace movement is made clear by a small German edited volume from 1988, which is titled *Natur ohne Frieden*, "Nature without Peace." The cover page depicts a tank riding down a tree with a peace dove flying over it.¹⁰ Conservationists were also quick to make comparisons with historical examples. Gerd Schuster, editor of the journal *Natur*, argued that "a mentality of medieval mercenaries governs at least the higher echelons of the (West) German Army." Another journalist equated that same army with "medieval rob-

⁹ Westing, *Warfare in a Fragile World*.

¹⁰ Achilles, ed., *Natur ohne Frieden*; Gleditsch, "Armed Conflict and the Environment"; Skrotzky, *Guerres*; van Mourik, van Teijlingen, and Vertegaal, *De natuur onder vuur*.

ber barons.”¹¹ The presumed similarity to medieval mercenaries is of particular interest within the context of this study because it reveals that the stereotyping of the Middle Ages is both explicit and implicit. The modern German word for mercenary (*Soldner*) is also the medieval German word for soldier.

It is unclear to what extent the sheer horror of being called “medieval” contributed to a change in attitudes, but military organizations have put substantial effort into presenting a different image to the general public from the 1980s onwards. Most military forces, national or international (NATO), now have a specific webpage dedicated to presenting an image of an organization for which environmental conservation is a major concern. Such websites invariably refer to military domains which have increasingly been turned into nature reserves during the last decades, or at least receive special protection because of their biodiversity value. In recent years they have facilitated the comeback of wolves in Western Europe.¹² There is also an increasing awareness among conservationists of the ecological value of former militarized landscapes as unique environments. Abandoned bunkers from the World Wars have become home to bat colonies, and the demilitarized zone between North and South Korea constitutes a rare paradise for endangered species. The Indian army has special “Environmental Task Forces” to carry out afforestation and irrigation projects, particularly near the frontiers with Pakistan, Bangladesh, and Nepal, while the armed forces of countries such as South Africa and Botswana can claim that they actively protect wildlife against poachers. In recent years soldiers have also become increasingly involved in the protection of the Amazonian rainforest.¹³

The ways that the historic past is used within these important, but also very complex, debates, is striking. A clear tendency exists, though, to either ignore historical examples of the close entanglement between armies and ecological systems altogether or refer to them in a simplistic manner (“mercenaries,” “robber barons”). This is based on two more or less contradictory assumptions. The first supposition is that due to technological “backwardness,” historical armies were not able to influence their environments in a cognisant and meaningful way and are thus not relevant to current debates. The second assumption is that armed forces have always been destructive, even though their potential impact on ecological systems did increase with technological developments. In both instances, however, protective or non-destructive behaviour is presented as something “new,” as an accomplishment of environmentalism, environmental organizations, and modern military forces.

11 “Allzu deutlich war nämlich geworden, dass zumindest in höheren Riegen der Bonner Verteidigungsarmee, eine Art mittelalterliche Söldnermentalität herrschte.” Lange, “Raus aus den Kartoffel,” 209; Schuster, “Täuschen und Tarnen,” 14.

12 Brunel, *Les missions militaires*; de Wolf and Fautsch, “Les sites militaires”; Gilissen, *Missie natuur*. For a critical discussion of military forces’ rhetoric, see Coates et al., “Militarized Landscapes”; Woodward, “Khaki Conservation”; Woodward, *Military Geographies*, 85–103.

13 Adeney Thomas, “The Exquisite Corpses”; Boosten, Jansen, and Borkent, *Beplantingen*; Brunel, *Les missions militaires*, 71–72; Havlick, “Disarming Nature”; Henk, “Biodiversity and the Military”; Sabo, ed., *Tanks and Thyme*.

Historians have certainly picked up on these themes and made their own contribution to these debates: in the last decade several monographs have been published on the environmental consequences, mostly devastation, of the American Civil War, the World Wars and the Cold War.¹⁴ A growing number of works are also concerned with the impacts of disease or weather and climate on the conduct of warfare.¹⁵ These analyses have favoured rapprochement between military and environmental history, and it is perhaps even possible to speak about a “green turn” in military history. Still, environmental studies relating to warfare before “modernity,” before the industrialization of warfare in the nineteenth century remain quite rare. The works of J. R. McNeill and Richard P. Tucker need especially to be mentioned here.¹⁶ Other scholars, from the field of history as well as archaeology and literature, have also contributed significantly to the study of army–ecosystem interactions even though they do not link themselves explicitly to debates about the “environmental footprint” of modern military forces.¹⁷

In premodern Europe, however, there were no strict dividing lines between armed forces and general society. This book therefore considers armies or armed forces as temporary or permanent social groups characterized by the fact that their members carry weapons, whose main purpose is the management of organized and collective conflicts in which the use of—potentially—lethal violence is the essential element: war.¹⁸ Such a definition might seem unproductively wide. It emphasizes that function, rather than a debatable numerical minimum or political legitimacy, is an army’s key characteristic. Even setting a minimum limit for the concept of army is counterproductive in light of the relative growth in army size during the period 1250–1850.¹⁹

Furthermore, such a characterization avoids the assumption that warfare inevitably revolves around battles and sieges or that armies can only be raised by “states.” Many armed forces had a very short lifespan, especially before the late seventeenth and early

14 Bader, *Wald und Krieg*; Best, “The Historical Evolution”; Brady, *War Upon the Land*; Brauer, *War and Nature*; Closmann, ed., *War and the Environment*; Coates et al., “ Militarized Landscapes”; Corvol and Amat, eds., *Forêt et guerre*; Hupy, “The Environmental Footprint”; Masson-Loodts, *Paysages en bataille*; McNeill and Unger, eds., *Environmental Histories*; Meyerson, *Nature’s Army*; Muscolino, *The Ecology*; Pearson, *Mobilizing Nature*; Russell, *War and Nature*; Shively Meier, *Nature’s Civil War*; Tucker and Russell, eds., *Natural Enemy, Natural Ally*.

15 Degroot, “Never Such Weather Known in These Seas”; Degroot, *The Frigid Golden Age*, 154–95; McGready, “Contested Grounds”; Winters, ed., *Battling the Elements*; Zhang et al., “Climatic Change, Wars, and Dynastic Cycles.”

16 Agoston, “Where Environmental and Frontier Studies Meet”; Bankoff, “Wood for War”; Garnier, “Les ressources naturelles”; Gordon, “War, the Military, and the Environment”; Hughes, *Environmental Problems*, 150–62; Mayor, *Biological and Chemical Warfare*; McNeill, “Forests and Warfare in World History”; McNeill, *Mosquito Empires*; Tucker, “The Impact of Warfare.” See also the special issue “Environments of War” of the *Hungarian Historical Review* 7:3 (2018).

17 Childs, *The Military Use of Land*; Hanson, *Warfare and Agriculture*; Hevia, *Animal Labor and Colonial Warfare*; Hill and Wileman, *Landscapes of War*; Pluskowski, *The Archaeology*, 294–326; Trautmann, *Elephants and Kings*; Withers, “The Ecology.”

18 This characterization adopts Alexander Moseley and Keith F. Otterbein’s definitions of warfare: Moseley, *A Philosophy*, 14–16; Otterbein, *How War Began*, 9–10.

19 A useful overview is provided in Lynn, “The Evolution.”

eighteenth century. They were assembled for a particular purpose and disbanded afterwards. Even so, marching, standing guard, maintaining fortifications, and simply staying healthy by securing access to food and shelter were far more pressing issues on a daily basis than preparing for combat. If an army actually engaged the enemy it was most likely in the context of skirmishes, incursions, and sudden assaults, rather than major battles or sieges. The relative importance commanders attributed to such actions changed over time, and so did the terminology: from the medieval *chevauchée* or *Reise* to seventeenth-century partisan warfare, and eighteenth- or nineteenth-century “little war” (*petite guerre*, *Kleinkrieg*, *guerrilla*). Still, from the perspective of army–ecosystem interactions these aspects of warfare remain among the most significant.²⁰

The people who actually make up an army will be referred to as “army members.” While it might seem more logical to opt for terms such as “soldier” or “military,” this would also mean that the specific meaning of these terms in historical sources is ignored. “Army members” is in fact much closer to the terminology the sources themselves adopt (“men of war,” “men of arms,” “armed people,” “army people”).²¹ The term soldier, of medieval origin (*soudener*, *soudoier*, *Soldener*), derives from Latin *solidarius*, which is literally “someone who receives a solidus,” a golden coin of the Late Roman Empire, or “paid man” in a more general sense. It refers to combatants who receive monetary compensation for their services.²² When the term soldier appears in this study, it is always with this specific meaning.²³ In a similar way, the term “military,” derives from Latin *miles*, *militaris*, and indicates matters relating to war or armies in general (as in military history). It only became the preferred term to refer to a specific kind of army, characterized by uniforms, a strict hierarchy, and clear distinctions from the general population (“citizens”) during the eighteenth and early nineteenth century. When this study uses the term military it is in the general sense, unless stated otherwise.²⁴

Armies included, and still include, a considerable number of persons in their ranks who cannot be referred to as “soldiers,” and to a lesser extent “military.” These could be wagoners, servants, pioneers, medical personnel, combatants’ partners and children, and so forth. During the eighteenth and nineteenth century commanders and govern-

²⁰ Lomas, “Raids and Raiding”; Parker, *The Army of Flanders*, 12–13; Picaud-Monnerat, *La petite guerre*; Rogers, *Soldiers’ Lives*, 237–53; Satterfield, *Princes, Posts and Partisans*; Verbruggen, “Military Service.”

²¹ “Gens de guerre,” “Kriegsvolk,” “legervolk,” “gewapenden,” “Reisiger,” “gens d’armes,” “mannen van wapenen.” The terms *gens d’armes* and *mannen van wapenen* could also refer to a dominant group within armies (men-at-arms) or even a social group identifiable by its martial qualities (squires). In medieval Latin *miles* (plural *milites*) generally referred to knights specifically rather than combatants in general: Lind, “Genesis of the Civilian,” 52–53.

²² The word soldier spread from French (*soldat*) to Dutch (*soldaat*) around the late sixteenth century, and to German (*Soldat*) in the early seventeenth century. Schulten, *Contribution*, 104–5.

²³ Contemporaries mainly distinguished soldiers according to their function or geographical background. The use of the word mercenary remained rather limited until the late eighteenth or nineteenth century. DeVries, “Medieval Mercenaries”; Govaerts, “Fire-Eaters,” 9; Percy, *Mercenaries*, 68–90; Sikora, “Söldner.”

²⁴ Bardin, *Dictionnaire*, 12:3640–41; Lind, “Genesis of the Civilian,” 59–64.

ments put considerable effort into turning armies into military organizations. These processes entailed that the aforementioned individuals either adopted a more official presence (for instance, the militarizing of transport services and administration) or were excluded from army contexts (such as women and children).²⁵ In recent years scholars have started to question this close association again, by referring to the rise of private security companies and the blurring of distinctions between military and police forces in the fight against terrorism.²⁶

Establishing a clear definition of the second cornerstone of this book, the ecological system or ecosystem, is no less problematic. The concept conventionally refers to all of the organisms, meaning plants, animals, fungi, and microorganisms that live in a particular habitat (a community or multiple communities), along with their immediate physical and chemical environment. Living and non-living elements constantly interact with each other through flows of energy and matter (such as food chains). In theory, the term ecosystem cannot be limited to a certain spatial or temporal level. The Meuse River itself is an ecosystem, but so is a forest or a lake. Some might argue that the whole globe is one huge ecosystem.²⁷

This very lack of spatial and temporal limitations makes the term both thought-provoking and problematic. The concept of an ecological system was originally developed in the early twentieth century; the term was coined in 1935, on the basis of lakes. A lake is a closed system that can be reasonably well defined in spatial terms. In most cases, and the Meuse Region is a good example of this, it is very difficult to pinpoint where one ecosystem ends and another begins. The fact that “everything is connected to everything else” does not help either. Many scholars therefore prefer to examine a single aspect or level within ecosystems, such as the non-living environment (landscapes), living beings (biotic communities) or even pathogens (organisms or materials that cause disease), and individual species.²⁸

In order to approach the subject in a systematic way these same distinctions will be adopted. The first two chapters, frontiers and fortifications, represent the landscape level or the non-living environment, comprising soil structure, hydrography, and land use. Landscapes are considered here as ecological milieux that are created through the mutual engagement of environment and people. A landscape is simultaneously a material reality and a cultural construct.²⁹ The next two chapters, disturbances and policing,

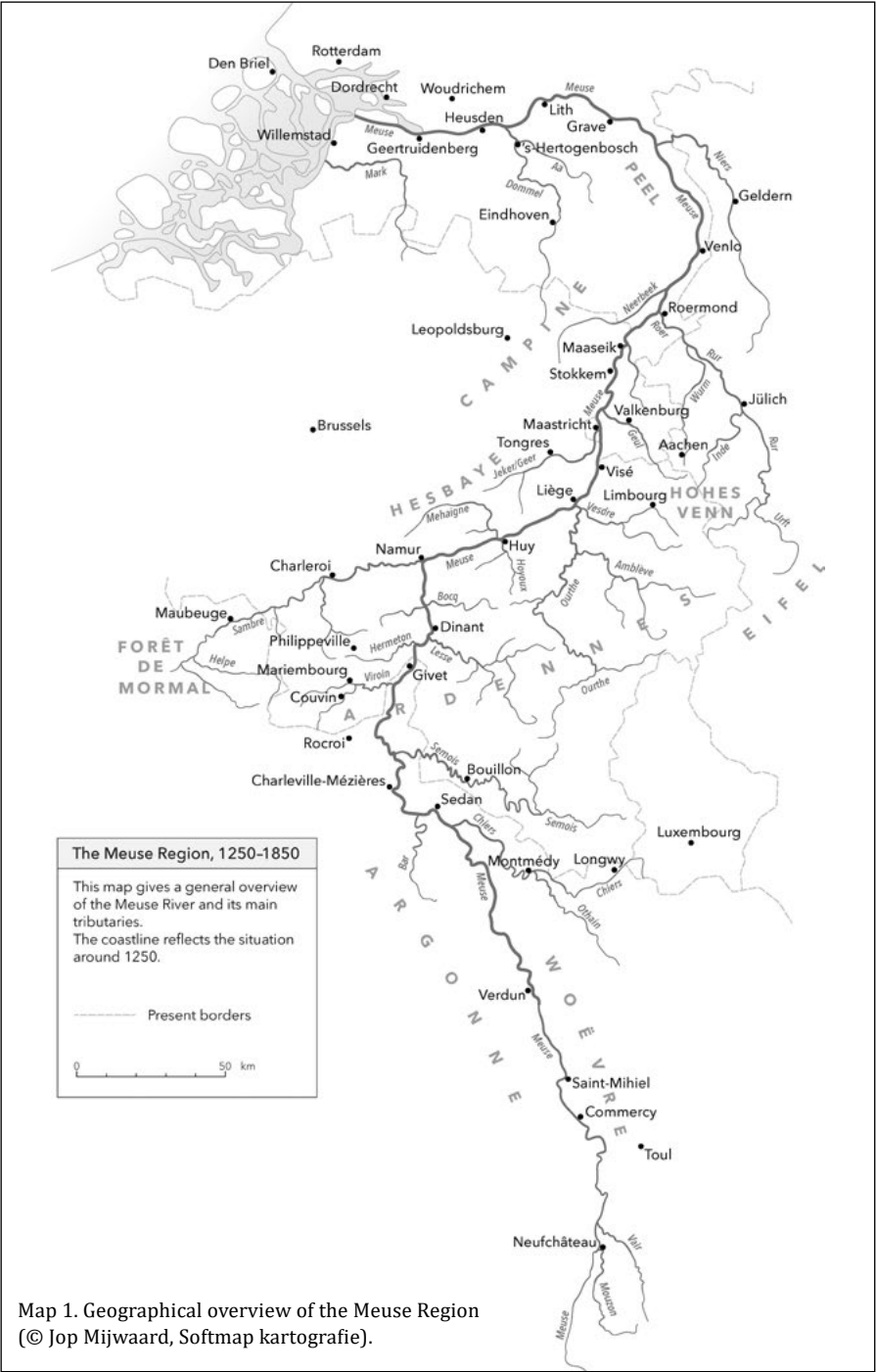
25 Cardoza, *Intrepid Women*, 166–228; Mayer, *Belonging to the Army*; Tachon, *Enfants du troupe*, 225–40.

26 Woodward, “Military Landscapes,” 51–52.

27 Park and Allaby, *Dictionary*, 135; Chapman and Reiss, *Ecology*, 187; Willis, “The Ecosystem,” 270.

28 Golley, *A History*; Raffaelli and Frid, “The Evolution”; Willis, “The Ecosystem.”

29 Many different definitions of “landscape” exist, depending on one’s field of study. In ecology for instance, landscapes can also be studied as units consisting of multiple ecosystems or ecotopes (the smallest homogeneous mapable units of land). This description focuses on the socio-cultural dimensions of the word landscape to emphasize the close entanglement of “nature” and “culture.” Förster, et al., “Towards Mutual Understanding”; Ingegnoli, *Landscape Bionomics*, 3–9; Jones, “The Elusive Reality of Landscape,” 232–34.



are concerned with living beings or fauna and flora (humans, animals, and plants). The final level comprises only one chapter, army health, and examines pathogens, or disease and disease prevention. These distinctions are not absolute, but should be seen as a shift in emphasis, as no single aspect of the ecosystem concept can be studied in isolation. Such a methodology also fits into the traditional geographical understanding of a region as multiple landscapes that share similar characteristics. The Meuse Region is composed of several distinct landscapes that are nevertheless related because they are part of the same river basin, and these landscapes in turn comprise diverse kinds of living beings and pathogens.³⁰

Despite the ambiguity of “ecosystem” as a concept, it still provides a suitable framework to think about the natural world in a way that more traditional notions, such as “nature” and “environment,” do not allow. It does not assume for instance that humans are fundamentally different from the world that surrounds them. Its rising popularity from the 1970s onwards originates to a large extent in its adoption by environmentalist movements.³¹ What is important for this study is that it permits the organizing of complex interactions between armies and their surroundings in a manner that is meaningful to military and environmental historians, or to historians and researchers of other disciplines.³² The concept of ecosystem provides a sound theoretical basis, while the actual chapters concern themselves with one of the three levels encompassed by the ecosystem concept: landscapes, biotic communities, and pathogens.

Now we have established working definitions of the two corner-stones of this book, it is time to say something about its geographical framework: the Meuse Region or the basin of the Meuse River, meaning the river itself and its tributaries.³³ The Meuse River measures about 925 kilometres or nearly six hundred miles, ranges from Pouilly-en-Bassigny on the plateau of Langres (in Lorraine), at an elevation of 409 metres, down to the North Sea, and is part of a basin that stretches over thirty-four thousand square kilometres (see map 1). Because it is mainly fed by rainwater, the Meuse’s behaviour can be quite unpredictable, a characteristic of considerable importance for army–ecosystem interactions. Today it is officially referred to as the Meuse from Meuse-en-Bassigny

30 Baker, *Geography and History*, 109–29.

31 Chapman and Reiss, *Ecology*, 92–93; Park and Allaby, *Dictionary*, 144, 287; Radkau, *Natur und Macht*, 29–32; Wiegleb, “A Few Theses,” 104–7; Worster, “History as Natural History.”

32 Some researchers have adopted the concept of “hybrid systems” to bridge the traditional divide between “nature” and “culture.” This analysis agrees with the general idea of hybrid systems, but does not adopt the terminology, because it might lead to unnecessary confusion. If one accepts that the term ecosystem in itself emphasizes connections between living and non-living beings, including humans, there is no need for yet another term. Human perceptions of their environment can easily be examined as a factor of importance regarding interactions within ecosystems. Hoffman, *An Environmental History*, 5–20.

33 The most important tributaries of the Meuse are, from source to estuary: Saône, Mouzon, Vair, Chiers, Bar, Sormonne, Semois, Viroin, Hermeton, Lesse, Molignée, Bocq, Houyoux, Sambre, Mehaigne, Hoyoux, Ourthe, Berwinne, Voer/Fouron, Geer/Jeker, Geul, Geleenbeek, Rur/Roer, Neer, Swalm, Niers, Raam, and Dieze.

onwards. The initial watercourse is simply known as “the Brook” (*le Ruisseau*).³⁴ The Meuse Region is relatively sparsely populated, especially if compared to the neighbouring Scheldt basin in Flanders, and the most important settlements lie directly on the Meuse River itself. Note that on map 1 the Meuse estuary reflects the situation around 1250 in order to draw attention to the processes of land reclamation that have occurred during the medieval and early modern period.

The choice for a geographical approach, inspired by Fernand Braudel’s famous monograph on the Mediterranean, serves as an alternative to the traditional emphasis on political entities, and more particularly nation states. This is not to say that the concept of “region” is unproblematic. Its role in geography is similar to that of “period” in history. It refers to a set of lands that share some specific characteristics, but its exact size and limits can diverge widely depending on the subject, and researchers’ individual preferences. The Meuse Region from an economic or political point of view does not necessarily correspond to this geographical framework. The importance of the Meuse as a political boundary for the Kingdom of France, for instance, far extends these geographical limits.³⁵

The basin of the Meuse as a subject of study is valuable because it provides a geographical framework that is relevant for both military and environmental history. If historians refer to the Southern Netherlands as the “battlefield” or “cockpit” of Western Europe, then the Meuse valley certainly is a highway to that battlefield. Rivers were crucial to military movement, especially before the invention of railways, for several reasons: they considerably facilitated the transportation of heavy equipment and supplies, provided relatively clean (running) water and served as a defensive line. It is hardly surprising therefore that the Meuse Region assumed considerable strategic importance from at least the Late Roman Empire to the World Wars (with the struggle for Verdun in 1916 and the battle of the Bulge in 1944 as the best-known examples). The role of the Meuse is in this sense quite similar to that of other major rivers, such as the Rhine and Danube.³⁶

A comparison of the Meuse and Rhine is of particular interest here because of their proximity. Some geographers might even argue that the Meuse River is a tributary of the Rhine. While the symbolic value of the Rhine as a boundary between France on the one hand and Germany on the other is well known, this perception is a relatively recent phenomenon. In the broader historical context of this study the Meuse Region has been far more important as a boundary marker between the kingdom of France on the one hand and the Holy Roman Empire, dominated by the Habsburgs, on the other. The linguistic and political variety of the Meuse Region is also more considerable than that of the Rhine, especially if the former’s smaller geographical dimension is taken into account. In this way, this study transgresses different historiographies organized by nation states.

34 Breuer, *Die Maas*; Guillery, *La Meuse*; Loicq, *Les noms*, 253–56; Suttor, *La Meuse*; Vereerstraeten, “Le bassin.”

35 Baker, *Geography and History*, 156–63, 182–93.

36 Agoston, “Where Environmental and Frontier Studies Meet”; Babinger, “Die Donau als Schicksalstrom des Osmanenreich”; Schmid, “The Environmental History of Rivers”; Suttor, “L’espace fluvial”; Suttor, *La Meuse*.

Diversity within the Meuse Region is indeed essential to this analysis. Being part of a geographical belt that stretches from northern France and the Low Countries to the western part of Germany and northern Italy, and being well known for incorporating some of the most densely populated areas in Europe, the Meuse Region stands out because relatively sparsely populated regions dominate it. The riverbanks of the Meuse River are very fertile and so are a handful of other areas, characterized by fertile loam or clay soil, such as Hesbaye. If the Meuse Region is considered as a whole, however, the most common landscapes are mountainous forests (Woëvre, Argonne, Ardennes, Eifel) and peat or heath lands (Hohes Venn, Peel, or the Campine, also known in Dutch as the Kempen). Many armed forces have been drawn to the Meuse Region because of its strategic importance, but most of them preferred to remain in the fertile parts, especially the river valley of the Meuse itself.

The soil characteristics of the Meuse Region are also important when it comes to construction materials. Some settlements, especially in the southern and middle parts of the basin, had access to relatively large quantities of wood, while inhabitants of the lands near the Meuse estuary started to run out of suitable construction wood as early as the High (or Central) Middle Ages. The local presence or absence of raw materials, such as wood, coal, or stone, had a substantial impact on trade patterns along the Meuse River, because river transport was mainly limited to such high-volume, low-value goods. The valley of the Meuse from Givet to Maastricht is well known for its layers of limestone, which come very close to the surface. Because of the presence of calcium carbonate these landscapes contain unique vegetation that only grows on calcareous soils. Many sites, including the aforementioned Sint-Pietersberg, have now received special protection because of the rare species that live there (notably herbs, flowers, butterflies, and bats). This might seem to be a consequence of their inherent geographical features, but some of the most valuable ecosystems are actually man-made (the grasslands and quarries). The dominance of limestone as a building material is of major consequence for the ways fortifications in the Meuse Region interact with ecosystems at large, especially in a long-term perspective.³⁷

Our chronological limits, 1250–1850, reflect the general emphasis on a long-term perspective. These parameters do not constitute absolute boundaries, but serve, in the same way as the geographical scope, as an alternative framework. They transgress traditional chronological divisions and bring the importance of the Central Middle Ages as a transformative period in European history to the fore. As will be argued below, the Central Middle Ages were characterized by a series of changes—environmental, social, economic, cultural, military, and more—that constitute a background or framework that remains dominant until it was replaced by another series of changes during the nineteenth century. The main turning point is around the year one thousand, or the years 1000–1300 more generally, rather than the fifth or fifteenth century. This is not to argue that the 1250–1850 period did not experience significant changes, only that many historians privilege such transformations above forms of continuity with the Middle Ages.

37 Breuer, *Die Maas*, 54–76; Rousseau, “La Meuse,” 99–121; Suttor, *La Meuse*.

The object is to open up research perspectives, rather than to replace one determinism with another.

Landscapes that are considered archetypical for specific areas in the Meuse Region, or even as “natural” landscapes, such as the ponds of Woëvre, the heathlands of the Hohes Venn or the Dutch coastline, were to a large degree created during the Middle Ages. Pro-environmental organizations put much effort into recreating or maintaining such ecological milieus because they encompass species that can be found nowhere else. Paradoxically this often involves cutting down the very forests and trees that for many people represent true “nature.” People may be aware that these landscapes have become much scarcer or even disappeared because of changes in land use, particularly during the last hundred and seventy years. Few of them realize, however, that they are to a large extent recreating medieval landscapes.³⁸

These older landscapes both originated in and brought about changes in agricultural practices (e.g., the three-field system) that supported significant demographic growth during the Central Middle Ages. The extent of this growth is reflected in the fact that most of the settlements that currently exist in the Meuse Region can trace their history back to precisely this period. The great majority of cities today had already obtained municipal charters granting them rights during the Middle Ages. It is noteworthy that the few exceptions to this general pattern often have a military origin (such as Charleroi or Leopoldsborg). Of no less importance is that these settlements built specific stone structures—fortresses (“castles”), urban walls, and churches—which retained a major military role until the eighteenth or nineteenth century. This same period also saw the development of an ideology centred on the “Three Orders” (i.e., those who pray, those who fight, those who work), even if the reality could be rather more complex. The association of nobility with knighthood is of particular importance for subsequent chapters. Finally, the development of a money economy also encouraged the renewed spread of paid military service (soldiers) for the first time since the Late Roman Empire.³⁹

The political fragmentation of the Meuse Region came about during this period as well, notably as a result of the disintegration of the Duchy of Lorraine (Lotharingia) into a multitude of relatively small principalities. The original division, between Upper and Lower Lorraine from the second half of the tenth century, was quickly followed in the eleventh century by a further series of separations, as local aristocrats consolidated their power.⁴⁰ By 1250 the following principalities had emerged: the duchies of Lorraine, Brabant, and Limburg, the bishoprics of Verdun, Liège, and Toul, and the counties of Bar, Champagne, Rethel, Chiny, Luxemburg, Hainaut, Namur, Loon, Jülich, Guelders,

38 Barends, et al., eds., *Het Nederlandse landschap*; Girardot, *Le droit et la terre*, 1:239–48; Nienhuis, *Rhine-Meuse Delta*, 49–79; Noël, *Quatre Siècles*; TeBrake, *Medieval Frontier*, 190–220; Webb, “The Traditional Management.”

39 Bartlett, *The Making of Europe*; Burgers and Damen, “Feudal Obligation or Paid Service,” 785–86, 789–90; Dejongh and Thoen, “Arable Productivity”; Hoffmann, *An Environmental History*, 119–54; Hoppenbrouwers, “Town and Country”; Krieger, “Obligatory Military Service”; Napran, “Mercenaries and Paid Men”; Pounds, “Population and Settlement”; van Bavel, *The Invisible Hand*, 145–69.

40 Alberts, *Overzicht*; MacLean, “Shadow Kingdom”; Milis, “Counts, Cities, and Clerics.”



Map 2. Political overview of the Meuse Region in 1250
(© Jop Mijwaard, Softmap kartografie).



Map 3. Political overview of the Meuse Region in 1789
(© Jop Mijwaard, Softmap kartografie).

and Holland. Furthermore, there were several more or less independent lordships, principalities, and cities, such as Commercy (from the Germanic *marka*; march), Stavelot-Malmédy, and Aachen (see map 2).⁴¹

Despite numerous attempts at unification, the Meuse Region remained highly fragmented from a political point of view. In 1789, on the eve of the French Revolution, the borders of the kingdom of France already closely resembled the current situation, while the northern half of the river basin was still divided among various rulers as well as the Dutch Republic (see map 3). Ecclesiastical territories, such as the Prince-Bishopric of Liège, were a major factor of continuity because their survival did not depend on the fortunes of one family. French expansion from 1792 onwards briefly united the entire Meuse Region, but new splits followed in 1814–1815 (with the division of the northern half of the basin between the Kingdoms of the Netherlands and Prussia) and in 1830–1839 (with the secession of Belgium and Luxembourg).

In this way, this book emphasizes the importance of a “peripheral” region that has received far less attention in historical studies of the late medieval and early modern Low Countries than neighbouring “core” regions (Flanders, and the more densely populated parts of Holland and Brabant). This is partially the result of the relative availability of source material, but the fact that the history of this region does not fit well into traditional narratives of the rise of the Burgundian/Habsburg composite state or the Dutch Republic certainly plays a role as well.

The claim that frameworks established during the Central Middle Ages lost most of their significance only in the nineteenth century can best be illustrated with two examples: gunpowder weapons and the so-called Columbian exchange. Military historians traditionally attribute great importance to the fifteenth and sixteenth centuries because of the effects of gunpowder weapons on fortifications’ architecture. While such devices did become relatively more efficient during those centuries, these same scholars often neglect to emphasize that gunpowder had already spread to Europe during the thirteenth century.⁴² The oldest written reference to a gunpowder weapon in the Meuse Region comes from the 1346 city accounts of Aachen: an iron gun that shot arrows.⁴³ It took almost three centuries (thirteenth to sixteenth centuries) before gunpowder weapons transformed the way (new) stone fortifications were constructed. Another century would pass before the need to carry gunpowder weapons caused a divergence between warships and other types of vessels. As far as battlefields are concerned, gunpowder weapons did not end the continued prevalence of melee weapons before the nineteenth century.⁴⁴

In a similar way, overseas travellers brought all kinds of new plants to the Meuse Region from the sixteenth century onwards, but very few of them spread beyond (bot-

41 The boundaries of the counties of Champagne and Rethel as well as other components of the kingdom of France are not illustrated because they did not constitute frontiers, as defined in this study. For the same reason the lordships of Breda and Briey have been given the same colour as respectively the duchy of Brabant and the county of Bar.

42 Hall, *Weapons and Warfare*, 41–45; Partington, *A History*.

43 “busa ferrea ad sagittandum tonitrum”: see Laurent, *Aachener Stadtrechnungen*, 182.

44 For a general overview see McNeill, *The Pursuit of Power*.

anic) gardens. The cultivation of tobacco, for instance, became quite common during the seventeenth century, but this plant requires a relatively intensive garden-like cultivation. The same applies to the potato, which was only widely adopted at the end of the eighteenth and the beginning of the nineteenth century. The number of neophytes, plants that were introduced after 1500 and could survive independently of human aid, was negligible before major changes in transportation during the nineteenth century, especially if compared to the large number of archaeophytes; plants that were introduced and established themselves before the Columbian exchange (e.g., good king henry, wormwood, common snapdragon). It is often very difficult to distinguish these from actual “native” plants.⁴⁵ A comparison of animal introductions is also revealing: archaeozoological research and fiscal accounts indicate that turkeys (“Indian peafowl”) lived in a handful of prestigious lordships during the sixteenth century (such as the castles of Breda, Eindhoven, and Pietersheim), but this handful of animals seem barely relevant in light of the medieval introductions of the rabbit and domesticated carp (see chap. 5).⁴⁶

The fundamentals of army–ecosystem interactions were only transformed during the nineteenth century. Some of these changes were technological: railways (1830s), ironclad warships (1860s), the general adoption of breech loaders (1840–1870), the machine gun (1860s), the construction of detached fortifications made of concrete and steel rather than stone and wood, and barbed wire (1870–1890). It is also during the nineteenth century that the first large-scale attempts were made to channel the Meuse River itself.⁴⁷ Others were of a more social nature, such as the militarizing of armies and the adoption of personal military service (see chap. 4). Major developments in the iron industry and coalmines altered landscapes in the middle of the Meuse basin, from Charleroi to Liège. It is also at this time that agricultural practices lost their medieval roots, with the last elements of medieval practices disappearing one by one (such as the end of common land and small-scale ownership).⁴⁸

The need for wider chronological limits is imperative given the “Military Revolution” paradigm, which became the subject of major debates in the 1990s, but still looms large within the field of military history. Research on military revolution(s) largely ignored the environmental aspects of armed forces, and emphasized the difference between medieval and early modern warfare.⁴⁹ This book studies continuity and change across a

⁴⁵ Preston, Pearman, and Hall, “Archaeophytes”; Schroeder, “Zur Klassifizierung”; Zeven et al., *De introductie*.

⁴⁶ Coenegrachts and van de Konijnenburg, “De kasteelsite van Oud-Rekem,” 64–65; de Jong, “Huisdieren, jachtwild, vissen en weekdieren,” 222–23; Lauwerier and Zeiler, “Wishful Thinking”; Marchal, *Inventaire*, 174; Nagels, Kerklaan, and van Kaam, *Kasteel van Breda*, 16, 52.

⁴⁷ This applies to the Meuse River as a whole. Human interventions at the most local level, notably dike building, altered the course of the Meuse significantly and repeatedly during the Middle Ages and Early Modern period (see also chaps. 1 and 2). Breuer, *Die Maas*, 95–123; Guillery, *La Meuse*; McNeill, *The Pursuit of Power*, chap. seven.

⁴⁸ Dejongh and Thoen, “Arable Productivity”; Lebrun et al., *Essai sur la révolution industrielle*; Parmentier, *Pays de Charleroi*.

⁴⁹ Rogers, ed., *The Military Revolution Debate*.

period during which several of these transformative changes supposedly took place, and in a region which Geoffrey Parker identified as part of a core zone in which his “Military Revolution” first came about.⁵⁰

Making interactions between armies and ecological systems the subject of this argument means bringing different rates of historical time to the fore again and provide an alternative framework for understanding military change during the *longue durée*.⁵¹ Because of the general emphasis on long-term impacts political events and individual rulers occupy a far less prominent place in this analysis than in most works concerned with military history. The book rather assesses the ecological aspects of state formation, as well as the agency of common soldiers, their families, animals, plants, and the Meuse River itself; actors that historians have often neglected or taken for granted.

Studying the reciprocal impacts of armies and ecosystems in a timeframe of six hundred years and a multilingual context creates evident challenges. The continuous strategic importance of the Meuse Region has also had the unfortunate result that warfare related damage caused a considerable loss of archival material. In 1940, for instance, most of the medieval and early modern archives kept in Mons and Mézières went up in flames.⁵² Chronological and geographical differences are an integral part of the argument, and will be given due attention, but constantly referring to distinctions within the basin of the Meuse even when this is of limited relevance to the argument would have turned this study into a work the size of Braudel’s magnum opus. The text instead focuses on a select number of examples, which can thus be properly contextualized. Further references are provided in the footnotes to avoid the impression that one example represents the whole Meuse Region.

The main argument, which is that armies’ conscious and concerted protection and conservation of ecosystems long predates the rise of modern environmentalism, and that this supposedly modern behaviour is just one element in a complex web of inter-connections between armies and ecological systems, will be demonstrated through five chapters: frontiers, fortifications, disturbances, policing, and army health. These themes represent the three levels encompassed within the ecosystem concept and, as argued before, constitute a more practical framework than ecosystem. The chapters follow logically as the analysis starts with the largest ecological level and follows up with lower levels. At the same time, they all refer to and need each other as a basis.

The first two chapters, frontiers and fortifications, represent the landscape level. The chapter about frontiers connects the ecological impacts of military domains, which constitute such an important part of current military forces’ discourse, to much older practices of security against external threats. It examines how significant military training practices were within larger processes of frontier management, and whether medieval perceptions of frontiers continued to influence armies’ actions in later centuries. The next chapter, fortifications, analyzes the current emphasis on abandoned defences

⁵⁰ Parker, *The Military Revolution*, xvi–xvii.

⁵¹ Braudel, *La Méditerranée*, 13–14 (*préface*); Kinser, “Annaliste Paradigm”; Latham, “Warfare Transformed.”

⁵² Collin, *Guide*, 31, 71–72.

as safe havens for endangered plants and animals. Ruined buildings overgrown with plants might fit well a romantic idea of nature, but say little about to what extent present biodiversity levels are based on historical management practices. Discussions about former fortifications as cultural heritage or ecological sites would benefit from a more thorough understanding of the ecological value of these structures when armed forces still managed them.

The third and fourth chapters, on disturbances and policing, examine biotic communities, or fauna and flora. They embody two seemingly antagonistic influences: damage and protection, both of which figure prominently in recent debates about the “environmental footprint” of military forces. The chapter about disturbances investigates whether the most obvious or spectacular devastations, such as sieges or other large-scale interventions, were also the most meaningful in a long-term perspective. Warfare obviously involved the killing of humans, animals, and plants, but one should keep in mind that ecosystems consist of transfers of energy. Theoretically, for every species negatively affected, there could be another taking advantage. Furthermore, armed forces might have exerted lesser-known impacts that were far more destructive in the long run. The policing chapter places the current depiction of modern military forces as “nature’s army” in a broader historical context. Soldiers have a vital role in the protection of endangered animals such as elephants or rhinos, but this behaviour might not be as progressive, or modern, as is often claimed. These are conflicts over control of natural resources, and the socio-economic value that they represent. Given that armies act as agents of both order and disorder, the use of armed force could very well have become a necessity because of soldiers’ own actions.

The fifth chapter, on army health, focuses on the lowest level within the ecosystem concept: pathogens. Histories of military medicine traditionally construct a narrative of gradual progress, from medieval armies as epidemic hazards, over early modern attempts to impose basic hygiene, to the spread of modern medical theories in the nineteenth century. The last chapter questions this teleological paradigm by drawing attention to prophylactic health measures, or disease prevention, rather than the well-known emphasis on hospitals, surgeons, and wound treatment. It also considers historical examples of biological warfare, or deliberate attempts to spread disease, a major ethical problem that eventually started the debate on the ecological impacts of the military.

Drawing these together, the conclusion returns to the book’s main argument, and emphasizes the significant role of historical armed forces in the protection and conservation of ecological systems. It also determines the main characteristics of army–ecosystem interactions in the Meuse Region from the thirteenth to the nineteenth century, and makes some final remarks about the relevance of these findings for current ecological conservation and future research.

Part One

LANDSCAPES

Chapter I

FRONTIERS

The Garden–Wilderness Dichotomy

In 1893 Frederick Jackson Turner presented his seminal essay titled “The Significance of the Frontier in American History,” a theory that has had an enormous impact on the perception of the United States’ environmental history. Crucial to Turner’s reasoning is the association of the word frontier with the advance of civilization, as opposed to “wilderness,” or uncontrolled nature.¹ The popularity of this thesis lingers on to this very day, even though environmental historians such as William Cronon have demonstrated convincingly that no such thing as a primeval wilderness existed when immigrants of European descent settled on the continent and increasingly moved westwards.²

Many different definitions of the term “frontier” exist, but all acknowledge that it essentially refers to a boundary, a dividing line of some kind. Scholars have identified political–military as well as cultural, ideological, or ecological frontiers, depending on their respective perspectives. These definitions are not necessarily mutually exclusive, but can cause unnecessary confusion if the word frontier is used as a simple synonym for related words (such as borderland or border). This is especially so since historical sources also employ a variety of terms to describe boundaries (limits, confines, poles), the different connotations of which are often difficult to grasp. Language differences make matters even worse. The word *frontière* in modern French has not the same meaning as frontier in English, for instance, because during the early modern period it became a common term to refer to political boundaries, regardless of their military or ecological significance.³

The following chapter uses the original medieval meaning of the word frontier as its starting point, and defines it as a military boundary, a dividing line between “the self” and “the other,” where the other is perceived as particularly threatening to the extent that warfare becomes a distinct possibility. The English word frontier derives from the French *frontière*, which in its turn originates in the Latin *frons*, a front(line) of an army or a house. It therefore implies a notion of linearity. The word *frontière* can be traced back to the early fourteenth century, while its use in Spanish and Italian is even older (twelfth and thirteenth centuries respectively).⁴ It was not the only medieval term to refer to military–political boundaries, however, and contemporaries often used it along-

1 The essay was published in 1921 as the first chapter of Turner’s book: *The Frontier in American History*.

2 Cronon, “The Trouble with Wilderness.”

3 Berend, “Medievalists”; Gouguenheim, “Les frontières”; Febvre, “Frontière: le mot et la notion”; Janeczek, “Frontiers and Borderlands”; Rankin and Schofield, *The Troubled Historiography*.

4 Berend, “Medievalists,” 66; Febvre, “Frontière: le mot et la notion.”

side words such as “limits,” “marches,” and “poles.”⁵ Henry VI of England, for instance, declared his intention in January 1427 to overcome the last French centres of resistance, strongholds, on the left bank of the Meuse River, located in Champagne, Thierache, Rethel [...], and their *marches et frontieres*.⁶

The mentioning of strongholds is hardly a coincidence, for fortifications constitute an indispensable aspect of the ways frontiers were actually managed or defended. In the interest of clarity, this part of the argument analyzes frontiers in a general way, and leaves the specific ecological impacts of fortifications to the next chapter. Both frontiers and fortifications can be considered as “militarized landscapes,” a term coined by Peter Coates and his research group to describe landscapes modified by modern military organizations.⁷ Given the emphasis on premodern warfare and the complexity of the ecosystem concept, this study describes a militarized landscape as an ecological milieu in which interactions between armed forces and its physical features have become so encompassing that they can be considered as a defining characteristic. Militarized landscapes are prepared in a direct or indirect way for coping with the possibility of organized violence by armies, but they do not have to be actually engaged in armed conflict. Frontiers for instance can be studied as militarized landscapes because the risk of attack necessitates a more or less permanent military presence.

Because of its close association with enemy threats the concept of frontier is also closely connected to the construction of territories and ultimately to processes of state formation. Any study of the territory concept has to take its history of violence and warfare into account, for the very word territory relates to the military concept of terrain and Latin *terrere*, “to frighten.” This analysis adopts the interpretation of “territory” developed by Michel Foucault and Stuart Elden, which is that control over land or space (“territory”) and people (“populations”) is intrinsically linked. In this way, it connects the chapters of frontiers and policing to each another as two different aspects of territory formation.⁸

The object of the following chapter is to use the historical development of frontiers as militarized landscapes in the Meuse Region to explain the origin of military domains, which constitute a core element in current debates about military forces’ “environmental footprint.” It seeks to establish whether the idea of a frontier as a frontline against wilderness, or uncontrolled nature, has a medieval origin, and to what extent these medieval perceptions had a role in the establishment of the military training areas that still exist today. This chapter thus lays the basis for the argument that there is little modern or progressive about the ways current military forces interact with ecological systems.

There is a general consensus that during the Middle Ages and the early modern period boundaries became more defined and tended to encompass larger entities. Whereas in the Central Middle Ages many areas in the Meuse Region were characterized

5 Ellis, *Defending English Ground*, 65; Genicot, “Ligne et zone,” 31; Gouguenheim, “Les frontières,” 54–56; Lieberman, *The Medieval March of Wales*, 11–12.

6 Luce, *Jeanne d'Arc à Domrémy*, 203.

7 Coates et al., “Militarized Landscapes,” 465–91; Pearson, “Militarized Landscapes,” 115–26.

8 Elden, “Land, Terrain, Territory,” 801–7; Elden, “How Should We Do the History of Territory.”

by a multitude of jurisdictions and enclaves, some as small as individual villages or even hamlets, the nineteenth century is well known for the dominance of “nation states” with large and clearly demarcated borders or frontiers. Given that boundaries were initially drawn between fairly small entities and tended to become larger over time, it comes as no surprise that boundary markers first developed at the local level became central elements in processes of state formation. The brooks, ditches, hedges, isolated trees, and boundary stones that marked the limits between villages were eventually replaced by “natural frontiers,” the mountains, rivers, and forests that, in an ideal situation, separated (nation) states. The fifth line of the German national anthem states that Germany should extend *Von der Maas bis an die Memel* (“from the Meuse to the Neman”).⁹

A basic awareness of agricultural developments in medieval Europe is necessary to understand these processes. The Central Middle Ages saw the appearance of nucleated villages, concentrated around a parish church and, in some cases, a noble house (“castle”; see chap. 2). This development corresponds with agricultural systems, or “agroecosystems” if one wants to stress the close entanglement of humans and ecological systems, that distinguish between an intensively cultivated “infield” and extensively used “outfield.” This infield is generally located near the village itself and consists of commonly managed agricultural lands that are fertilized regularly by the village flock, which explains the German name *Dungland*. The outfield by contrast is composed of areas that are cultivated more irregularly or possibly not at all. In such a context, it is only to be expected that boundaries between settlements are drawn in their extensive outfields and that the need to clearly demarcate them is a result from local conflicts. Moreover, the description of outfields and common land as *Wildland* or *terres sauvages* strongly suggests that the connection in Western Europe between general boundaries and wilderness originates in medieval agricultural practices.¹⁰

The relevance of these changes for the historical development of frontiers can be demonstrated by referring to another medieval term: the march. Marches were specially designated jurisdictions located on the limits of the Carolingian empire (for instance, Brittany, Spain, Saxony), headed by a margrave whose main responsibility was to deal with potential enemy attacks. Marches were in effect the frontiers of the Carolingian Empire. The oldest occurrences of the term march, from the sixth century, did not refer to political boundaries, but to the uncultivated land between two properties, “wilderness.” In some German-speaking regions it was even synonymous with the term *Wald* (woodland). The notions of frontier and wilderness were thus closely connected to each other.¹¹

A charter from 1301 regarding the castellany of Couvin, located at the frontier of the Prince-Bishopric of Liège with the County of Hainaut, clearly shows the close association between military organization and agricultural practices. According to the councillors of Couvin the inhabitants of the castellany, the town itself, and its surrounding

9 Belissa, “La question des frontières naturelles”; Genicot, “Ligne et zone”; Girard d’Albissin. *Genèse de la frontière franco-belge*; Suttor, “Le rôle d’un fleuve.”

10 Genicot, *L’économie rurale*, 4:88–102; Hoffmann, *An Environmental History*, 156–65; Hoppenbrouwers, “Territorialiteit en landsheerlijkheid”; Wealer, “Une identité paysagère,” 73.

11 Lieberman, *The Medieval March*, 11–12.



Figure 2. The Leo Belgicus prevents Spanish pigs from entering the “Garden of Holland,” late sixteenth century. Amsterdam, Rijksmuseum (RM, RP-P-OB-77.682).

villages, constituted one “banner,” had the same war cry and alarm, and had access to the common pasture, woodlands, and waterways.¹² The word banner, a flag that organizes armed forces into specific units, derived from *bannus/bannum*, the royal right to command, forbid, or punish. It could also, as in this example, refer to a territorial unit in which the inhabitants fought under the same banner and shared control over natural resources. The town of Geldern even designated in 1571 its *Landwehr*, earthen embankments with hedges planted on top of them, which demarcated the city’s territory, as a *bantuin*. The area included within the ban is thus denoted as a garden. In Venlo, the toponym *bantuin* has survived until this very day.¹³

The description of specific territories as “garden” enclosures is of particular interest because it reinforces the aforementioned perception of frontiers as wilderness.¹⁴ Gardens figure after all as symbols of human mastery of the natural world. Calling one’s

¹² Bormans, *Cartulaire de la commune de Couvin*, 21.

¹³ Geldern, Stadtarchiv, A, no. G9, Stadtrechnung, fol. 250v (1571) (transcript by Rien van den Brand, <http://www.scriptoriumempeje.nl>); Berens, *Territoriale Entwicklung & Grenzbildung*, 140; Hanssen, *Inventaris*, 481.

¹⁴ On the importance of perceptions in geopolitics see Black, *Geopolitics*.

own territory a garden means emphasizing the civilized or cultivated nature of one's own lands versus the wilderness that lay beyond. The medieval Dutch word for garden, *tuyn*, in particular refers to a fence or an enclosed space.¹⁵ Late medieval accounts from Heusden, Geldern, Grave, and Venlo use the word as a verb to describe the making of a fence with planks, branches, and thorn bushes.¹⁶ The use of the garden concept is not just a play on words: wartime areas perceived as lying outside one's own "garden" were far more likely to experience the full extent of armed forces' destructive force, which contributed to the spread of actual wilderness (see chap. 3).¹⁷

The symbolic depiction of a territory as a garden relates to the late medieval cult of Our Lady, in which Mary was commonly portrayed within an enclosed garden, which represented the Garden of Eden.¹⁸ This garden imaginary rose to particular prominence in the medieval County of Holland. The accounts kept by the count's administration indicate that in the fourteenth century his army actually went to battle with a banner depicting a fence, and Willem van Oostervant, later known as Willem VI of Holland (1404–1417), founded a new chivalric order in 1387: the Order of the Garden (*Orde van de Tuin*).¹⁹ The County of Hainaut, united with Holland through a personal union, also used the term *jardinet* ("little garden") to describe its territory in the 1390s. The diminutive might have been adopted to distinguish it from the *Jardin de France*, which denoted the Île de France.²⁰

This emphasis on the medieval origin of the garden terminology puts better-known early modern characterizations into perspective. The French engineer de Vauban's description of France as a "square field" (*pré carré*) protected by a mixture of fortresses and "natural frontiers," for instance, has its origin in these medieval ways of frontier perception.²¹ The same applies to the famous "Garden of Holland" (*Hollandsche Tuyn*), which will be forever associated with the Eighty Years War (1568–1648). An etching related to this conflict, dating to the late sixteenth century is of particular interest here (see figure 2). It portrays a lion defending his "garden," a fence, against Spanish pigs. The rendering of Spanish forces as pigs not only reinforces the notion of an enclosed garden,

15 *Middelnederlandsch Woordenboek*, "Tuun" (<http://gtb.inl.nl>); Rudd, *Greenery*, 165–70.

16 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fols. 6v, 7r, 15r, 26r, 94r, 146v, 151r, 152r, 257r, 258r, 267v, 268r; and 277v (transcript by Rien van den Brand); Bondam, "Oudste stadsrekening," 109–110; de Groot, *De stadsrekeningen*, 1384 fol. 5; 1385 fols. 7, 8, 39; 1386 fol. 7; 1387 fols. 24, 26, 28; 1388 fols. 9, 15, 26; 1397 fols. 8–9; 1399a fol. 8; 1402 fols. 9, 20; 1404 fol. 24; 1405 fol. 14; 1406 fol. 8; 1407 fol. 15; 1408 fol. 10; 1409 fols. 10–12, 14; 1412 fol. 41; 1415 fol. 28; Kuppers, "De stadsrekeningen," 9, 11, 20, 22, 34, 48, 60, 61, 69–72, 83, 92–93, 105, 158, 220, 235, 296.

17 Kroener, *Les routes*, 84, 95–96, 100, 112–13.

18 Miwa, "The Hortus Conclusus," 2–4, 7–11, 54–55, 76–79, 86–87, 128–31; van Winter, "De Hollandse Tuin," 59–64, 102–3.

19 van Tol, "De Orde van de Hollandse Tuin"; van Winter, "De Hollandse Tuin," 31–59.

20 Dauphant, *Le Royaume des quatre rivières*, 211; Flammang and Van Eeckenrode, "Le jardinet de Hainaut," 45–49; de Planhol and Claval, *An Historical Geography*, 104.

21 Bitterling, *L'Invention du pré carré*.

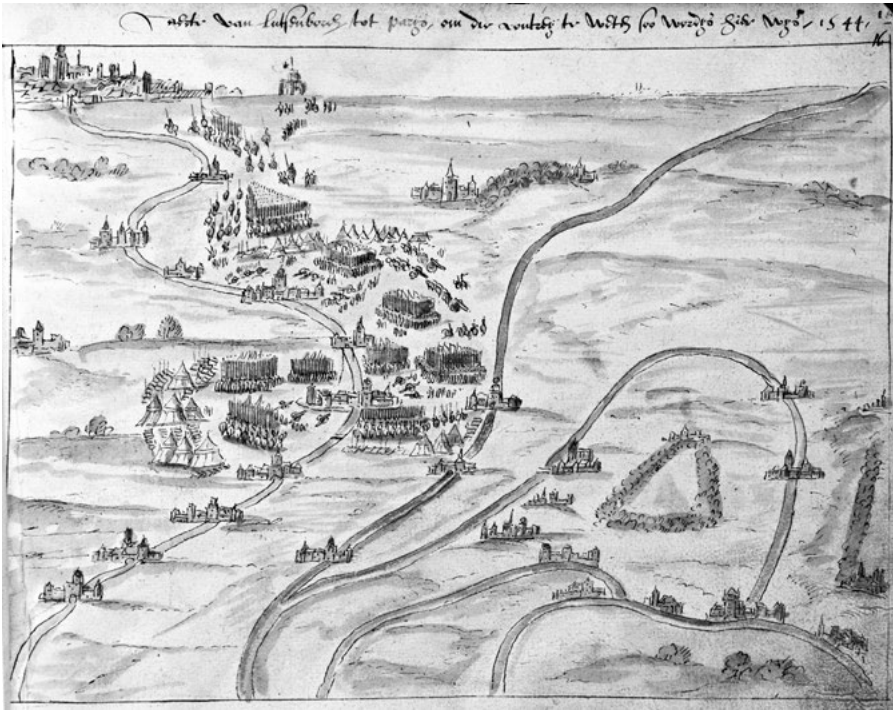


Figure 3. Itinerary from Luxemburg to Paris, 1544 (Brussels, KBR, MS 22089). Reproduced with permission of the Bibliothèque Royale de Belgique/Koninklijke Bibliotheek van België.

but might also refer to the forced conversion of Jews and Muslims.²² The anonymous artist has also given the sea a very prominent place, as an obstacle that the pigs had to cross. The apparent paradox of the wilderness–garden terminology, an aspect of frontiers that will be referred to again later, is indeed that the very defence of a “garden,” a territory, against wilderness, could also be based on wilderness elements. It is precisely this military perception of frontier landscapes that we will now examine.

Studying the ways armed forces perceived, and ultimately managed, frontiers might seem to be relatively straightforward. The political–military importance of these areas after all ensured a relatively strong interest on the part of rulers and/or states. It is in fact well known that peripheral areas, and frontiers in particular, were generally charted before a political entity’s core regions.²³ The oldest maps from the Meuse Region, made with a military purpose in mind, date to the fifteenth century at least. Charles the Bold, Duke of Burgundy, paid painters in the 1460s, during his conflicts with the Prince-Bishopric of Liège, to make two maps: one of the frontier between the Duchy of Limburg and

²² van Winter, “De Hollandse Tuin,” 82–87.

²³ Dalché, “Les usages militaires”; Dauphant, *Le Royaume des quatre rivières*, 182–88; Desbrière, *Cartes et mémoires*, 5, 15–18, 22–25, 125–26; Hale, “Warfare and Cartography.”

the Prince-Bishopric, and an itinerary, a road map, that connects *les pays de par deça* ("the lands over here" or the Burgundian possessions in the Low Countries) with *les pays de par delà* ("the lands over there" or the Duchy of Burgundy and Franche-Comté).²⁴

The maps themselves do not seem to have been preserved, but it is possible to get an idea of what they might have looked like from a sixteenth-century map, now kept in the Royal Library in Brussels (see figure 3). This map, dating to 1544, depicts an itinerary from Luxemburg to Paris. It has to be read from the corner on the lower right to the one on the upper left. It was probably made in preparation for an actual invasion of France, given that Habsburg troops were actively fighting French forces at that time. The text on top says "Map from Luxemburg to Paris, to know the country so you will learn, 1544" (*Caerte van Lutsenborch tot Parijs, om die contreij te weten soo wordijs hier wijs, 1544*). While this map evidently used different conventions from military maps from the eighteenth and nineteenth century, it does show a clear emphasis on waterways and woodlands. These natural elements are depicted in a very schematic way, but it is still possible to identify the Meuse and Ardennes on the foreground.

Waterways and woodlands are in fact a prominent feature of all military maps, which were never meant to be realistic depictions of landscapes but guides to commanders on how to take advantage of them and avoid potential pitfalls. The eighteenth-century Ferraris map of the Southern Netherlands, named after the Habsburg engineer, the count de Ferraris (see figure 8), might appear to be more accurate than this medieval-looking map from 1544, but it still does not depict economic activities that were considered irrelevant for military commanders. In order to properly understand the assumptions and perceptions on which these maps are based, they have to be read in juxtaposition with the original written explanations that accompanied them, or with military handbooks. These sources confirm that military commanders saw woodlands and waterways as potentially dangerous environments, as obstacles to military movement, but also as potential aids to defence, as sources of fuel, and transportation routes.²⁵

A far more important question than issues of accuracy or completeness is whether these maps actually reflect the perceptions of army members in general. Only a handful of higher-ranking officers and engineers had access to them. The information encompassed in these maps was not public; it constituted a carefully guarded secret.²⁶ While it is very unlikely that the average combatant was familiar with military maps, he still shared the same feelings towards woodlands, waterways, and other kinds of "wilder-ness" and expressed these sentiments in various kinds of tales and stories. John M. Collins actually made a connection between military perceptions of woodlands and fairy tales in his military geography handbook, as both depict woodlands as "dangerous." He

²⁴ Paviot, "Les cartes et leur utilisation," 209–10, 213.

²⁵ Brussels, KBR, Cartes et plans, MS IV 5.567: Carte de Ferraris; de la Fitte, *Mémoire militaire*; Desbrière, *Cartes et mémoires*, 32–33, 37–39, 41, 113; Despy, "Les opérations," 287–90; Graatsma, "Limburg 1802–1807"; Lemoine-Isabeau, *La Cartographie*, 141–43, 321–44.

²⁶ Printed maps for instance were far less detailed than their manuscript versions. Lemoine-Isabeau, *Les militaires*, 67–72; Lemoine-Isabeau, *La cartographie*, 52–56; Schäfer, "Krygsvernuftelingen," 239–45.

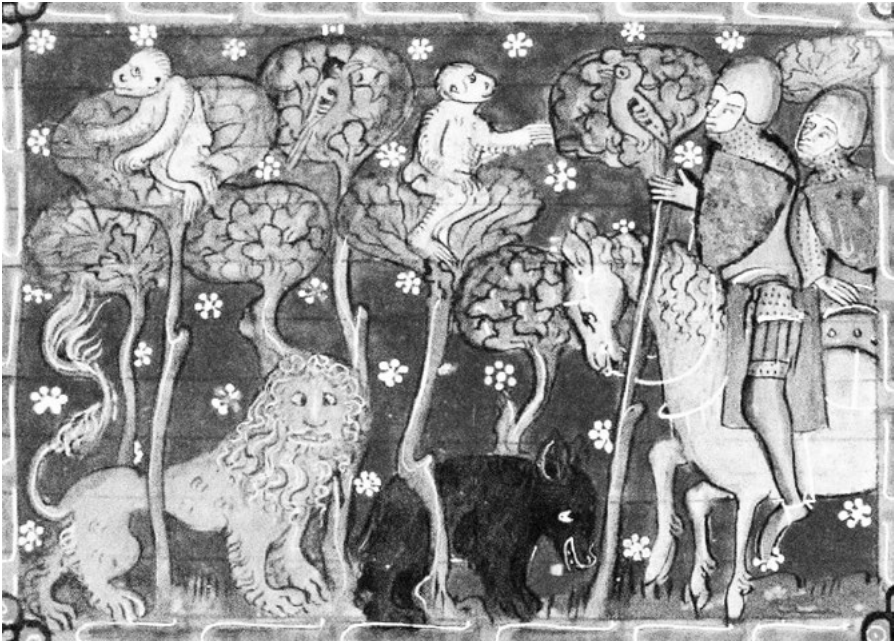


Figure 4. A knight errant enters a forest full of exotic animals, miniature from a Lancelot–Grail manuscript made in Tournai or Hainaut, mid-fourteenth century (Paris, BnF, MS français 122: *Lancelot Graal*, Piérart dou Tielt (atelier), 1344–45, fol. 180r).

intended this just as a joke, and failed to see that the connection between tales or sagas and armed forces is very real.²⁷ The average storyteller in premodern Europe was far more likely to be an adult male than the stereotypical “Mother Goose” character. The essential feature of a good narrator, aside from being able to speak fluently, was experience of travel. Soldiers and sailors therefore constituted a substantial group among such storytellers. The Brothers Grimm for instance paid J. F. Krause, a pensioned non-commissioned officer of the Saxon cavalry, because he was a famous storyteller, to obtain some typical soldiers’ tales.²⁸

The roots of these stories lay, at least partially, in the Middle Ages, and more specifically in chivalric romance (see figure 4). The tale of “Les Quatre Fils Aymon” or Renaud de Montauban and the horse Bayard, for example, can be dated to the twelfth century, and describes events that supposedly took place in the Ardennes during the reign of Charlemagne. It had a major role in contributing to the perception of the Ardennes as an impassable wilderness, and was still told in Lorraine during the eighteenth and nineteenth century with minor adaptations; the four knights had simply become soldiers.²⁹

²⁷ Collins, *Military Geography*, 41.

²⁸ Bahro, “Afgedankte soldaten”; Fink, “The Fairy Tales”; Hopkin, *Soldier and Peasant*, 71–73, 108–24.

²⁹ Hopkin, *Soldier and Peasant*, 221–36; Lejeune, “L’Ardenne,” 69–72.

In a medieval context the actual narration was typically left to minstrels or heralds rather than combatants, but these storytellers also had a strong connection to warfare. Heralds accompanied armies on campaign to record events and identify noble participants. The herald Gelre for instance, the author of one of the most famous armorial books in medieval Europe, wrote a series of poems in which he praised the chivalric deeds of knights from the lands of the Meuse and Rhine.³⁰ Minstrels on the other hand had to raise the morale of the troops. The blacksmiths' guild of Liège, one of the most powerful associations in the city, enlisted two minstrels for life in 1403 to accompany them on military campaigns and processions.³¹

The *Rymkronyk* of Jan van Helen ("Heelu"), written in 1288–1290, which narrates the duke of Brabant's victory in the battle of Wörringen (1288) and the actions that led up to it, is another good example. It recites real events that happened relatively recently and is therefore not a fictional tale in the same way as the Romance d'Arthur or Lancelot's quest to find the Grail, but still draws on the same stereotypes. It claims in effect that when Duke Jan I of Brabant advanced through the Ardennes in the winter of 1286–1287 to besiege the fortified church of Sprimont, he rode through the "wildest lands of the German Empire."³² The poet also added a very practical element, however, one that can also be found in later military descriptions: the Ardennes were considered inhospitable because invading forces found it difficult to procure sufficient amounts of food there (they were full of snow, and consisted of forests, mountains, and rocks). The duke, anticipating these problems, ordered his men to carry provisions with them on packhorses. The supposed impassability of the Ardennes, or indeed any other huge stretches of wilderness, was therefore connected to logistical issues.³³

The Duke of Brabant's response to these supply problems deserves further scrutiny. It demonstrates that fast moving mounted forces were able to overcome most of the risks posed by these barren environments. Areas of wilderness certainly had their share of armed forces passing through. One just has to distinguish between huge invading forces and smaller armies with local bases to fall back on. Only the first category was relatively rare, at least when compared with more fertile lands, such as along the banks of the Meuse. The nobility of the lands between the Meuse and Rhine enjoyed a particular warlike reputation during the Central and Late Middle Ages, mainly because of their willingness to serve for pay or booty when an opportunity presented itself.³⁴

30 De Boer, Faber, and van Gent, eds., *De rekeningen, 1393–1396*, lxi–lxii; van Anrooij, *Spiegel van ridderschap*; Verbij-Schillings, *Beeldvorming*, 224–32, 238–44.

31 de Chauvelays, "Les armées," 174, 176, 179, 206; Fairon, *Chartes*, 132–33; Mora-Dieu, "Les corporations," 200.

32 Jan van Helen uses the term *Oesselinc* or *Oesseninc* for the Ardennes, which might also be a reference to its wilderness character (*woest*). Goossens, *De geografie*, 10; Sleiderink, *De stem van de meester*, 87–97; van Helen, *Rymkronyk*, 100, 130–32.

33 Arnold, *Negotiating the Landscape*, 155–62, 216–18; Deniéport, ed., "Routes de terre et d'eau"; De Rabutin, *Commentaires*, 1:260–66; d'Haynin, *Mémoires*, 1:164 and 2:84–85; Kroener, *Les routes*, 59, 100; Muller, "Histoire militaire"; Vallée and Pariset, eds., *Carnet*, 7, 13, 217, 218, 229; Vilain, *Mémoires militaires*, 131.

34 Govaerts, "From Knight Errants to Disloyal Soldiers."

The main difference between these two kinds of forces can be demonstrated by taking the French invasion of the northern Meuse Region, in 1388, as an example. This expedition was directed against Guelders and Jülich and had to pass through the Ardennes, Hohes Venn, and Eifel. Despite the assembly of numerous wagons for this purpose, the chronicler Jean Froissart claims the army column measured no less than forty-five kilometres in length, logistical preparations would prove to be utterly inadequate in the face of difficult terrain, hostile inhabitants, adverse weather (incessant rains), and the cold climate. The size of this invasion force quickly became a liability rather than an asset: no fewer than three thousand labourers had to clear the roads between Virton and Neufchâteau in the Duchy of Luxemburg.³⁵ The famous French poet Eustache Deschamps served in this army, and later commented on his experiences in several ballads. One explicitly warns against the dangers of a winter campaign, another complains about the money and horse he lost. The French army eventually accomplished its goal, the duke of Guelders and the count of Jülich signed a peace treaty, but the campaign was hardly the glorious victory the soldiers had expected. Many French noblemen were taken prisoner by their German counterparts, who were not hampered by these same environmental constraints, possibly because they knew the local terrain, and wore lighter armour.³⁶

Given the predominance of large stretches of wilderness in the Meuse basin, such as the Campine/Kempfen, Peel, Hohes Venn, Eifel, Ardennes, Woëvre, and Argonne, the use of the Meuse River as a symbolic frontier between the kingdom of France and the Holy Roman Empire might seem to be self evident. It should be stressed therefore that while the ecological characteristics of the Meuse Region have a significant role in explaining the political history of these lands, there is nothing predestined about the use of the Meuse as a frontier marker. This particular use, which has consequences to this very day, as the current basin of the Meuse River is divided among five states, is an accidental outcome of centuries of historical developments, in which political, economic, cultural, and military impacts were at least as important as ecological ones.³⁷

During the Early Middle Ages the Meuse Region was in fact not a frontier at all. It constituted the core of the Carolingian Empire. The Carolingian dynasty came originally from the middle part of the Meuse basin, more precisely from Hesbaye, the fertile lands to the north of Liège. Names such as Pepin of Landen and Pepin of Herstal are very revealing in this regard. Charlemagne also established his empire's capital in Aachen. This does not diminish that contemporaries already perceived the Ardennes as a wilderness. The main point is that in the Early Middle Ages an area such as the Ardennes could become the core of an empire despite its apparent wilderness character. Charlemagne

35 Froissart, *Chroniques*, 13:196–98; Laurent and Quicke, *L'Accession*, 220–53; Moulin and Pauly, *Die Rechnungsbücher*, 1:38–42.

36 Deschamps, *Oeuvres*, 1:123–24, 3:24–26, 5:121–22; Laurent and Quicke, *L'Accession*, 220–53; Le Bouvier, *Le livre*, 113.

37 On the use of woodlands as frontier markers see Bechmann, *Trees and Man*, 259–62; Dubois and Renard, "Forêts et frontières," 29–34; Higounet, "Les grandes haies forestières."

liked to hunt in the Ardennes and might actually have killed some of the last aurochs living in Western Europe.³⁸

The wilderness aspects of large areas of the Meuse Region became relevant in the specific context of the division of the Carolingian Empire. It is hardly a coincidence that the two major agreements that settled disputes over this inheritance came about in the Meuse Region: the treaties of Verdun (843) and Meerssen (870). It is particularly as a result of the latter treaty that most of the Meuse Region, which had become part of Lothair I's Empire, was incorporated into the eastern half of Charlemagne's former imperium.³⁹ The Meuse only served as a limit between what later became the kingdom of France and the Holy Roman Empire in Champagne and the Argonne. Further north the Scheldt replaced it as the official dividing line. Even in these southern areas, the importance of the Meuse River can be called into question. A list of testimonies, assembled in 1288 on request of emperor Rudolf of Habsburg (1273–1291), regarding the exact limits of the Empire in the Argonne, demonstrate that not the Meuse, but a small river, the Biesme, a tributary of the Aisne, served as the actual boundary marker.⁴⁰

The gathering of these testimonies reflects the emperor's growing discomfort with French expansion towards the east. It is precisely in the late thirteenth century that the kings of France incorporated the Meuse River into a discourse that presented their kingdom as delineated by four rivers (the Meuse, the Saône, the Rhône and the Scheldt). The year 1301 was a crucial turning point, for Count Henry III of Bar (1291–1302), whose county lay on both banks of the Meuse River, had to acknowledge Philip the Fair (1285–1314) as his overlord for "Bar non-mouvant," more or less the part of his county located on the left (western) river bank. This made him a fiefholder of both king and emperor, whereas until this point the entire principality had been part of the Empire. In other words, the Meuse River became a dividing line because of European politics in the Central Middle Ages. This still did not turn the river into a real frontier, however, since the County of Bar still occupied both riverbanks. The Meuse only served as a frontline in the 1420s, when troops loyal to Henry VI (King of France, 1422–1453) occupied almost the entire kingdom of France north of the Loire River. Partisans of Charles VII (King of France, 1422–1461) only held out in a handful of fortresses east of the Meuse River: in other words, in the Holy Roman Empire. It is in this specific context that Jeanne d'Arc, born in Domrémy, on the left bank of the Meuse River, rose to prominence.⁴¹

The example of the County of Bar refers to a fundamental aspect of the distinctions between the Meuse's symbolic and practical value as a frontier marker. During the Middle Ages, the ways in which the various principalities that actually composed "France" and the "Holy Roman Empire" interacted with each other and drew boundaries were often more important than perceived boundaries between these larger entities. Most

38 Arnold, *Negotiating the Landscape*; Müller-Kehlen, *Die Ardennen*, 109–10; Rousseau, "La Meuse," 49–64; Suttor, *La Meuse*, 221–37.

39 Pettiau, "Un espace frontalier"; Suttor, *La Meuse*, 231–37.

40 Aimond, *Les relations*, 54–69; Havet, *La Frontière d'Empire dans l'Argonne*, 22, 26–27, 37. See also Kraemer, "Une carte chorographique," 219–24.

41 Dauphant, *Le Royaume des quatre rivières*, 121–22; Toureille, *Robert de Sarrebrück*, 78–86.

of these smaller principalities straddled both riverbanks (see map 2). The Meuse River only served as a frontier along rather small stretches of its course: in 1250 between Namur and Luxemburg near Poilvache, between Namur and Liège from Andenne until Huy, and between Loon and Brabant on the one hand and Guelders on the other around Stokkem and Maaseik and Oss and Cuijk. In some of these areas copper boundary poles were put in the Meuse during the Late Middle Ages. Processes of political amalgamation reduced its role as a dividing line even further (see map 3). Today, it only serves as a border between the Dutch and Belgian provinces of Limburg (see map 1).⁴²

The limited role of the Meuse as a frontier marker can be explained by drawing attention to its economic importance. The river was one of the main transport routes in Western Europe since at least Late Antiquity, especially for large volume goods such as wood, metal, or stone. Such traffic inevitably led to attempts to control trade networks and extract income (for instance, tolls). Military transportation also had to rely on rivers because moving artillery or large quantities of food and ammunition over land was a very laborious task. The detailed accounts of the fifteenth-century Burgundian administration make it clear that the transportation of the heaviest guns, which could easily weigh two tons, necessitated the use of specially reinforced wagons drawn by over thirty horses. Their ammunition, specially extracted stone or cast iron balls, had to be carried along in wagons that also required more horses than usual: a wagon carrying twelve bullets needed nine horses instead of the usual three or four. Charles the Bold had to mobilize almost three thousand horses to transport his artillery (one hundred and twelve guns) and associated material during the 1473 campaign against Guelders.⁴³

There were in effect many drawbacks to land transport: it was slow and cumbersome, and the horses and wagoners needed to be fed and paid. When the dukes of Burgundy assembled their armies they did so preferably near waterways: Mézières in 1465, Namur in 1466, and Maastricht in 1473. Transporting artillery over water does require, however, that a commander controls both riverbanks, or at the very least that his boats do not have to pass through hostile territory. Artillery became more standardized from the sixteenth century onwards and consequently easier to handle, but during this entire research-period sieges required relatively large amounts of heavy artillery (e.g., twenty-four pounder guns, howitzers, and mortars instead of twelve or six pounders), which had to be specifically brought up for that purpose.⁴⁴ Dutch military treatises from the early seventeenth century indicate that the transportation of sixty-seven tons of ammunition required either one hundred thirty five wagons or five boats. It is indeed revealing that a plan of the French engineer Filley to block an Allied advance towards Dinant in

42 Dauphant, *Le Royaume des quatre rivières*, 127–28; Panhuysen, “De politieke verhoudingen”; Suttor, “Le rôle d’un fleuve,” 361–64.

43 Decuyper, “De Bourgondische artillerie,” 218–27; Douglas Smith and DeVries, *The Artillery*, 48–49, 112, 351–52, 208–9; Sommé, “L’Artillerie”; Suttor, *La Meuse*, 444–46.

44 Decuyper, “De Bourgondische artillerie,” 221–27; Harari, “Strategy and Supply”; Marchal, *Inventaire*, 135; Naulet, *L’Artillerie*, 186–212.

1695 by constructing a dam in the Meuse was never executed because it also made a French counterattack towards Namur impossible.⁴⁵

The use of the Meuse River for transporting troops and their horses was far less important, because marching over land was faster and easier. The militias of cities located next to the Meuse made frequent use of river transport, but the actual number of troops could be as low as a dozen.⁴⁶ The accounts of Venlo from 1412 specify, for instance, that it paid for the transportation of about fifty men on two *baardsen* to Batenburg, a fortress located between Lith and Grave. A *baardse* was a relatively shallow and small ship, which made it ideal for navigating rivers as well as carrying out military expeditions on the North Sea. In the medieval County of Holland the use of ships, cogs as well as *baardsen*, during military campaigns was so conventional that the number of people that each settlement had to supply was measured in oars (similar arrangements existed in Scandinavia and Scotland).⁴⁷

River transport remained a distinct possibility well into the early modern period as long as the navigability of the Meuse itself allowed it.⁴⁸ A temporary drop in the water level, or conversely, a sudden flood, made it impossible for boats to pass through. Even in the best of circumstances the river could only be navigated from Commercy onwards. Commercial traffic was only possible between Sedan to the North Sea. The Freiherr von Natzmer (1654–1739), a former officer of the Dutch army, remembered in his memoirs how the low water level of the Meuse significantly complicated their retreat from Maastricht in 1676, since the sick and wounded, as well as the cannons, could not be transported by water.⁴⁹ The construction of new forts at Stevensweert (near Maaseik) and Navagne (near Visé) by the Habsburg government in respectively 1633 and 1634 also attempted to secure traffic over the Meuse after the Dutch conquest of Maastricht.⁵⁰

Throughout these six centuries many rulers tried to reunite the entire Meuse Region, and several of them could claim to have been temporarily successful. Any of these actions could, potentially, have led to the unification of the region under one political entity. Charles the Bold (1467–1477), for example, made major efforts to restore Lothair's former empire (855–869) and effectively controlled almost the entire northern half of the Meuse Region by the early 1470s. He died at the battle of Nancy while fighting for control over the southern half. Charles V (1506–1555) again united a considerable part of the region, by occupying the Duchy of Guelders, but the Dutch Revolt caused a renewed separation. The armies of Louis XIV (1643–1715) seized large stretches of the Meuse basin, even taking Maastricht in 1673, yet eventually had to abandon many of their conquests.

⁴⁵ Muller, "Les gués"; Wijn, *Het krijgswezen*, 388.

⁴⁶ Burgers and Dijkhof, eds., *De oudste stadsrekeningen*, 23, 43–44, 65, 71; Suttor, *La Meuse*, 463–64; Waale, *De Arkelse oorlog*, 118; van Helen, *Rymkronyk*, 116.

⁴⁷ de Groot, *De stadsrekeningen*, 1405 fols. 14–16, 1407 fols. 18, 22, 1412 fols. 18, 44; Fritze and Krause, *Seekriege*, 57–58; Jansen and Hoppenbrouwers, "Heervaart in Holland."

⁴⁸ Helmich, *Journal*, 230, 232; Kroener, *Les routes*, 92–93; Suttor, *La Meuse*, 464–65.

⁴⁹ von Adlersfels-Ballestrem, ed., *Memoiren*, 24–25.

⁵⁰ Sangers and Simons, *Geschiedenis*, 82–83; van Hoof and Ramakers, "De militair-strategische betekenis," xxix.

Napoleon I (1804–1814) ruled over the entire Meuse Region after the incorporation of the kingdom of Holland into the French Empire (1810) until his abdication caused renewed divisions. The Meuse Region might have been perceived as a symbolic frontier since the Early Middle Ages, but it only became a real one as a result of specific political events.

Managing Frontiers

Armed forces' perception of frontier landscapes was to a large degree based on the garden–wilderness dichotomy, which reflects the basic fact that armies operating in the Meuse Region came from societies that depended on agriculture for their survival. This agrarian origin also had a major influence on the ways armed forces actually operated in frontier landscapes. Let us first analyze the core of frontier strategies: concentrated defence (strongholds) versus drawn-out linear fortifications. Both options had their value and limitations. The choice for one or the other can therefore be used to gain insight into the nature of the perceived threat, the “other” standing on the opposite side of the frontier.

Fortresses control their surrounding territory, not only through their strategic location, but also by operating as a seat of government. A classic example is the city of 's-Hertogenbosch, founded at the end of the twelfth century in what was originally a forested area (the name literally means the Duke's Forest). This city functioned as the centre of the northern part of the duchy of Brabant; the Meierij of 's-Hertogenbosch. When the Dutch captured the city in 1629 they could therefore lay claim to the entire district. It was also a key stronghold in the defence of the Meuse River, first for the dukes of Brabant and later for the Dutch Republic.⁵¹

The city of 's-Hertogenbosch was only one of many new towns founded in the Central Middle Ages with strategic considerations in mind. Rulers throughout the Meuse Region granted charters of liberties and urban rights for similar purposes to settlements as Geertruidenberg, Nieuwstad, Stokkem, Montmédy-Haut, and Marville. Villagers typically received such privileges in the expectation that they would defend a ruler's fortress or to consolidate the frontier more generally.⁵² The main difference between these medieval towns and their sixteenth- and seventeenth-century counterparts (Mariembourg, Rocroi, Philippeville, Willemstad, Stevensweert, Charleroi, and Longwy) is that armies, and more particularly soldiers, often had an active role in the latter's construction, a reflection of processes of state formation. Another noteworthy characteristic is the concentration of these early modern defences around the Meuse River where it enters the inhospitable landscapes of Marche-en-Famenne and the Ardennes. This part of the Meuse Region became especially important as a corridor within the context of the Habsburg–Valois rivalry in the 1540s and 1550s.⁵³

⁵¹ De Cauwer, *Tranen van bloed*, 143, 261–63; Deprez, “La politique castrale.”

⁵² Aarts and Hermans, “Castle Building,” 17–18; Berens, *Territoriale Entwicklung & Grenzbildung*, 125, 137; Reichert, *Landesherrschaft*, 2:585, 2:609–10, 2:615; Yante, “Franchises, paysages et environnement,” 134.

⁵³ Gaber, “Marville et l'espace frontalier”; Hasquin, *Une mutation, le “Pays de Charleroi”*, 18–23,

While these fortresses did control strategic access points, they were still unable to defend a “frontline” on their own. Only in exceptional cases were rival strongholds built so close to each other that one might speak of a true frontier in the sense of a frontline. The best example is the long-standing rivalry between Bouvignes and Dinant with the destruction of Dinant by Burgundian forces (1466) as a notorious climax. The town of Bouvignes, in the County of Namur, was founded in the twelfth century as a counterpart to Dinant, in the Prince-Bishopric of Liège, on the opposite (left) bank of the Meuse River. Copper boundary poles were put into the river to demarcate their respective territories, and by 1465 the cities’ respective fortifications had been expanded to such an extent that gunners could actually target their adversary’s defences.⁵⁴

The example of Bergeijk, in the Campine/Kempen on the Brabant–Loon frontier, on the other hand, might be more typical for most frontiers within the Meuse Region. Of particular interest is a charter from 1415, written down in the context of a local boundary dispute. Such disagreements invariably involved witness testimonies of the oldest members of a village. In this charter villagers of Pelt (Overpelt and Neerpelt) declared that several decades earlier, possibly in 1334, an official of the count of Loon wanted to burn neighbouring Bergeijk in retaliation for a Brabant attack on the count’s town of Beringen. The villagers managed to convince him not to do so by pointing out that the count also owned twelve manors in the district. Apparently, a fixed boundary had not yet been established in the heathlands of the Brabant–Loon frontier. The inhabitants of Bergeijk again narrowly avoided a raid in 1388, when they persuaded the duke of Guelders that their lands depended on both Brabant and Liège. That very same year the councillors of Theux wrote down an agreement between the inhabitants of the lordship of Franchimont in the Prince-Bishopric of Liège, and those of the Duchy of Limburg. It stated that livestock could graze on the common land from sunrise to sundown and that, if one of the principalities was involved in an armed conflict, villagers could pasture their animals on the lands of the other side.⁵⁵

The aforementioned charters demonstrate that medieval principalities were assemblies of lands over which a ruler could claim some right (notably taxation or justice). Power was not exerted uniformly across the whole territory.⁵⁶ Over time general boundaries did of course become more clearly defined, but it is illuminating that even in the late eighteenth century, when the Ferraris map was drawn, major issues regarding the exact location of the borders between the Austrian Netherlands and the Prince-Bishopric of Liège still remained unsolved. The gunners who made this map went to considerable trouble to denote enclaves and contested boundaries.⁵⁷

The awareness that premodern frontiers could assume the shape of both zones and actual frontlines is crucial for understanding how armed forces interacted with frontier

251–53; Sangers and Simons, *Er ligt een eiland in de Maas*, 82–83, 244–51; van den Eynde, “La fonction militaire”; van Nispen, *Willemstad*, 25–33.

54 Borgnet, *Bouvignes*; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 2:103–10.

55 Bormans, “Chambre des Finances,” 20–21; Vangheluwe, “Bergeijk,” 309–24.

56 Chouquer, *Traité d’archéogéographie*, 23–38; Genicot, “Ligne et zone”; Noordzij, *Gelre*, chapters 3–4.

57 Brussels, KBR, Cartes et plans, MS IV 5.567: Carte de Ferraris.

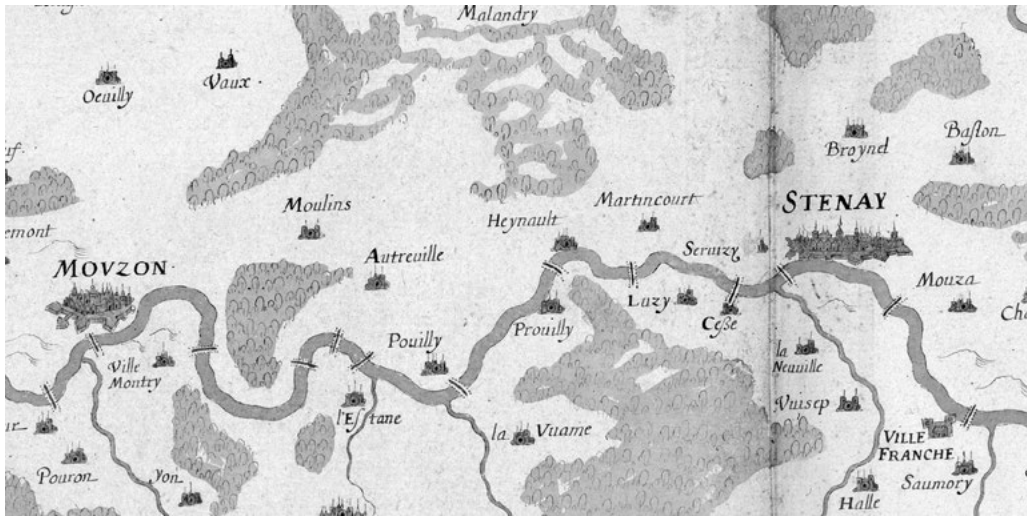


Figure 5. Detail of a map depicting fords in the Meuse River from Saint-Mihiel to Revin, 1640 (Paris, BnF, Cartes et plans, GE BB–246 (IX, 128–129 *Partie du cours de la Meuse avec les guez sur icelle*)).

landscapes. Many armies, especially up to the early eighteenth century, simply intended to raid and devastate, or otherwise extract income from enemy lands (contributions), rather than to occupy territory. Revealing in this regard is a treaty from 1707, signed by representatives of the French king and the Dutch Republic. The French government agreed to pay contributions and not to raid the land of Cleves, and in return the Dutch would not invade the lands to the west of the Meuse River with a force of fewer than four thousand men. In other words, in 1707 a force of four thousand men was accepted as a dividing line between an army bent on establishing contributions and one able to occupy territory.⁵⁸

When the French engineer de Vauban devised his famous “iron belt” (*frontière de fer*) in the late seventeenth century, two lines of fortresses along the frontiers of Louis XIV’s kingdom, he left a gap between the Meuse River on the one hand and the Moselle and the Rhine on the other. In this area it was assumed that the Ardennes, a “natural frontier,” constituted an adequate barrier. As the treaty from 1707 demonstrates, this defence system deterred only large invasion forces, not fast-moving bands of mounted raiders. From 1644 to 1748 the French monarchy thus had to construct special defensive lines on the Meuse and Semois rivers to cope with this threat.⁵⁹

These linear defences deserve closer attention because they show the difficulty of using the Meuse, or any other river, as an obstacle. The French government connected major strongholds (Mézières, Sedan, Mouzon, and Stenay) to each other through the

⁵⁸ Desbrière, *Chronique critique*, 128–31, 136.

⁵⁹ Desbrière, *Chronique critique*; Parker, *The Army of Flanders*, 11; Satterfield, *Princes, Posts and Partisans*, 86–88.

garrisoning of medieval fortresses along the Meuse, and the creation of new watchtowers and earthen embankments (redoubts) near fording places. Soldiers of the royal army concentrated in the former points of defence, while guarding the latter linear defences became the responsibility of thousands of armed peasants, drawn from the lands between the Meuse and Aisne. The costs of this defence were manifold: it drained manpower from the regular army, removed peasants from their work, and consumed massive amounts of timber. A surviving report from 1710 indicates that the construction of a single redoubt required one hundred and twenty-eight *fascines* (bundles of branches) and two hundred and fifty pallsades. Yet these lines rarely succeed in keeping well-organized raiders at bay.⁶⁰

The character of the Meuse River itself lay at the heart of the difficulties: depending on the season multiple fords could appear or disappear, and each had to be fortified (see figure 5). This unpredictable behaviour also lowered the life expectancy of earthen fortifications considerably: the seasonal flooding of the Meuse ensured that if these redoubts were not properly maintained they became completely unusable in a few years due to erosion. Yet worst of all was that despite these defensive efforts enemy forces crossed the Meuse River anyhow, either because armed peasants could do little to oppose them, or because they found other ways to get across, by using boats or swimming. The French government responded to these issues by establishing a different defensive line, on the Semois, a tributary of the Meuse, and by increasing the number of guards. M. de Lagrange, *lieutenant de roi* in Rocroi, even ordered the cutting of wood alongside the main road from Sedan to Bouillon in 1701 so that enemy troops could be spotted more easily.⁶¹

The problems faced by French generals were hardly unique, as every effort to defend the Meuse River faced the same difficulties: 's-Hertogenbosch depended on temporary fortifications (*blokhuisen*) and patrolling by boat to fend off attacks from Guelders in the fifteenth and sixteenth century, and Imperial troops constructed earthen redoubts to defend themselves against Belgian rebels on the west bank of the Meuse in 1789–1790. Such defensive efforts could be hampered by harsh winters, when invading forces could simply walk over the frozen Meuse, as well as dry summer months (see figure 30).⁶² The Duke of Alba's attempt to keep William of Orange on the east bank of the Meuse River in 1568 famously failed when the prince's army found a ford in the Meuse between Stokkem and Obbicht on the night of October 5 to 6. Credit for this operation probably has to go to Karel van Bronckhorst, lord of Obbicht, who fought with the rebel army. In order to prevent surprises such as this, Michel de Warisoul, castellan of Samson, sent a report in September 1568 to the count of Berlaymont, stadtholder of Namur, listing all possible

60 Desbrière, *Chronique critique*; Desbrière, "Le bois," 243–47, 249.

61 Desbrière, *Chronique critique*, 21–22, 29, 34, 44, 90–91, 110, 117, 227; Richer, *Abrégé chronologique*, 220–94.

62 Adriaenssen, *Staatsvormend geweld*, 44; de Clercq, "Jean-Baptiste De Bouge," 207–52; Deloffre, "Guerres et brigandages," 352, 391; De Stavelot, *Chronique*, 101–2; Sabron, *De oorlog*, 2:125, 2:126, 2:159, 2:163; Terlinden, *Les souvenirs historiques*, 74–76; van Hoof and Ramakers, "De militair-strategische betekenis," xxvii–xxviii; Vilain, *Mémoires militaires*, 67; van Zuijlen, *Inventaris*, 1:497; von Adlersfels-Ballestrem, ed., *Memoiren*, 89; Waale, *De Arkelse oorlog*, 126.

crossing points between Dinant and Huy, including suitability for cavalry, infantry, and wagons. There were no fewer than thirty-one.⁶³

This concern with potential routes in the Meuse River is representative for a more general friction between road networks and the conservation of wilderness. Frontiers were landscapes characterized by the threat of a potential enemy attack. The standard response to an invasion was blocking the invader's road of advance. Depending on local landscape features this could entail the obstruction of routes with cut down trees (*abatis*) and ditches, the destruction of bridges, and the obstruction of river traffic with stakes or palisades. In 1422, for instance, the forester of Hainaut's lieutenant led his wardens and an unspecified number of labourers into the Forêt de Mormal to block roads with cut down trees and destroy bridges so that enemy troops would not be able to pass through. They needed thirteen days to complete this task.⁶⁴ Contemporaries thus not only perceived wilderness as dangerous because of its inherent nature, but also because these landscapes were far more likely to serve as hostile environments during armed conflicts.

Such needs could outweigh economic ones, creating certain tensions. In 1488, during the siege of the castle of Namur, which was built adjacent to the confluence of the Sambre and Meuse, the besiegers blocked traffic on both rivers by putting chains between the pillars of an existing bridge over the Meuse, constructing a temporary wooden bridge over the Sambre, and placing a large floating barrel on the Meuse near one the artillery towers in the city wall. The creation of two separate barriers across the Meuse was necessary to close off the river before and after its junction with the Sambre (see figure 8).⁶⁵ The city of Maastricht (from the Roman "Mosa Trajectum" or bridge over the Meuse/Maas) likewise assumed considerable strategic importance because of its location on a major Roman road, connecting Bavay to Cologne, and its control over one of the few stone bridges over the river. Maastricht retained its military value from the fourth century CE, when the Roman army built a fort there, until its demilitarization in 1868.

Most roads in the Meuse Region, as elsewhere in Western Europe, were tracks leading from one settlement to the next. A 1632 handbook for the *maréchal des logis*, the officer in charge of billeting troops, depicts a variety of local road networks.⁶⁶ The state of such paths, filled with mud piles and holes, and rarely designed to accommodate any movements beyond local traffic, obviously left much to be desired.⁶⁷ Officers of the

63 Brouwers, "Les gués"; de Graaf, *Oorlog*, 243; Sangers and Simons, *Geschiedenis*, 67.

64 Delcourte Debarre, "Espaces forestiers," 320, 342. See also Becquet, "Montaigle," 108–9; Burgers, "De steden van Holland," 277; de Robaulx de Soumoy, "Recherches," 184–85; de Stavelot, *Chronique*, 365.

65 Borgnet, "Troubles," 35, 45–50.

66 De Solemne, *La charge du mareschal des logis*; Duyck, *Journal*, 3:395; Mourroux, "Stenay, ville militaire," 50–51; Parker, *The Army of Flanders*, 72–74; Richer, *Abrégé chronologique*, 183; van Hoof and Ramakers, "De militair-strategische betekenis."

67 Brunner, ed., *Reise des P. Reginbald Möhner*, 54, 101–2; d'Haynin, *Mémoires*, 1:139, 1:216; Douchamps-Lefèvre, *Inventaire*, 3:268; Felsenhart, "L'invasion," 306, 311; Hagendorf, *Tagebuch*, 62; Lidec, ed., "Routes de terre et d'eau," 50–54; Vallée and Pariset, eds., *Carnet*, 108, 122; van Werveke, *Die Erwerbung*, 38.

bishop of Liège's army, for example, complained in April 1756 about soldiers losing their shoes in the mud when chasing vagrants in the Campine/Kempen (see chap. 4). They explicitly stated that the roads were impracticable for a military unit.⁶⁸

Given that building high-quality paved roads rarely became a viable option before the eighteenth century, relatively few solutions were available to solve these problems. Accounts from the village of Chatelineau, near Charleroi, show that during the seventeenth century the villagers regularly procured hundreds of *fascines* to lay on local tracks.⁶⁹ In several of these instances, it is clear that these efforts were, directly or indirectly, stimulated by armed forces passing through. The main alternatives to not improving the tracks would be that the soldiers stayed longer in the area or were diverted from the tracks and trampled agricultural land in the process. Many legal acts or court records of war-related damage speak of armies cutting down hedges and damaging agricultural fields when passing through.⁷⁰

While armed forces complained regularly about the state of the road network, they also contributed to road degradation themselves. In 1665, for example, a new regional road connecting Liège and Sedan (*le Chemin Neuf*) was finished. This road had considerable economic value because it did not have to pass through the Spanish Netherlands. It thus allowed traders to avoid potential conflicts between the French and Habsburg monarchies, economic or otherwise. But French forces also took advantage of this new route to invade the Meuse valley in 1667–1668, and effectively rendered the road unusable until repairs could be carried out.⁷¹

Armies ultimately responded to the constraints on movement posed by land roads as well as rivers, such as the Meuse, by constructing canals (and later railways as well). Canals provided a relatively easy, and economical, way of transportation, just as rivers did, but their straight outline and constant water level made them much more reliable in terms of navigation. Of no less importance is that these same characteristics also made them much easier to defend. What we see here is a combination of military and economic goals, or at least the assumption that military and economic objectives can be complementary, in a way that resembles military concern with horse supply (see chap. 4). The Fossa Eugeniana (1626–1633) and the Canal du Nord (1806–1810) for example, both of which were never finished, aimed to divert traffic from the Meuse and Rhine Basins, and therefore the Northern Netherlands, towards the Scheldt Basin (favouring Antwerp). Yet at the same time these canals constituted a military defence line, a potential frontier. This is especially obvious in the Fossa Eugeniana because intermediate forts were built to defend this canal, and soldiers had an active role in its construction. The Zuid-Willemsvaart (built in 1822–1826), on the other hand, ran parallel to the

68 Liège, AEL, Etats, inv. no. 2974: Petition April 10, 1756.

69 Kaisin, *Annales historiques de la commune de Chatelineau*, 125, 127, 154, 345.

70 Caffiaux, *Essai sur le régime*, 272–73; Douxchamps-Lefèvre, *Inventaire*, 3:283; Driessen, *Emundt van Oeteren*, 347, 702; Illaire et al., eds., *Les cahiers de doléances*, 210; Jacob, *Bruyères*, 181; Lambert, "Des témoins," 195; Laurent and Quicke, *L'Accession*, 229; Mertens, "Bank van Pelt," 23; Sabron, *De oorlog*, 2:25; van Heiningen, *Tussen Maas en Waal*, 282–87.

71 Harsin, "Etudes sur l'histoire économique," 89–95. See also Mengels, *Chronyk*, 45–46.

Meuse River and created a relatively swift and reliable transportation route between the strongholds of 's-Hertogenbosch and Maastricht.⁷²

Such waterways might seem the perfect alternative for the relatively unpredictable Meuse River, but they created problems of their own. Canals drain water from surrounding areas, especially the rivers they are connected with, and in this way make the latter even more difficult to navigate. In 1460, for example, the citizens of 's-Hertogenbosch dug a canal near the fortress of Nederhemert, on the frontier of Brabant and Guelders, between two arms of the Meuse River. Creating this new watercourse isolated the aforementioned fortress, a fief of the duke of Guelders, but it also served to avoid Heusden's toll stations. The town council of Heusden continued to protest that it made the Meuse impassable in inquests of 1494 and 1514. Communities obviously wanted to convince their ruler that the tax burden should be reduced, but that does not mean that the grievances put forward in such documents were unfounded.⁷³

The complaints of the council of Heusden can be seen as emblematic for environmental problems near the Meuse estuary. Both Rotterdam and Dordrecht in the Middle Ages had almost direct access to the sea. By the sixteenth century processes of land reclamation and the silting up of significant parts of the Meuse had made this contact increasingly problematic. Defence of the sea, "the most important frontier of the republic," rested mainly on warships, but it was precisely these ships that found it increasingly difficult to navigate the Meuse estuary.⁷⁴ Such problems were not just the result of ecological processes; they were aggravated by an increasing divergence between warships and other vessels during the seventeenth century. The pressing need to carry more guns, symbolized by the adoption of so-called ships of the line, necessitated the creation of larger vessels.⁷⁵ The Admiralty of the Meuse, tasked with defending the Meuse estuary, therefore had to turn the small town of Den Briel into its main harbour, which was connected by the "Brielse Maas" to the main or Old Meuse in 1607. By 1650 even this forward post had to be replaced by new docks in Willemstad and Hellevuetsluis.⁷⁶

Armies valued wilderness because it served as a barrier, but at the same time its very naturalness made movements, especially counterattacks or offensive strategies, problematic. Rather than adopting an entirely defensive attitude towards frontiers, or abandoning wilderness as protective elements, armed forces ultimately came to their own unique solutions to solve the tension between road networks and wilderness,

72 Plans to connect the Oise to the Sambre or the Meuse to the Moselle were never executed, however. Blanchard, *Les ingénieurs*, 453–54; de la Fitte, *Mémoire militaire*, 101–8; Desbrière, *Cartes et mémoires*, 45; Filarski, *Kanalen*, 117–20, 296–97; Guillery, *La Meuse*, 6–7; Harsin, "Les projets"; Martin, "Maastricht," 115–21, 177–84; Pistor and Smeets, *Die Fossa Eugeniana*; Rowlands, "Moving Mars," 492–507; van der Woud, *Het lege land*, 108–30, 490–91.

73 *Enquete ende informatie (1494)*, 196; *Informacie up de staet faculteyt ende gelegentheyt*, 433; Hoeckx et al., eds., *Kroniek van Molius*, 118–19.

74 Krayenhoff van de Leur, *Militair-historische schetsen*, 89–92. de Jong, "Staat van oorlog", 65; Denessen, "Twee havenuitdiepings-projecten; van Hoof, "De kustverdediging."

75 Bruijn, *Varend verleden*, 81–84, 92, 95–97, 102–3, 184–85, 216.

76 Don and Voorne-Putten, 58–59, 67–74; Filarski, *Kanalen*, 52–54; 80–81; van Mastrigt, *Willemstad prinsheerlijk*, 48–53, 91–92, 101–4.

movement, and blockades: they created their own artificial “wilderness.” The most famous example of such an attempt is the Hollandic (or Dutch) Water Line.

The term Hollandic Water Line refers to a series of inundations intended to safeguard the core of the Dutch Republic, the County of Holland, if an attacker managed to invade the country. In effect it gave new meaning to the image of the *Hollandsche Tuyn*. Its basic conception originated in the desperate year 1672, when French and Münster troops overran large parts of the republic. It was only later that Dutch engineers developed a more complicated system of sluices and access dikes that allowed commanders to inundate specific areas and defend a handful of access points. The essential aspect of this Hollandic Water Line, or Lines, for one should distinguish between the Old (1672–1795) and New Hollandic Water Line (1815–1956), was therefore that large stretches of land had to be prepared for a potential inundation but were not flooded permanently. Their long-term ecological significance, which continues to this very day, lays in the preservation of large wetlands or marshes that would otherwise have been drained and turned into agricultural fields, rather than the handful of years the lands were actually flooded.⁷⁷

The French government by contrast adopted its own equivalent of the Hollandic Water Line, based on the preservation of woodlands near frontiers. This policy developed only gradually. The marquis de Langeron, a French general, left an account of an inspection tour along the French frontiers in 1773–1774, meant as an educational opportunity for his young son, on how to follow in his father’s footsteps. When he passed near the Forêt de Mormal he remarked that it is a good thing that the count de Nicolai, marshal of France, prevented the *grand maître des eaux et forêts* from constructing a major road through these woodlands. It would have facilitated an enemy invasion.⁷⁸

In 1776 the king of France passed an official regulation, which gave military engineers far-reaching powers to prevent anyone from creating new routes in frontier zones, which included the entire French-controlled part of the Meuse Region, without the approval of a special commission (*la Commission mixte des travaux publics*), dominated by military engineers. Given that any significant clearing of woodlands created a potential invasion route, the French military had a primordial role in the preservation of forest belts alongside France’s borders, which are clearly observable even today. These landscapes, symbols of European “wilderness,” are the result of a deliberate policy based on military perceptions of frontiers that date back to the Middle Ages at the very least.⁷⁹

Up till this point we have considered frontier landscapes in terms of access, and more particularly defence against a potential enemy attack. Armies’ interactions with frontier landscapes also included a set of impacts, however, that were not directly related to defensive needs, and might occasionally even run contrary to them. These will be referred to as “garrison services” because of their vital role in sustaining a military pres-

77 Bevaart, *Nederlandse defensie*, 71–76; 96–101; Caminada-Voorham, *Loevestein*, 109–11, 126–28; Ridderbos, *Kleine atlas*, 80–87; Will, *Sterk water*, 29–63.

78 Vallée, “Le journal,” 168–69.

79 *Ordonnance Corps du Génie* (1776), 30–31, 43; Dubois, “Les forêts”; Reitel, “Le rôle de l’armée,” 143–48.

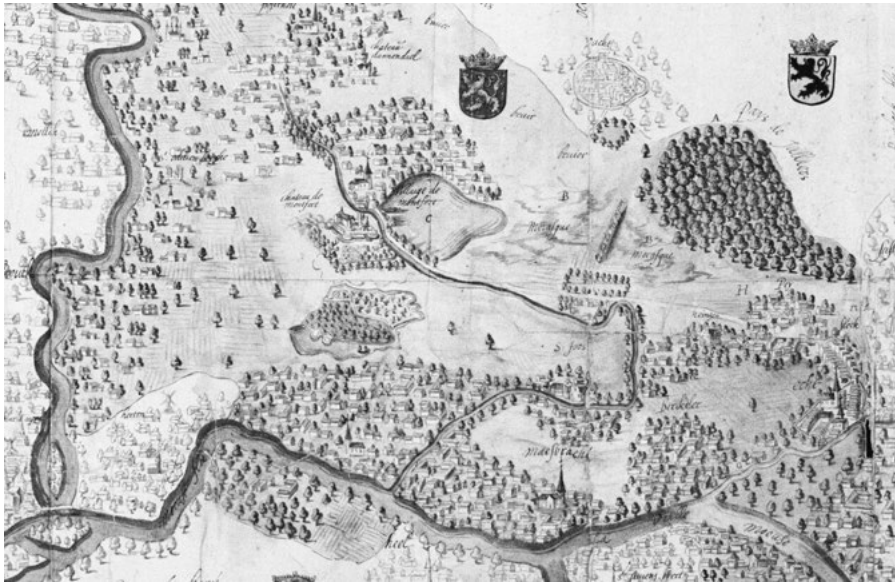


Figure 6. Map of the lordship of Montfort (detail), drawn by the engineer Philippe Taisne in 1625 (Brussels, ARA, Cartes et plans manuscrits, no. 73, *Carte topographique et figurative de la terre, la seigneurie et château de Montfort, avec les villages de sa dépendance, dressée, en vertu d'ordres de la Chambre des Comptes de Ruremonde, par l'ingénieur Philippe Taisne, en 1625*). Reproduced with permission of the Algemeen Rijksarchief / Archives générales du royaume.

ence. The French engineer de Vauban speaks of a *place forte*'s need for *dépendances*.⁸⁰ In order to study the relationship between these services and actual defensive needs, let us first examine the case of the fortress of Montfort, for which source material is relatively abundant. Besides a series of accounts, the oldest of which date back to 1294–1295, a map drawn by order of the Habsburg government has been preserved, which gives an exceptional depiction of the landscape there in the early seventeenth century (see figure 6).⁸¹

Henry of Guelders, bishop of Liège (1247–1274), founded the imposing fortress of Montfort on the right, or eastern, bank of the Meuse, close to Maaseik, in the 1260s. It quickly became a key fortress in the defence of the County of Guelders' southern frontier, because of its function as a seat of government. The lordship of Montfort is a classic example of what English medievalists have recently called "lordly" or "elite" landscapes: lands filled with symbolic elements of power.⁸² Several brooks in the area were channelled towards this fortress to create huge fishponds, and the lordship also contained several forests, the most important of which was the Echterwald, located on the Guelders–Jülich frontier between the towns of Echt and Vucht. Landscape elements such as

⁸⁰ Mourroux, "Stenay, ville militaire," 48.

⁸¹ Coenen, "Kasteel Montfort"; Meihuizen, *De rekening*.

⁸² Creighton, "Castle Studies," 5–17; Creighton, *Designs Upon the Land*; Liddiard, *Castles*, 97–121.

ponds or woodlands can be considered as status claims since access to game and fresh-water fish was a social privilege. It was also a rather uneconomic way of land use. The owner of such lands showed that his socio-economic base was so secure that he could afford to use his lands for display rather than agriculture.⁸³

It has become common practice to use this concept of elite landscapes to question or at least downplay the military role of medieval fortresses (or “castles”; see further in chap. 2), but the example of Montfort demonstrates that this is an oversimplification. There is no reason why a landscape feature such as a fishpond, which had obvious prestige value, could not have had a defensive role as well. In the case of Montfort, the fishponds were so extensive that a direct attack on the east side of the fortress became impossible. The chronicler Jean de Stavelot also wrote that in 1436 urban militias from the Prince-Bishopric of Liège first had to drain the ponds next to the fortress of Bossenove, near Rocroi, before they could assault it. This task took no fewer than three days.⁸⁴

By the early seventeenth century, when the engineer Tassin drew a map of the lordship, the landscape had changed markedly in many respects, a situation also reflected in inspection reports. The Echterwald was at this point the only major woodland remaining in the area; the others had become simple heathlands. Several of the ponds became dry during the summer months, at which time the local population used them for pasture. Overexploitation was a major cause of the degradation of this elite landscape, but it cannot be seen in isolation from fifteenth- and sixteenth-century political events: the fortress no longer served as a ruler’s residence, subjects of the Count of Jülich diverted one of the brooks supplying the ponds with water, and the lordship had suffered repeatedly during invasions. The impoverishment that resulted from these wars forced stewards to use lands in a more productive way. The deathblow to the last vestiges of the original lordly landscape came in 1650–1653, when soldiers stationed in the fortress dug a canal that drained the last remaining ponds.⁸⁵

The slow growth of the lordship’s permanent military presence might have had an essential role in bringing about these landscape changes. The oldest surviving accounts of the duchy, from 1294–1295, indicate that the “high bailiff” tasked with defending this fortress had at his disposal five knights doing guard duty because of feudal obligations, two gatekeepers, two sentinels, five watchmen, a crossbow maker and his son. A “garrison” of sixteen grown men and a child in times of war might seem wholly inadequate, but it is very much in line with the ways most fortresses were managed up to the late sixteenth century (see chap. 4). If an actual threat was imminent the garrison could easily be augmented to a hundred men and more. A garrison of about eighty soldiers was only established around 1578, and later expanded to about two hundred.⁸⁶

83 Coenen, “Een kasteel”; Coenen, “Kasteel Montfort”; Gentenaar and Hupperetz, “Personeel en werkzaamheden.”

84 Coenen, “Kasteel Montfort,” 76–77; Coulson, *Castles*, 72–76; Creighton, *Designs Upon the Land*, 80; de Stavelot, *Chronique*, 365–66.

85 Coenen, “Kasteel Montfort,” 86–91; Coenen, “Het keerpunt”; Roebroek, *Het land van Montfort*.

86 Coenen, “Kasteel Montfort,” 86; Coenen, “Het keerpunt,” 95; Meihuizen, *De rekening*, 8, 15 (text accounts).

These soldiers actively contributed to the overexploitation of natural resources by fishing in the moats, digging peat, and probably hunting as well. This behaviour was quite similar to that of their medieval predecessors, the main issue being that they were far more numerous.⁸⁷ Archaeozoological research of animal remains in Franchimont, a fortress located in the Prince-Bishopric of Liège with a similar strategic role, suggests that game, especially red deer and wild boar, constituted a significant part of its occupants' diet in the late fifteenth and early sixteenth century. According to the bishop's regulations from 1503 the household of the castellan residing here should include three horsemen (the castellan himself, his page, and a groom), four infantrymen, a gatekeeper, two sentinels, and two servants (male or female).⁸⁸

The appearance of large permanent garrisons in most parts of the Meuse Region from the late sixteenth century onwards therefore contributed to changes in frontier landscapes, as military governors, invariably members of prominent noble families, incorporated these same elements of lordship in the landscapes that they had to defend. A court record from 1660 Namur indicates for instance that the Prince of Chimay, governor of the city, had his own hunting park (*garenne*) in the forest of Hastimoulin. A local chronicle from 's-Hertogenbosch likewise mentioned in the year 1697 that the governor's hunters killed a deer and a wolf.⁸⁹ This reveals that the governor employed gamekeepers to manage his hunting grounds, and that wolf and deer had become so rare in the area that their killing became noteworthy. Soldiers' fondness of hunting could in effect cause considerable damage and friction, with citizens as well as governors, because they rarely respected hunting regulations or private property (see chap. 3).⁹⁰

Complaints about soldiers taking firewood from woodlands near their garrison should be read in a similar light. Providing garrison members with fuel, often coal or peat rather than wood, was the responsibility of the inhabitants in whose houses they lodged, the urban council, or the state, but these mechanisms often proved insufficient. Furthermore, the upkeep or expansion of fortifications and military material, notably gun emplacements, required substantial amounts of wood. Military garrisons would make sure they had access to nearby woodlands.⁹¹ In one case this even meant appropriating their actual management. During the Central and Late Middle Ages the Ravensbosch near Valkenburg was the main forest within this prestigious lordship. From the sixteenth century onwards it also became a major supplier of wood for the garrison of Maastricht. Records kept by the chief engineer demonstrate that he bought trees (oak, ash, field elm) to plant in this forest in 1750, in the aftermath of the reoccupation of Maastricht by Dutch forces, and had a major role in the establishment of new regulations for the forest's management in 1765. He also had a say in the appointment of new

⁸⁷ Arnold, *German Knighthood*, 85; Wadge, *Archery*, 114–15.

⁸⁸ Den Dooven, "Les émoluments," 98–99; Gautier, Hoffsummer and Vanguetaine, "Faune," 75–88.

⁸⁹ Douchamps-Lefèvre, *Inventaire*, 3:268; van Bavel et al., *De kroniek*, 414–15.

⁹⁰ The Hague, NA, Raad van State, inv. no. 2079, November 1, November 20, 1716; March 17, May 1, 1717; Verbois, *Rekem*, 296; Verschure, *Overleven*, 199.

⁹¹ Illaire et al., eds., *Les cahiers de doléances*, 129, 158, 167, 209, 474, 524.

forest wardens. It is indeed significant that in the early nineteenth century, when Dutch soldiers no longer had access to nearby woodlands, the garrison planted coppice wood in the outworks to secure their wood supply.⁹²

Besides wood and game, garrisons also needed access to pasture for their horses.⁹³ Because of the sheer volume of forage consumed, cavalry forces typically stayed in regions with ample access to grasslands. The French government stationed a disproportionate part of its cavalry forces in the Meuse basin from the seventeenth century onwards because the river valley provided extensive pastures for their horses. In 1789 ten of the sixty-one French cavalry regiments had garrisons in the Meuse Region. Frontier cities and towns for their part were quite content to receive them because they could sell their hay to the military and use the horses' manure to fertilize their fields. The town of Rocroi went so far as to build new barracks and stables at its own initiative in 1721.⁹⁴

Still, the intensive use of the Meuse and Sambre valleys by French cavalry units might have had other unintended results. Military consumption of hay and pasture removed a powerful incentive for local peasants to drain these areas and turn them into agricultural lands, thereby slowing down population growth in these areas. A 1693 plan to drain the meadows of the Sambre valley in order to use these fertile lands as agricultural fields was never executed because it would have prevented mounted regiments from garrisoning or even assembling in this area.⁹⁵ In sum, military management of frontier landscapes produced significant ecological results because it contrasted with agricultural or economic needs.

Military Training

After examining how armed forces perceived and managed frontiers in a general way, let us turn to one specific aspect of frontier management: military training. This particular feature of army–ecosystem interactions at landscape level deserves to be examined separately because it plays a key role in claims that today's military forces have become protectors of nature. It also draws attention to a neglected feature of military history, for few authors have devoted serious attention to how medieval and early modern armies practised military manoeuvres in peacetime; that is, beyond commenting on the adoption of “drill.”⁹⁶ Military training is defined here as any activity that aims to prepare someone, or a group of people, for warfare. Since this study is specifically

92 Maastricht, RHCL, 07.E01, inv. no. 1: Guarnisoensboek, B, September 29, 1749, January 12, 1750; January 16, March 18, 1765; January 20, 1768, August 1, 1768; February 17, May 11, 1769; January 22, November 19, 1770; inv. no. 9, 1824 no. 76; Anon, “Houthem-Sint-Gerlach,” 11–14.

93 Quicke, “Une enquête,” 397.

94 Barbe, “Rocroy,” 103, 119–20, 139; de Roussel, *Etat militaire de France, pour l'année 1789*; Le Moigne, “Le rôle économique,” 218–19; Petitot-Bellavène, “Verdun,” 91.

95 Ciriaco, “Dessèchements et politique agricole,” 8 (<http://books.openedition.org/editionsms/1334>); Le Moigne, “Le rôle économique,” 204, 218–19.

96 Houlding, *Fit for Service*; Kleinschmidt, *Tyrociniū Militare*; Rogers, *Soldiers' Lives*, 68–69; Settia, “Military Games.”

concerned with frontier landscapes, the main emphasis will be on weapon handling and unit manoeuvres.

Frontiers are an obvious place for military training, because relatively few people lived there, armed forces were already present in these areas, and the chance that actual fighting would take place was relatively high. Military training can also be initiated to intimidate an antagonist, or to show off an alliance, in a way not dissimilar to joint U.S.–South Korean military exercises in recent years. It reinforces the perception of frontiers as a “frontline” by sustaining and intensifying alleged distinctions between the “self” and the “other,” differences which could later justify the breaking of taboos during actual armed conflicts (notably killing other human beings).

Because large sections of a population could be called upon to serve in an armed capacity, military training became incorporated in other activities. In the Middle Ages in particular preparation for war often assumed the form of “games” or “sports.”⁹⁷ The Rule of the Order of the Templars (1128–1129), which served as a model for other military orders as well, specified that a member of order could engage in target practice, but was not allowed to wager any objects of value. He could also participate in *buhurts*, informal mounted combats in which the participants were often not in armour, but only if the commander was present. The Templars were a monastic order of fighting men. Military training was thus an important part of their lives, but the leisurely elements normally attached to it were not acceptable and forcefully removed or restricted. The rules regarding hunting confirm this impression. There is no doubt that hunting and warfare are directly linked to each other, and that hunting skills can be quite useful in warfare (the killing of other living beings, arms handling, riding, tracking, acting as a group, and so forth), but there was a world of difference between falconry and killing dangerous animals. Members of the Templar Order were therefore only allowed to hunt lions or accompany hunting expeditions when a Christian might be endangered. Hunting for pleasure, especially falconry, was strictly forbidden. Brothers of the Teutonic Order could likewise hunt large carnivores such as the wolf, bear, lynx, and lion, but were forbidden to use dogs. They could also shoot birds as target practice.⁹⁸

The development of formal military training during the early modern period might have put further pressure on the close association of hunting with preparation for war. The prince de Ligne, a member of the oldest and most prominent noble families in Hainaut, and a general in Habsburg service, criticized existing practices in 1780 when he wrote that “you do not tell a recruit: I will make you a hunter, you have to take him from the woods.” In the late eighteenth century “hunter” (*Jäger, jager, chasseur*) had become a general name for a particular kind of unit, “light troops” that typically wore green uniforms and might be armed with hunting rifles, but were apparently not necessarily composed of men with extensive hunting experience. A handful of units did establish

⁹⁷ Contamine, *La guerre*, 362–63; Kleinschmidt, *Tyrocinium Militare*, 27–29; Mehl, *Les jeux*, 58–59, 63–64, 194, 256; Settia, “Military Games.”

⁹⁸ Curzon, *La règle du Temple*, 84, 183–84 (rule nos. 95, 315, and 317), Perlbach, ed., *Die Statuten des Deutschen Ordens*, 47 (rule no. 23). See also Cummins, *The Hound and the Hawk*; Harrison, *Dark Trophies*; Manning, *Hunters and Poachers*, chap. 2.

a strong connection with forestry departments, but for these specialist units replacing wartime losses was a major problem (see chap. 4).⁹⁹

The connection between hunting and woodlands, mountains, or wilderness is hardly a coincidence. It demonstrates that the ambiguous perception of frontiers as both wilderness and garden barriers is omnipresent in military training practices as well. Preparation for war, especially arms handling, is a very disruptive activity. The choice for particular practice areas close to or within frontiers is therefore closely related to the ways armies cooperated with society at large. They could opt for sparsely populated lands (wilderness), or close off their exercise fields from local inhabitants (gardens).

Studying military training in a historical context can be problematic, because arms handling is a skill that large parts of the general population were expected to master. The available sources are therefore biased towards more large-scale and notable military exercises, many of which included significant performance elements. The main issue from an ecological perspective is how important such events actually were in the long-term evolution of frontier landscapes. Their effects might be quite similar to that of actual battles, except that killing one's adversary was not the primary goal.

The oldest medieval tournaments, in the late eleventh and twelfth century, were indeed very hard to distinguish from real combat: they included fighters on horseback and on foot and there were very few rules. The well-known *Chronicon Hanoniense* of Gislebert of Mons (ca. 1150–1225) makes it clear that many of these early tournaments were held in the Meuse Region, and more specifically on the frontiers of its numerous principalities (such as Trazignies or Maastricht). David Crouch has rightly argued that the northern part of France, and the Southern Netherlands, including most of the Meuse Region, played a key role in the tournament's early history.¹⁰⁰ Even in the thirteenth century, when tournaments became more "urban" in character, they were still held in frontier areas (such as Andenne or Geertruidenberg).¹⁰¹

Tournaments were organized on or near frontiers because of their political significance, but also took the presence of major roads, and the ecology of frontier landscapes into account. A horse's hoof exerts a force more than six times greater than a human heel on a level surface.¹⁰² One can imagine the effects of a few hours of martial play with hundreds of horse hooves moving about on carefully tended agricultural fields. It is for good reason that many tournaments were held after the harvest was brought in, or even better, on land of relatively low value. The tournament of Chauvency (1280), arguably one of the most famous tournaments of the entire Middle Ages, was held in the river valley of the Chiers, between the town of Montmédy and the fortress of Chauvency, according to the verses of Jacques Bretel (1285). Such open grasslands were the most convenient

99 de Ligne, *Fantaisies militaires*, 110.

100 Crouch, *Tournament*, 27–29, 49–50, 124–25; Neumeyer, *Vom Kriegshandwerk zum Ritterlichen Theater*, 36–57.

101 de Behault de Dornon "Un tournoi à Mons," 386–91; *La chronique de Gislebert de Mons*, ed. Vanderkindere, 95, 101–2; Janse, "Toernooicultuur," 153; Poncet, "La guerre," 277.

102 Liddle and Chitty, "The Nutrient-Budget of Horse Tracks."

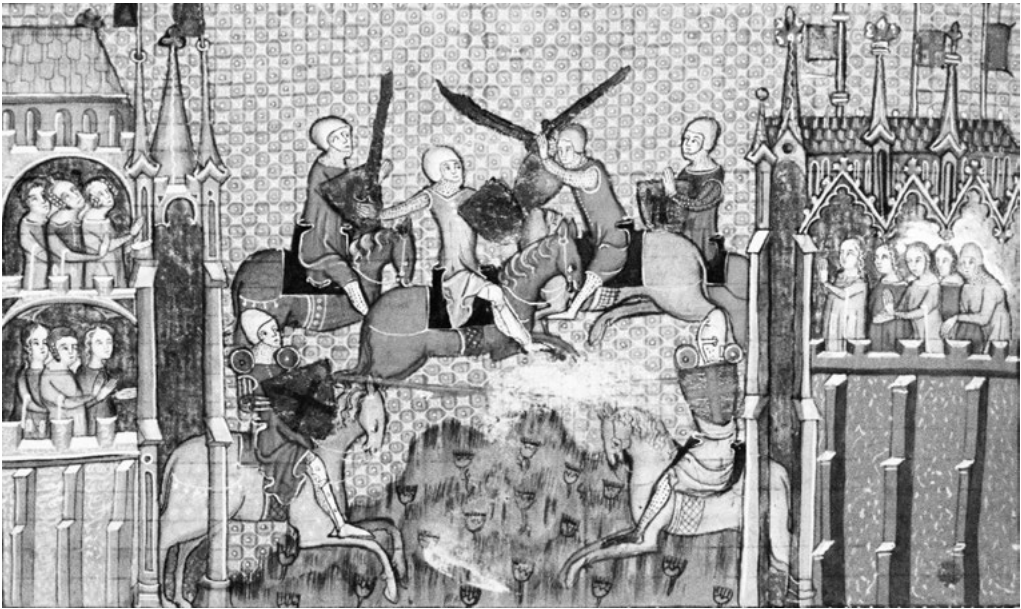


Figure 7. Medieval tournament held in the open fields between two fortresses, Hainaut, early fourteenth century (Paris, BnF, MS français 122: *Lancelot Graal*, Piérart dou Tielt (atelier), 1344–45, fol. 80v).

place to organize a tournament; they were not enclosed and served simply as pasture and for hay production (see figure 7).¹⁰³

By the fourteenth century the tournament proper, the melee or the charging of two groups of knights at each other, had all but been surpassed by the individual joust. Most tournaments were now held within towns, and group combat subsisted as only one part in a series of competitions. This should not be taken to mean, as has often been claimed, that tournaments lost their military relevance altogether. When Charles V (Emperor 1519–1556, Lord of the Netherlands 1506–1555) came to the Low Countries in 1549 to present his son, Philip II (1555–1598), as his successor, there were both huge public activities, such as a mock battle outside Brussels, and still large-scale but more private forms of spectacle, such as the storming of a “castle of love” in the hunting park of Mariemont (Hainaut), where eight knights disguised as “savages” held four noble ladies prisoner.

The latter performance, which involved at least several hundred soldiers, is particularly revealing because the young prince is portrayed as an ideal successor surrounded by noblemen from all over the Habsburg Empire in the context of a controlled space, a hunting park and gardens, which just happen to serve as symbols for the unity of one’s own territory. It should also be stressed that while all this might seem more like the-

103 Bretel, *Le Tournoi de Chauvency*, 106–8; Neumeyer, *Vom Kriegshandwerk zum Ritterlichen Theater*, 289–333.

atre than military training, the front of this castle, described as a *bastillon*¹⁰⁴ in a fiscal account recording the tournament's expenses, was composed of bricks, and the actual assault involved a range of manoeuvres, including livestock raiding, an attack on a convoy, and live firing at the *bastillon*. The besieging army included cavalry, infantry, artillery, pioneers, and at least one engineer. Three hundred and seventy-six infantrymen were drawn from the frontier with France to participate in this event. There were no human fatalities, but at least one horse died as result of a lance thrust, a nobleman suffered burns because his beard and clothing caught fire, and several others fell from the castle's walls during the attack. It can be very difficult to distinguish theatrical elements from practical military needs, and the question remains to what extent contemporaries actually made such distinctions.¹⁰⁵

The tournament of 1549 establishes a useful link between medieval tournaments on the one hand and early modern military training exercises on the other. Despite the supposedly "revolutionary" character represented by the adoption of drill in the late sixteenth and early seventeenth century, particularly in the Dutch army, there is relatively little evidence for how armies practised unit manoeuvres. A new kind of military handbook made its appearance in this period, one that stressed the importance of drill and provided numerous illustrations to accompany the text, but it is quite unclear to what extent such manuals represent actual practice. David Parrott and Erik Swart have stressed the informal character of contemporary military training, based more on experience than formal drill.¹⁰⁶ A notarial act from 1652 Rotterdam, concerning a soldier who refused to follow orders, mentions that the unit to which this man belonged exercised outside the walls, the same spaces Habsburg and French forces utilized for their military reviews.¹⁰⁷ It is useful to note that open fields or heathlands regularly served as background for target practice as well, even though permanent shooting ranges existed from at least the fourteenth century. The citizens of 's-Hertogenbosch, for instance, dragged a newly cast gun to the heath and marshes outside the city in 1545 in order to test it, according to the city's accounts.¹⁰⁸

The connection between military exercises and city walls, the city's "frontiers," was mirrored at a much larger scale by the establishment of major training camps on state frontiers from the late seventeenth century onwards. The establishment of these camps should be seen in the context of a significant growth in the size of armies in the period from 1660 to 1760, which made it necessary to practise manoeuvring with bigger forces. Surviving reports and plans demonstrate the intention of training soldiers

104 A small *bastille*, meaning a *blokhuis* or bulwark (see chap. 2).

105 Bragard, *Dictionnaire*, 52–53, 249; Buchon, ed., *Oeuvres complètes de Pierre de Bourdeille*, 1:302–4; Frieder, *Chivalry and the Perfect Prince*, 135–58, 183; Marquet and Glotz, eds., *Une relation*, 57–62; Wellens, "Un compte."

106 Parrott, *Richelieu's Army*, 38–48; Swart, "De mythe van Maurits en de moderniteit."

107 Rotterdam, SAR, ONA, inv. no. 452, no. 44 October 1, 1652; Boonen, "Maaseiker soldeniers en huurlingen," 11; Callot, *Les Grandes Miseres et les Mal-heurs de la guerre*, depiction of a military review; von Adlersfels-Ballestrem, ed., *Memoiren*, 11, 21.

108 van Zuijlen, *Inventaris*, 2:626.

in camping and foraging as well as military manoeuvres in the strict sense of the word (including mock battles, sieges, and bridge building). Camps were typically pitched in grasslands or heathlands, but with access to running water.¹⁰⁹ The French army thus established training grounds next to the Sambre, near the village of Aymeries, in 1727, 1732, 1753, 1754, and 1755.¹¹⁰ As surviving maps indicate, these areas were sparsely populated, and therefore easy to rent or appropriate, and provided the necessary wide-open spaces. The soldiers even had to flatten the prospective sites so that no obstacle impeded manoeuvres. Yet all this made these encampments more vulnerable to sustained rain showers and the resultant flooding. The Dutch training camp in Oosterhout, organized in the heathlands near Breda in 1732, had to relocate twice because of incessant rain and the flooding of the campsite, and was eventually broken up prematurely.¹¹¹

Because campsites were chosen for their strategic locations, it comes as no surprise that some of them were held near or on actual battlefields. When Walloon regiments of the Imperial army performed the manoeuvres prescribed by their new drillbook, in 1767, 1768 and 1770, they did so near Jemappes, the same common lands, used as pasture, where they were defeated by a French republican army in 1792. While the ecological effects of one encampment or battle would be ephemeral, the focus on specific areas could lead to long-term effects.¹¹² This was especially so if camping involved major landscape changes. Dutch officers of the military academy in Breda for example referred to some artificial hills near the city as the “English Mountains” at the end of the nineteenth century. They thought British troops had constructed them during the 1793–1795 campaigns against France, while they were actually remains of Dutch practice camps from 1769 and 1776. These hills served as huge butts to prevent any cannon balls from flying off the range. The published testimony of a corporal of the English footguards confirms that the British army was not responsible for the hills’ construction, but that its members were well aware of their military origin. It is worth noting that both Dutch and British soldiers contributed to the lowering of the groundwater level by digging wells in these heathlands, where water was relatively scarce.¹¹³

While such notable events involving relatively large numbers of combatants were closely connected to frontiers, due to their very transient character they provide little evidence of long-term ecological consequences. Less prominent military activities, however, also produced lasting effects, because they occurred repeatedly on the same piece of land. As far as the Meuse Region is concerned, the appearance of permanent training grounds can be traced back to the creation of brotherhoods or guilds of crossbowmen from the thirteenth century onwards. These were later supplemented by archers,

109 *Ordonnance Corps du Génie*, 43–44; Chagniot, “Les camps”; Pierrot, “L’arrondissement de Montmédy sous la Révolution,” 18–20; van Nimwegen, *De Republiek*, 111–14.

110 Paris, BnF, Département Arsenal, MS 6452 (456); MS 6452 (457); MS6452 (458B,1); MS 6452 (458B,3); MS 6453 (461); MS 6453 (462); Département cartes et plans, GE D–16345.

111 *Nauwkeurig dag-verhaal van ’t campement bij Oosterhout*, 3, 21, 23; van Seters, “Het Campement bij Oosterhout anno 1732,” 140. See also Duyck, *Journaal*, 3:485.

112 Gosseries, “Souvenirs militaires de Mons,” 239–43.

113 Brown, *An Impartial journal*, 187–89; de Bas, “De Kalix Berna of Kalbergen.”

(hand)gunners, and swordsmen's guilds. The oldest surviving such charter dates back to 1266 Namur and was granted by Guy of Dampierre, Count of Flanders and Margrave of Namur (1253/1263–1305/1298). Because these men trained regularly, at least once every two weeks, they were considered a military elite; they had a major role in the maintenance of law and order, were always the first choice for military expeditions, and served as permanent guards on city walls during conflicts.¹¹⁴

From an ecological viewpoint, it is important to note that only a relatively small part of the adult male population engaged in these exercises, in contrast to late medieval England, where every adult male was supposed to own a bow and arrows and practise regularly. The terrains allocated to these associations tend therefore to be described as enclosed spaces (*courtills*) or gardens¹¹⁵, while in England target practice usually took place on common land and frequently led to the massive destruction of gardens (enclosures).¹¹⁶ Such shooting ranges, which could contain fruit-bearing trees and vines, were often located just inside or outside the city walls ("frontiers"), mostly in dry moats, especially if these ditches had lost their original function due to the expansion of the fortifications. In the fifteenth century one of the companies of crossbowmen in Dinant, according to the town's cartulary, practised shooting at the foot of the walls, the other in part of the dry moat.¹¹⁷ Shooting guilds lost most of their military importance over time, and were disbanded in most garrison towns as early as the late sixteenth century, as central governments considered them unwanted competition for regular military units.¹¹⁸

The relative decline of these militias corresponded with a more general shift towards paid troops, "soldiers." As mentioned earlier, it is unclear where these men trained, and whether they occupied a specific terrain for such purposes, before the eighteenth century. The garrison orders of Namur are one of the few sources to provide good, detailed information. They indicate that the infantry, artillery, and cavalry more or less had their own drill grounds in 1759–1761. The cavalry exercised in the open fields outside the Porte de Jambes (near the like-named village, to the southeast of the city), the artillery next to the Meuse, outside the Porte Saint-Nicolas, and the infantry mostly outside the Porte Bulet (see figure 8). This does not mean that access to suitable grounds was easy. The garrison had to pass review in April 1761 outside the Porte Saint-Nicolas instead of Porte de Jambes, for example, because of obstruction by the city council. The governor complained to that same body in 1771 and 1772 that owners of the training fields near Jambes not only sowed them, but that one man even turned his lands into a garden (that

114 Borgnet, *Histoire*, 4–6, 14, 26–27, 43–44; Devillers, "Notice historique sur la milice communale"; Thewissen, *De gezworen schutterijen*.

115 Tongeren, SAT, Resoluties, inv. no. 1, fol. 21r.; Borgnet, *Histoire*, 9, 16–17, 26–27, 43, 45, 48; Bormans, "Extraits des cris du péron," 209; de Groot, *De stadsrekeningen*, 1399a f. 23; Devillers, "Notice historique sur la milice communale," 178–79; Gaier-Lhoest, *L'évolution topographique*, 42, 44; Mora-Dieu, "Les corporations," 208; Rizzo, "La prévôté de Marville," 13; Thewissen, *De gezworen schutterijen*, 183–91; van der Eerden-Vonk, *Raadsverdragen*, 379, 397.

116 Gunn, "Archery Practice," 53–57, 63.

117 Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 2:52–54, 2:58–60, 3:206–7.

118 Denys, *Police et sécurité*, 118–30; Thewissen, *De gezworen schutterijen*, 251–56.



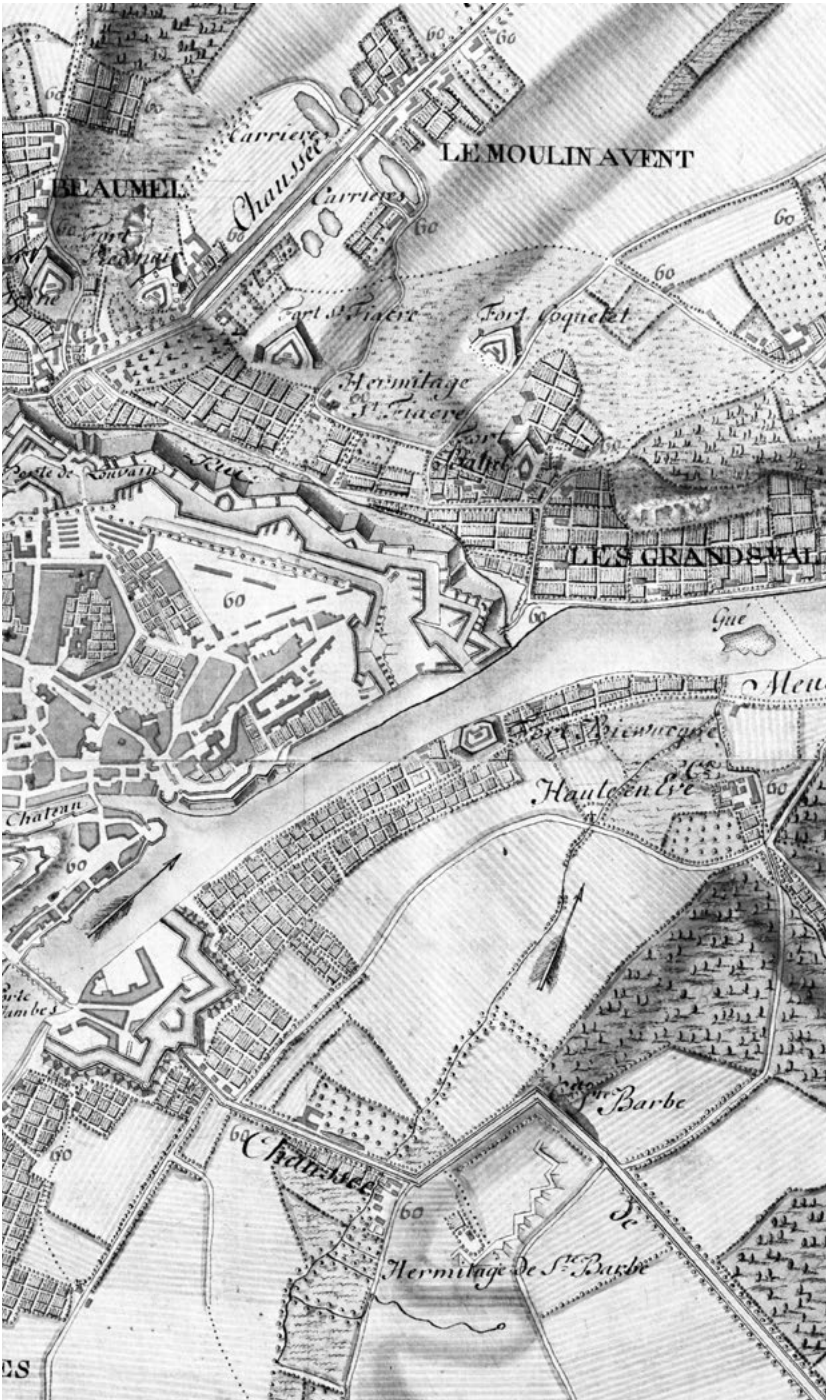


Figure 8. Depiction of Namur and its immediate surroundings, map of the Count de Ferraris, 1777 (Brussels, KBR, Cartes et plans, MS IV 5.567: *Carte de Ferraris*, fol. 116). Reproduced with permission of the Bibliothèque Royale de Belgique/Koninklijke Bibliotheek van België.

is, he enclosed it). Apparently, the sowing had been allowed earlier only as a special favour.¹¹⁹

The governor's opposition to the enclosure of fields was reminiscent of an earlier conflict, in 1749, shortly after the Dutch garrison reoccupied the city. The governor wanted to establish training grounds large enough to accommodate the entire garrison, and demanded access to the *Plaine de Salsinnes*, to the west of the city, near the castle, which in his view were common lands and therefore suitable for military training. He also argued that the garrison already used them for military exercises before Namur had been lost to the French in 1745. Internal correspondence reveals that Dutch officers preferred to use this plain to prevent citizens from constructing earthen embankments with hedges or dig ditches, which facilitated an attack on the castle. The governor got his way and a training field was established, but it remained the property of individual citizens. The aforementioned references to the garrison orders of 1761 prove that the Dutch army eventually did lose access to these grounds and that such conflicts over land use were not solved for the long-term.¹²⁰

The garrison of Maastricht meanwhile experienced similar problems. In 1790 it reached an agreement with a citizen named J. M. Theelen, who leased the right to cut the grass on the fortifications, to use fields next to the walls for training purposes. The soldiers could train there before the harvest, from February until the first half of May, for five years. Yet the contract also specified that cavalry units could not enter. The leaseholder was evidently well aware that this resulted in far more extensive compaction of the soil. In order to provide their cavalry with suitable space for manoeuvres, the garrison appropriated about six hectares of land in Amby, a village to the east of Maastricht, that very same year. This land, known as the *Geuselderenbroek*, consisted of a significant part of the village's common land as well as some meadows owned by major landowners. Its extensiveness also made it suitable for advanced manoeuvres with all infantry regiments together. Detailed fiscal accounts have been preserved, which demonstrate that, since charging on marshy ground is very difficult for cavalry units, soldiers turned them into suitable training fields by flattening the soil and digging drainage canals. The only concessions made to the villagers consisted of allowing them to pollard the trees on the edges of the field, and pass through with their wagons or carts, but only outside the drill season, and all tracks had to be levelled afterwards.¹²¹

During the eighteenth and especially nineteenth century military forces increasingly began to feel the need for larger areas where they could practise on a permanent basis without causing conflicts or, conversely, without being disturbed. These camps

119 The Hague, NA, Raad van State, inv. no. 2079, Orders March 23, 1714, August 5, 1715, September 10, September 11, 1716; inv. no. 2081, Orders April 24, May 16, 1741; inv. no. 2087, Orders May 9, May 22, May 23, May 25, May 26, 1759; May 20, May 23, 1760, April 24, May 26, May 27, May 28, 1761; inv. no. 2088, Orders June 16, September 14, 1771, September 25, September 28, September 29, December 13, 1772; May 25, May 26, September 20, 1773; May 23, May 24, May 25, June 22, September 30, 1774.

120 The Hague, NA, Raad van State, inv. no. 2598: *Plaine de Salsinnes*.

121 The Hague, NA, Raad van State, 2074: *Garnizoensorders Maastricht, Geuselderenbroek*.

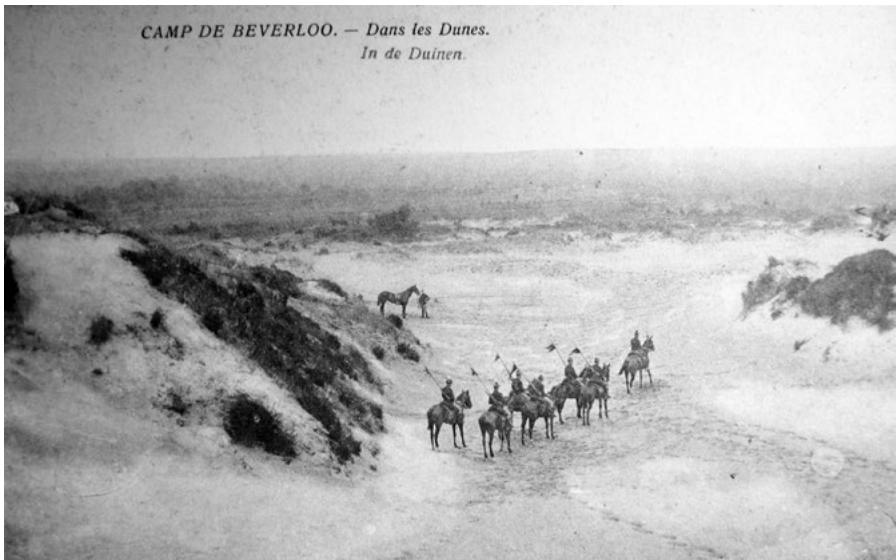


Figure 9. Cavalry patrol in the dunes and drift sands near the Camp of Beverlo, early twentieth century (postcard).

also served changing military needs, notably an increased emphasis on target practice and more diverse kinds of terrain on which to manoeuvre. The Napoleonic garrison of Maastricht, for example, reoccupied the Geuselderenbroek. In marked contrast to their predecessors, they also used it for target practice in 1808, which in turn prompted an immediate complaint by the city's mayor to the prefect. The new Netherlands government subsequently established several large training grounds on heathlands in the 1820s.¹²² The Belgian army followed suit and founded the camp of Beverlo in 1835. This has proven to be one of the most long-lasting training grounds in the Meuse Region. The camp's location, in the middle of desert-like heaths and drift sands of the Campine/Kempen, gained considerable strategic importance in the aftermath of the Ten Days' Campaign (1831), as it controls a major road leading from Eindhoven to Hasselt. It was originally made near the garrison of Diest, but transferred to this desolate wilderness because the lands were inexpensive (see figure 9).¹²³

Parts of the camp, now military domains, have received protection in the 1990s because of their value for endangered flora and fauna, mostly species that depend on

¹²² Maastricht, RHCL, Frans Archief, inv. no. 710: letter of August 1, 1808; Biemans, *August von Bonstetten*, 87, 129, 203; Teunisse, *Onderdaan in Oranje's oorlog*, 71, 72–74, 94, 102–3, 119, 121–23, 125, 127; van der Heijden and Sanders, eds., *De levensloop*, 78.

¹²³ "Notice sur l'armée néerlandaise," 94–95; Delameillieure, "Het kamp van Beverlo," 51–60; Roymans, Beex, and Roymans, "Some Napoleonic-Style Army Camps"; Weuts, *Honderdvijftig jaar kamp van Beverlo*, 10–11; Wanty, *Le Milieu militaire belge*, 61–64.

heathlands and drift sands for survival. The ecological value of these military domains is therefore similar to that of other training areas in Western Europe: they preserve landscapes that have become very rare elsewhere due to changes in agricultural practices. The Belgian army's disruptive activities—the trampling of the soil, earlier by horses and now by mechanized vehicles, and the burning of vegetation as result of live firing—more or less ensure that this desert-like landscape does not turn into woodlands. These domains' garden-like character (they are not freely accessible and often enclosed) makes them a safe haven for endangered species as well.¹²⁴ While the military deserves credit for this protection, they also made a significant contribution to the disappearance of these same heathlands and drift sands. The Belgian army after all used the labour force of a penal company, the only unit to be stationed permanently in the camp, to turn one hundred and forty hectares of heathland into gardens (a quarter of the total), grasslands (an eighth), woodlands (one half), and plant nurseries (an eighth) in 1847–1849.¹²⁵

These changes were initially very practical responses to the challenges posed by this landscape: the lack of cover made soldiers' tents and huts very vulnerable to the wind, there was very little or no running water, and food for man and horse alike had to be imported from elsewhere. Soldiers thus planted pine trees to strengthen the soil and shield their encampment from the wind, dug wells, and used their own horses' manure for the fertilization of these lands. By the 1850s, a new canal and a railway made the camp more accessible. Such landscape changes considerably raised the status of the army, for it made itself useful in peacetime by turning the wilderness of the Campine/Kempen into valuable land. But none of the more ambitious programs, such as a horse-breeding project, were ever put into practice. Perhaps its most enduring influence is the town of Leopoldsburg (Bourg-Léopold), created in 1835 because so-called camp followers were not allowed to live in the actual camp; a stringent reminder that the military-civilian divide had now become the norm.¹²⁶

Conclusion

Military domains, rather than being a symbol of progressive behaviour, are actually the isolated remains of what were once far more encompassing and diverse strategies of frontier management. Armies in the Meuse Region contributed to landscape variety on frontiers from the thirteenth to the nineteenth century because their actions were well integrated into the fabric of societies in the past, even though they often opposed economic needs. Military concerns helped preserve some of the last remaining stretches of wilderness from agricultural expansion, as they were efficient barriers against an enemy attack.

Developments within armies themselves—a relative increase in scale, and standing forces, combined with modifications in agriculture, notably enclosure movements—

124 Sterckx and De Blust, *Heide in de vuurlinie*, 16–18, 90–99.

125 Brion, "L'armée"; Delameillieure, "Het kamp van Beverlo," 61–72.

126 Brion, "L'armée"; Delameillieure, "Het kamp van Beverlo," 64, 70; Eenens, *Ontginning*; Wanty, *Le Milieu militaire belge*, 91–94.

stimulated the appropriation or acquisition of permanent training grounds from the eighteenth century onwards. These areas laid the basis for current military domains. They are considered ecologically valuable because the military's disruptive activities preserve landscapes that have disappeared elsewhere, such as heathlands and drift sands, while also providing a refuge for endangered species. Given that such military domains are to a greater or lesser extent closed off from the general public, one might say that they have preserved a wilderness by turning it into a huge garden. But comparing these last refuges with the large stretches of wilderness preserved by historical armed forces gives a somewhat gloomy perspective of ecological conservation today.

Chapter 2

FORTIFICATIONS

Defences and Their Basic Maintenance

Apart from frontiers, another kind of militarized landscape plays a significant role in debates about the ecological effects of warfare and military forces. The Meuse Region abounds with abandoned fortifications, from prehistoric and Roman times to the Second World War. Every year thousands of bats seek out bunkers, forts, and ruins for hibernation, because of the constant low temperatures and high humidity. Many have also become sanctuaries for rare species of wall vegetation and lichens, or serve as city parks (such as Namur, Liège, Jülich). A handful of former fortifications have even been turned into nature reserves to protect the rare species that dwell there. The Bossche Fronten in Maastricht for instance provides a home for one of the northernmost populations of wall lizards (*Podarcis muralis*) in Europe, not to mention many rare flowers, herbs, and lepidoptera (butterflies and moths).¹

The aim here, as with the previous chapter, is not to question the value of such structures for current ecological conservation, but to expose some of the underlying assumptions. Very few, if any, serious attempts have been made so far to assess to what extent the biodiversity of former fortifications is based on or relates to their management when armed forces still controlled them.² Old walls overgrown with various plants or a ruin covered with moss and/or lichens fit well into a romantic idea of nature reclaiming its rightful place, and support a general belief that ecological conservation and peace are intrinsically linked to each other. It also creates a dichotomy between those who want to preserve the structures' heritage and those who primarily seek to maintain their ecological value. The city of Namur for example suffered disputes on the issue whether the trees standing on the former castle should be removed because their roots could damage historical edifices.³

This chapter studies the ecological impacts of these varied types of fortifications when they still had military value and were maintained with this function in mind. It thus considers fortifications as militarized landscapes in order to establish a link between the historical management of defensive edifices, and their current ecological state. The main aim is to consider whether armed forces had a significant role in bring-

¹ Brandes, "Burgruinen"; Brandes, "Flora und Vegetation"; Harbusch, Engel, and Pir, *Die Fledermäuse Luxemburgs*, 10, 26–34, 74, 90, 136; Maassen and Vennix, *De groene vestingmuren*; Pelzer and Kerz, *Der Jülicher Brückenkopf*; Thoen, "Bouillon"; Weeda, "Maastricht," 258–67.

² See especially Boosten, Jansen, and Borkent, *Beplantingen*; Cremers, Kaaij, and Steenbergen, *Bolwerken*, 121–47; Jordan, "Grün in Festungen"; Neumann, *Festungsbaukunst*, 368–76.

³ Boosten, Jansen, and Borkent, *Beplantingen*, 108–11; Bragard et al., *Namur, la citadelle hollandaise*, 140–42.

ing about and preserving landscape elements that are now considered valuable for ecological conservation, and to what extent they preserved these structures in a manner currently recommended by environmental organizations. If this were the case, then this chapter lays the second keystone for the argument that armed forces did preserve ecosystems centuries before the rise of environmentalism.

Most historical analyses of fortifications only examine them from the perspective of military architecture, or their relationship to general society, and devote little attention to the ecological aspects of such structures. The field of castle studies is an exception, for it has seen an increasing number of studies since the year 2000 that aspire to go beyond the traditional image of “strongholds,” and analyze castles as central elements within larger “noble” or “elite” landscapes. Such novel approaches are invaluable in understanding interactions between armed forces and ecosystems. The meaning of the term “castle” (*castrum*, *castellum*) in medieval sources is in fact quite ambiguous. Often they simply refer to noble “houses.” Recent emphasis on a castle’s basic function as a residence is especially important since it has led to a better understanding of landscape elements that figure as symbols for lordship (woodlands, ponds, gardens, and suchlike). Still, arguing that most castles had no military function, or at least that this function was subordinate at best, as Robert Liddiard has done, might be equally missing the point.⁴

The poem “Le Jugement dou roy de Behaigne,” for example, was written in the 1330s by Guillaume de Machaut, secretary of Johann von Luxemburg, King of Bohemia and Count of Luxemburg (1310/1313–1346). It gives an exceptional description of the house (“castle”) of Durbuy on the Luxemburg–Liège frontier, and describes it as being located on a rocky mount in the middle of a valley, surrounded by a river (the Ourthe). There were orchards filled with birds whose song echoed through the valley, a spring, a fountain, and broad and long meadows above the riverbanks with many kinds of herbs and grasses. The protagonists (a knight and a lady) had never seen a place so beautiful, so noble, and so easy to defend. Even the kings of France or Germany could not take it. The poet also specified that the house was located far enough from the surrounding hills so that no crossbow or siege weapon could reach it. The castle’s aesthetic and military qualities were thus complementary rather than conflicting.⁵

It is worth noting that while this poem certainly gives an idealized image, it is still based on the site’s actual geographical features. Any missile fired from the hills would have to cover at least three hundred metres to reach the fortress. This is indeed outside crossbow range. A trebuchet might still be able to target the fortress, but only by throwing smaller stones, which could only inflict limited damage.⁶ Furthermore, Count Johann of Luxemburg did make efforts to make his house more secure, for in 1325 he asked papal permission to demolish a chapel that impeded its defence, and rebuild it on another location.⁷

4 Coulson, *Castles*; Creighton, “Castle Studies”; Liddiard, *Castles*, 70–96, 151–52.

5 Machaut, *Oeuvres*, ed. Hoepffner, 1:109–111 (vv. 1379–1431).

6 Purton, *The Medieval Military Engineer*, 174–76.

7 Fayen, ed., *Lettres*, 1:592–93; Vannérus and Grob, eds., *Dénombrements*, 551, 559.

Given that distinctions between armies and general society were not drawn very rigidly before the eighteenth or nineteenth century, it is only natural that many fortifications had multiple functions and were well integrated into people's daily lives. Every inaccessible place, including caves, quarries, woodlands, and marshes, could of course become a refuge in times of insecurity. This does not automatically turn it into a "fortification." Churches for instance had an important refuge function, but one can only consider them as fortifications if they incorporated features such as arrow or gun slits, and battlements with or without murder holes (*machicoulis*).⁸ A fortification will therefore be defined in this study as a material reinforcement or barrier constructed or adapted to strengthen a place against attack. It is therefore invariably man-made to some extent, for even rivers, hedges, or woodlands need to be modified to military needs in order to become defensible.

In this context the question against whom people were trying to defend oneself becomes of major importance. One of the reasons why many types of fortifications have been left largely unexamined until now is that scholars assume that a certain scale is a prerequisite before we employ the terms "warfare" or "armies." If one does not accept that huge armed forces with the latest siege equipment were the only threat, then the military function of less elaborate defensive structures is much harder to ignore. Such an approach also has the advantage of contradicting the simplistic, but widespread, idea that rural areas are essentially undefended, or "flat" (*plat pays, platteland*).⁹

The safety provided by fortifications often went beyond warfare and armies, as attested by an example from a late medieval fiscal account. In 1495 the high bailiff of 's-Hertogenbosch sent members of the city's shooting guilds to the village of Liessel, between Eindhoven and Venlo, to bring a notorious highwayman, who had been taken prisoner by the villagers at their *landweer*, to him.¹⁰ *Landweren* or *Landwehren*, earthen embankments with hedges planted on top of them, which could be several kilometres long, had an important role in maintaining safety in the countryside, because they restricted the movements of both people and animals, and forced them to use guarded routes.

It is indeed significant that the term *Landwehr* or *landweer* originally referred to the duty of a population to defend the land if called upon. Given this origin, the word chiefly appears in sources from German-speaking lands, as well as the Northern Netherlands. It is possible that such defences were more elaborate in those areas, but one can find similar structures throughout the Meuse Region. They are just not called *Landwehren*.¹¹ When the chronicler Jean de Stavelot wrote that horsemen from Maastricht rode up to the hedges of Heure le Romain in the late fourteenth century to draw out the defenders,

⁸ Genicot, ed., *Les Tours*, 122–26, 131–42; Pagnotta, *Les églises fortifiées*, 116–28.

⁹ Gaier, "La fonction." See also Gold and Revill, "Landscapes of Defence."

¹⁰ Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. no. 12996, 080.1.2.12 (transcript Henk Beijers Archiefcollectie); Kraus, *Die Aachener Stadtrechnungen*, 426. See also Contamine, "Scènes de chasse," 238.

¹¹ Brokamp, "Landweren," 1:13–26, 1:30, 1:38–57, 2:104; Engels, "Die Instandsetzung"; Gaier, "La fonction," 767–68; Huyskens, "Stadtbefestigung," 183–88; Kneppel, ed., *Landwehren*; Ulrix and Paquay, *Zuidlimburgsche plaatsnamen*, 8, 20, 26–31, 41–44, 47, 56, 58–59, 66, 86–87, 91.

he meant that they approached the barriers that defined the spatial limits of the village. The settlement might have been fortified with ditches and earthen embankments in the same way as a city wall.¹² Hedges, with or without ditches, are one of the most ubiquitous, but also most neglected, object of study as fortifications. Similar defences can be found in many parts of Europe, in Sub-Saharan Africa, the Yucatan, and Southeast Asia. Caesar already mentioned their use by the Nervii, probably in the Scheldt basin, in the first century BCE. It is an agricultural technique that could easily be converted to warfare.¹³

Many hedges would have been composed of common hawthorn (*Crataegus monogyna*), which is still used in the Meuse Region today. Alternatives could include blackthorn, seabuckthorn, and non-thorn bearing trees or shrubs such as beech, oak, and hazel, depending on the hedge's primary function. Woodlands acting as barriers in frontier landscapes could also be called "hedges" for instance (such as the Haies d'Avesnes). A hawthorn hedge is the most difficult to get through, but its wood is an unsuitable source of either fuel or timber. The "laying" of a hedge, a general term to describe techniques to cut and intertwine branches in such a way that the hedge becomes an impassable wall, was likewise a common way to turn a hedge into a more formidable defence, but it made it a far less productive supplier of wood. Some hedges were not even composed of living plants: the use of wooden poles with willow branches woven between them was a common alternative.¹⁴

The late medieval accounts of cities like Geldern, Grave, and Venlo suggest that many structures were actually combinations of living hedges and fences, as they mention the use of wooden poles, planks, willow branches, and thorns.¹⁵ Given that it takes several years before a newly planted hedge becomes a real obstacle, and that it is always possible that gaps appear because individual plants die, it was common practice to combine living with non-living materials. Once a hedge has matured, however, it is far easier to maintain than fences or palisades.¹⁶ A small town like Bree for example, located in the Campine/Kempfen, planted three thousand eight hundred thorn bushes and twelve

12 De Stavelot, *Chronique*, 114.

13 Caesar, *Gallic Wars*, Book 2, chapters 17–26; Charney, *Southeast Asian Warfare*, 92; Palka, "Ancient Maya Defensive Barricades," 428; Seignobos, "Pre-Colonial Plant Systems."

14 Brokamp, "Landweren," 1:46–48; Capelle, "Landwehrbau," 26–28; de Groot, *De stadsrekeningen*, 1385 fol. 6; 1386 fol. 7; 1387 fols. 5, 8; Ducape-Lamarre, *Chasse et pâturage*, 240–41; Kraus, *Die Aachener Stadtrechnungen*, 155; Kuppers, "De stadsrekeningen," 105, 134, 220; Vera, *Grazing Ecology*, 159–62; Weerth, "Westfälische Landwehren," 160–61.

15 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fols. 7r, 94r, 217r, 258r, 267r, 277v; inv. no. 218, fols. 173v, 175v; de Groot, *De stadsrekeningen*, 1384 fol. 5; 1385 fols. 7, 8, 39; 1386 fol. 7; 1387 fols. 24, 26, 28; 1388 fols. 9, 15, 26; 1394 fols. 9–10; 1396 fol. 16; 1397 fols. 8–9; 1399a fol. 8; 1400 fol. 6; 1402 fols. 9, 20; 1404 fol. 24; 1405 fol. 14; 1406 fol. 8; 1407 fol. 15; 1408 fol. 10; 1409 fols. 10–12, 14; 1412 fol. 41; 1415 fol. 28; Kuppers, "De stadsrekeningen," 8–11, 20–22, 35, 48–49, 61, 83, 124.

16 Bragard, "Soldats et jardiniers," 95–96; Bragard et al., *Namur et ses enceintes*, 42; de Groot, *De stadsrekeningen*, 1377 fol. 6; 1400 fol. 7; 1408 fol. 9; Marchal, *Inventaire*, 155; Moreau, *Bolwerk der Nederlanden*, 128; Pagnotta, *Les églises fortifiées*, 21–23; Rizzo, "La prévôté de Marville," 28; van Nispen, *Willemstad*, 36.



Figure 10. A knight errant encounters a hedge made of shrubs and spiked heads, miniature from a *Lancelot-Grail* manuscript made in Verdun or Metz, late thirteenth century (Paris, BnF, MS français, 344: *Roman arthurien*, fol. 388r).

willows on the slope next to its moat in 1507–1508. This corresponds closely with the known length of its walls; about twelve hundred and twenty-nine metres.¹⁷

It is precisely this maintenance argument, aside from the resistance to artillery fire, which led famous engineers such as Daniel Specklin (1536–1589), Sébastien Le Prestre de Vauban (1633–1707), and Henri-Alexis Brialmont (1821–1903), to recommend their planting. Thorn bushes in particular performed a similar function to barbed wire, and it is illuminating that the demise of hedges, first in military contexts (late nineteenth century), then in agriculture (mostly after the Second World War) corresponds closely to the latter's adoption.¹⁸ Jean d'Haynin, a nobleman from Hainaut, obtained first-hand experience of hedges' defensive value during the Burgundian invasions of the Prince-Bishopric of Liège in 1466–1468, and later wrote down a description of these encounters in his memoirs. According to this exceptional witness account the hedges were

¹⁷ Maes, *De geschiedenis van Bree*, 2, 21.

¹⁸ Belonje, "Beplantingen," 91–94; Boosten, Jansen, and Borkent, *Beplantingen*, 36–39; Brialmont, *Etudes sur la défense*, 1:167, 1:325; de Vauban, *Traité*, 26–27; Jordan, "Grün in Festungen," 101–2; Netz, *Barbed Wire*, 23–31, 56–63; Speckle, *Architectura*, 27r, 31r, 108v, 109r.

eventually overcome, but only after the soldiers dismounted, and they had great difficulty getting through (once they even had to use ladders). Hedges seem to have been especially valuable as anti-cavalry obstacles in open landscapes, such as Hesbaye, but d'Haynin also mentions that the villagers of Loverval, near Charleroi, turned their woodlands into more effective barriers by constructing hedges (*les bois estoie hayes*).¹⁹

It is possible that events similar to those described by Jean d'Haynin found their way into literary works as well, for tales of medieval romance are enduring testimonies to the efficacy of these hedges (see figure 10). In the famous *Roman de la Rose*, from the second half of the thirteenth century, the narrator fell in love with a rose that grew in an enclosed garden protected by a thorn hedge, and later had to rescue her from the fortress where she was held prisoner. It served as a major inspiration for the *Roman de Perceforest*, probably written in the County of Hainaut in the early fourteenth century. This remarkable story tells of the deeds of a knight errant who also had to pass through thorns and dense woodlands to reach his beloved. It is one of the oldest written versions of the fairy tale later known as "Sleeping Beauty."²⁰

Hedges are one of the most important, but not the only, type of fortification that is often overlooked because it does not fit well into the traditional military-civilian dichotomy. Many churches in the Meuse Region were also fortified, a logical consequence of their role as ultimate refuge.²¹ Relatively large numbers of such fortified churches have been preserved in the southern half of the Meuse Region, but they existed elsewhere as well. The city accounts of Grave record, for instance, that its citizens besieged the church of Herpen in 1463. Some churches had defensive value that went beyond mere local defence, as in 1408, when John the Fearless, duke of Burgundy (1404–1419), insisted during the peace settlement with Liège that the walls of all fortified churchyards located next to the Sambre had to be demolished, which is difficult to understand if they were mere refuges for the villagers.²²

The use of fortified mills, and forges, is even more poorly understood than that of fortified churches. Mills were a prime target for raiders because they had a crucial socio-economic function, represented wealth, and their supply of water or wind energy made them stand apart of the rest of a settlement. In 1397, for example, Willem I Duke of Guelders and Jülich (1377/1393–1402), attempted to destroy a windmill built on top of a bulwark outside the gates of 's-Hertogenbosch, but retreated when one of his knights was shot down. To save face he then burned a windmill that stood unprotected outside one of the other gates.²³ Forges were vulnerable because of their role in arms

¹⁹ Haynin, *Mémoires*, 1:138–39, 1:161, 1:223, 1:225, 1:226, 1:233, 1:235–37. See also Froissart, *Chroniques*, 3:35–36.

²⁰ Bryant, ed., *Perceforest*; Horgan, *The Romance of the Rose*.

²¹ Genicot, *Les églises mosanes*, 276–303; Girardot, "Les forteresses," 7, 17–29, 38–44; Harrison, *Castles of God*; Pagnotta, *Les églises fortifiées*; Rousseau, "Tours domaniales"; Rousseau, "A propos de la recherche de la sécurité"; van Helen, *Rymkronyk*, 130; Wright, *Knights and Peasants*, 102–15.

²² Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 135v (transcript Rien van den Brand, <http://www.scriptoriumempeje.nl>); Chevalier, "Les 'attres' fortifiés," 37–41.

²³ van Boendale, *Brabantsche yeesten*, 2:341 (book 6, vv. 9907–9929).

production, and their need for running water. Fortifying both mills and forges could thus become a valid option in times of insecurity. The most conspicuous are two of the largest forges in the Meuse Region, those of Nouzon, near Charleville, and Ster (Vaux-sous-Chèvremont near Liège), which accommodated small garrisons in the seventeenth and eighteenth century.²⁴ Perhaps the most striking case is the so-called “Tomp,” a fifteenth-century windmill in the north of the Prince-Bishopric of Liège (at Achel). This structure was studied as a noble tower for decades, simply because it included obvious defensive features (gun slits, a hedge/fence, and a ditch).²⁵

Noble houses (“castles”) certainly constitute one of the most archetypical fortifications, but here similar confusion exists. First of all, relatively few such noble houses resemble the classical castle as traditionally depicted. Jacques de Hemricourt, a nobleman from Liège, wrote in the late fourteenth century a history of the famous feud between two of the most powerful noble families in the Prince-Bishopric: the War of d’Awans and de Waroux (1297–1335).²⁶ In this book he makes a distinction between three types of noble houses: a fortress (*forteresse*), a tower (*tour*), and a simple house (*plat maison*). The first corresponded closely to the stereotypical medieval stronghold, while the others refer to simpler structures. It is in fact unclear whether a *plat maison* could be considered as a fortification at all.²⁷

Still, even the smaller types of noble house, which were also the most common, had some defensive worth. The Dutch/German word for a manor house with a tower, a *blokhuis*, is the same term used to describe temporary fortifications built from the thirteenth to the mid-sixteenth century during armed conflicts to either block access to a besieged city or fortress, or control traffic on a major river such as the Meuse.²⁸ A fourteenth-century book of fiefs from the County of Loon, for example, mentions in 1367 *unam assisiam, cum una turri dicta vulgariter blockehuys*, located near the village of Milten, close to Maastricht. It is likely that when the Count of Loon agreed to participate in the siege of Gripekoven, near Roermond, in 1354, and provide thirty men-at-arms and thirty crossbowmen as garrisons for two *blokhuizen*, that these structures were closely modelled on such noble houses.²⁹ The major difference being that they were typically made of wood rather than stone. Fiscal accounts suggest that their defences included ditches, fences, and *gabions*. At least one sixteenth-century *blokhuis* also comprised a drawbridge. They might have resembled both the *bastilles* of the Hundred Years

²⁴ Adriaenssen, *Staatsvormend geweld*, 59–60; Barbe, Laverdine, and Parizel, *Moulins*, 16–17; Bertrand, “La forge”; Desbrière, *Chronique critique*, 118–19; Douxchamps-Lefèvre, *Inventaire*, 4:172; Gaier, “La fonction,” 766; Gaier, *Art et organisation*, 243, 250; Hansotte, “L’industrie métallurgique dans la vallée de la Vesdre,” 183; Langlet, “La forge fortifiée”; Marchal, *Inventaire*, 167; Matthieu, “Construction d’un fort avancé”; Rizzo, “La prévôté de Marville,” 28.

²⁵ Claassen, *Van mottoren tot kasteel*, 27–34; Doperé and Ubregts, *De donjon*, 130.

²⁶ de Hemricourt, *Traité*.

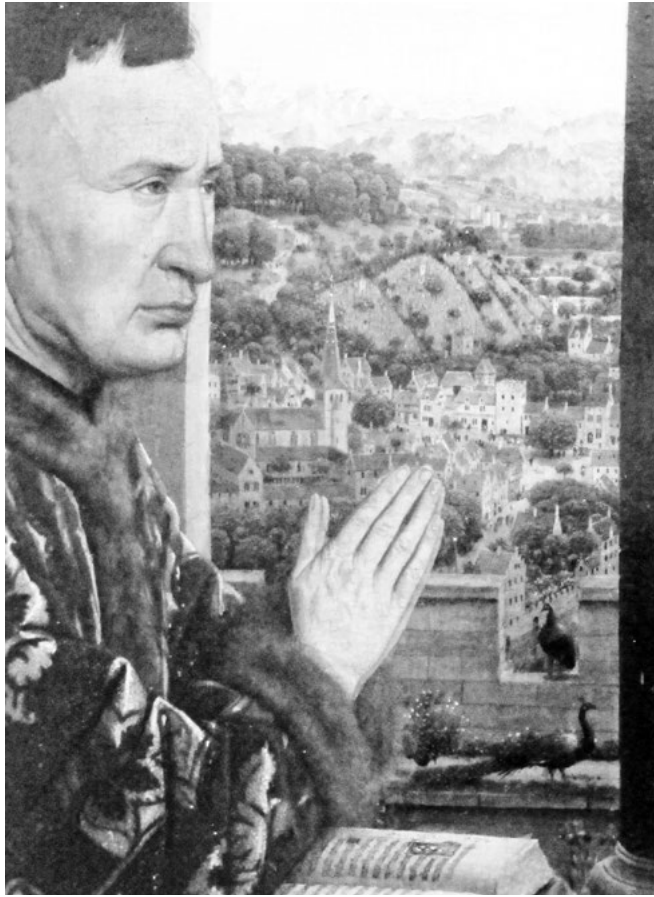
²⁷ Coulson, *Castles*, 42–63; Genicot, ed., *Les tours*, 31–38.

²⁸ Girardot, “Les forteresses,” 29–38; Laurent, *Aachener Stadtrechnungen*, 291; Waale, *De Arkelse oorlog*, 129.

²⁹ de Borman, *Le livre*, 55–56; Ennen, *Quellen*, 394–95.

War, and bastions (bulwarks, *bolwerken*, *boulevards*) built to defend gateways in the Late Middle Ages (the word *blokhuis* was often used interchangeably with *bolwerk*).³⁰

These *blokhuisen* played a similar role to the motte-and-bailey castles made during military campaigns in the eleventh and twelfth centuries, and the earthen forts (*sconces*, *schansen*, *Schanzen*, or *redoubts*) constructed from the late sixteenth century onwards.³¹ All these fortifications have in common that they can be built relatively quickly, and that their construction mainly requires the presence of large numbers of semi- or unskilled labourers. Alpert of Metz records for example that in the early eleventh century Count Wichmann of Vreden ordered local peasants to make a motte-and-bailey castle on an island in a lake, which was located about two hundred paces from the Meuse River itself. This refers to the village of Boxmeer, which lies next to a dead arm of the Meuse, and a Roman road connecting Nijmegen with Cuijk. Wichmann's fortification was taken and demolished shortly after its construction, but the location retained major strategic value. A *blokhuis* situated at Boxmeer was besieged in 1284 by the count of Holland, and again in 1365 by the duke of Brabant, because its owners exacted toll from merchants travelling along the Meuse. Habsburg forces partially demolished a castle built on this same location in 1572 and 1590.³²



30 Douglas Smith and DeVries, *The Artillery*, 341; Hanssen, *Inventaris*, 24–26; van Zuijlen, *Inventaris*, 1:xi–xii, 1:91, 1:94, 1:97, 1:261, 1:279, 1:441, 1:497, 1:507, 1:513, 1:523, 1:557; Waale, *De Arkelse oorlog*, 185–90.

31 Creighton, and Wright, *The Anarchy*, 51–73; Raynaud, “‘Défenses annexes’”; Rogers, *Soldiers’ Lives*, 95.

32 Alpertus Mettensis, *De diversitate temporum*, 710–11; Aarts, “‘Montferland’ en de consequenties,” 34–37; Bachrach, “‘Civilians and Militia’”; Burgers and Dijkhof, eds., *De oudste stadsrekeningen*, lxxviii, 30–31; van Helen, *Rymkronyk*, 108.



Figure 11. Madonna and chancellor Rolin, early fifteenth century (detail). Painting by Jan van Eyck. Paris, Musée du Louvre; reproduced by Directmedia Publishing GmbH). Note the peafowl in the foreground, whose presence in castle contexts is also attested archaeologically.

Broadening our definition of the range of structures that functioned as fortifications is only the first step. In order to come to a better understanding of army–ecosystem interactions at a landscape level, we need to consider them as elements in larger defence systems rather than as isolated points of resistance. Creating systems or networks of defence, that is organizing communication and cooperation between the defenders of individual fortifications, adds to the strength of the whole. In ideal circumstances defence systems ensure that the entire landscape works against the enemy. Given that the establishment of such defence systems is well known for early modern and nineteenth-century states (such as the Hollandic Water Line or Vauban’s *pré carré*) this chapter emphasizes their functioning in the absence of permanent armed forces.³³

33 See also Strickland, “Securing the North.”

From the eleventh century onwards the most important, most elaborate fortifications, the very core of defence systems, were invariably made of stone. Stone stood as the preferred building material because of its durability and resistance to the two most common assault techniques: setting fire and breaking down obstacles with an axe.³⁴ Fire in particular presented a very serious threat: fiscal accounts from castellans and urban councils demonstrate that the roofs of towers and gates in major fortresses, such as Valkenburg, and prominent cities, such as Maastricht, were made of straw until well into the fifteenth or sixteenth century.³⁵

The Meuse Region itself was a well-known centre of stone production. The Meuse valley from Givet to Maastricht more specifically had a good reputation for the quality of its limestone, and it was transported along the Meuse. A few isolated shipments ended up as far as Utrecht and Frisia. River cobbles, silex, schists, or sandstone provided the main alternatives, sandstone being especially common in the Eifel and Ardennes. Because land transport was so expensive such natural stone constituted only a relatively small part of building materials, bricks being the main component of most stone structures. However, since bricks were generally made from local materials, many of these can be considered calcerous as well. Fortresses located on rocky hilltops, such as Poilvache or Valkenburg were simply built or expanded by broadening the moat.³⁶

The background of a well-known fifteenth-century painting, "Madonna of Chancellor Rolin," shows various stone fortifications (fortresses, city walls, a fortified bridge) scattered throughout a landscape, which is centred on a major river (see figure 11). It is possible that the artist, Jan van Eyck, who came probably from Maaseik, had his native region in mind when he created this work of art. Jean Lejeune has identified the stone bridge as the *Pont des Arches* of Liège. This bridge, fortified by a massive gateway, existed from the eleventh century until its destruction by massive flooding of the Meuse in 1409. It protected the city's core from the district on the right riverbank, Outre-Meuse, which lacked city walls until the thirteenth century.³⁷

The landscape created by Jan van Eyck is more or less fictional, as one of the city's towers is based on the Dom Tower in Utrecht, but actual defences in the Meuse Region might still have looked quite similar to it. The paintings of the brothers van Eyck are indeed famous for their realism and detail. This depiction of a river valley is significant, because it shows that fortifications have to be considered as part of larger defence systems rather than as individual structures. A similar emphasis on landscape control

34 Raynaud, *A la Hache!*, 346–49.

35 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 17v; *Informacie up de staet faculteyt ende gelegenthey*, 464; de Groot, *De stadsrekeningen*, 1385 f. 21, 1388 f. 8, 1398 f.10, 1403 f.12, 1407 f. 17; Genicot, ed., *Les Tours*, 92–94; Kappelhof, "De heren en drossaarden," 24–25; Marwede, *Die Befestigung*, 36–38; Moreau, *Bolwerk der Nederlanden*, 95–96; Uitterhoeve, *Burg Rode*, 14.

36 Coenen, "Een kasteel," 61, 66; Doperé, "Steengroeven," 102–10; Genicot, ed., *Les Tours*, 78–82; Marwede, *Die Befestigung*, 17–21; Moreau, *Bolwerk der Nederlanden*; Mourroux, "Stenay, ville militaire," 44; Olson, "Medieval Stone Production," 189–208; Rhoen, *Aachen*, 124–31; Roosens, "Habsburgse defensiepolitiek," 262–63, 346; Silvertant, *Valckenborgh*, 87–89, 95–107.

37 Henaux, "Note sur le pont des Arches."; Lejeune, *Les Van Eyck*, 127–31, 154–55; Snyder, "Jan van Eyck."

existed in the small city-state of Aachen, where the watchtowers in the *Landwehr* stood in direct visual contact with the towers of the city walls. The inclusion of visual control, reminiscent of the original meaning of the term landscape (land-scape: a view, or scenery of a collection of lands), is necessary to understand individual fortifications as parts of networks, not to be seen in isolation from other ways of communication.³⁸

Once a threat was identified and located mobilization of defending forces generally occurred through sound.³⁹ Horns, drums, and gunshots could all raise the alarm, but none of these instruments could rival the importance of the *bancloque* or *stormklok*, kept in the bell tower of a parish church, belfry, or fortress, to assemble the ban's population in case of alarm (some villages did not have a *bancloque*, but instead sounded all church bells at the same time). When this bell called all able-bodied adult males had to assemble and prepare to either defend the settlement, pursue criminals, or put out a fire. This bell was also the heaviest and largest one because its sound needed to carry across the entire territory of the ban (its "soundscape"). The reach of the *bancloque* corresponded to the limits of the ban's jurisdiction.⁴⁰

Organizing systems of defence was rarely such a straightforward process, however. Authority over Maastricht for instance was shared between the duke of Brabant and the bishop of Liège, and to make matters even more complicated the city's hinterland included several imperial immediacies, lordships that were held directly in fief from the emperor. When Maastricht became involved in a conflict between Brabant and Jülich-Guelders in 1396, the city council made known to several lords in the area (those of Kortesseem, Stein, Elsloo, Rekem, Neerharen, Born, Pietersheim, and Mopertingen) that if any raiders passed through their lordships, they had to sound the bells and pursue them, or the city would recompense itself double for the damage done by confiscating their goods or those of their subjects, and taking them prisoner. The lords in question were fiefholders of the duke, and some might have been citizens of Maastricht, but theoretically the city had no authority to command them.⁴¹

This order, while threatening, was not an isolated incident, for both cities and rulers did their best to convince more or less independent lords or village communities to cooperate with them and join their defence system. A classic example are agreements between a particular nobleman on the one hand, and a ruler or city on the other, which stipulated that the former would provide armed service when required, or that the latter could treat his fortress as an "open house," meaning that they had access to it during

³⁸ Huyskens, "Stadtbefestigung," 186. See also Bertrand, "Les trois tours," 1–7, 16–18; Guénoun, "Deux edifices," 83, 85.

³⁹ Desbrière, *Chronique critique*, 31; Sabron, *De oorlog*, 2:32–33, 2:xv; Unger and Bezemer, *Oudste stadsrekeningen*, 50; van Mastrigt, *Willemstad prinsheerlijk*, 79, 158–59; van de Venne, *Het beleg*, 20.

⁴⁰ Becquet, "Montaigle," 123–24; Berens, *Territoriale Entwicklung & Grenzbildung*, 140; Jacobs, *Justitie en politie*, 161; Kaisin, *Annales historiques de la commune de Chatelineau*, 94; Sartelet, *La principauté*, 67.

⁴¹ van der Eerden-Vonk, *Raadsverdragen*, 218–19. See also Coun, "Een Middelnederlandse rol" and Koreman, *De stadsrekening*, 98, 108–9, 116, 118, 120.

armed conflicts.⁴² Yet such contracts invariably included caveats that a nobleman could not be forced to fight against a ruler to whom he owed fealty, a consideration of particular importance in the politically fragmented Meuse Region.⁴³

At the other end of the spectrum, cooperation between the different elements that constitute a premodern territory could not be taken for granted. The numerous messages that rulers, cities, and individual lords sent to one another in wartime, payments for which appear regularly in accounts, certainly give a perception of regular cooperation and communication, but defence primarily remained a local matter.⁴⁴ The town of Tongres (Tongeren in Dutch) for instance refused the bishop's soldiers entry in December 1566, and only acceded to its ruler's demands after extended negotiations, during which he promised to pay for their upkeep.⁴⁵

While cities and noblemen had good reasons to fear loss of autonomy and status, it was the mass of lowly peasants that paid the heaviest price. The duke of Bar instituted a policy of *traire à forteresse* in the mid-fourteenth century, meaning that the rural population had to seek refuge in fortresses with their movable belongings in case of attack. This reinforced their dependency on local lords and undermined the relative increase in status and autonomy they had gained during the preceding period. In exchange for protection during a period of insecurity, the Hundred Years War, they were forced to perform labour duties typically associated with serfs: maintenance work on a ruler's fortress, notably cleaning the moat, and delivering certain supplies, such as wood, free of charge. Some also had to perform guard duty. The significant development is thus that obligations that had previously been bought off now had to be performed physically again, or were now being imposed for the first time.⁴⁶

In 1402 the villagers of Vaux-la-Grande started a lawsuit against Amé de Sarrebruck, lord of Commercy, because he forced them to perform guard duty in his fortress. The villagers argued that Commercy was not part of the kingdom of France, that the road was long and led through woodland (the village lies about fifteen kilometres southwest of the town), and that they had their own fortified church. Their opponent responded that Commercy was an important city on the frontier, and that its security was in the king's interest. Furthermore, the villagers were not allowed to turn their church into a fortress, it could only serve as a refuge during a raid.⁴⁷

The southern half of the Meuse Region was hardly unique in this (re)imposition of labour duties. The Habsburgs and the bishops of Liège similarly ordered peasants to

42 Girardot, "Les forteresses," 44–55; Laurent and Quicke, *L'Accession*, 382; Noordzij, *Gelre*, 143–45.

43 Burgers and Damen, "Feudal Obligation or Paid Service," 788.

44 Deloffre, "Guerres et brigandages"; Dinstühler, ed., *Die Jülicher Landrentmeister-Rechnung*, 60–75; Gentenaar and Hupperetz, "Personeel en werkzaamheden," 187, 210–13; Roosens, "Habsburgse defensiepolitiek" 94–100; Ward, "Holland," 185–89.

45 Tongeren, SAT, Resoluties, inv. no. 2, fols. 262, 264v.

46 Bar-le-Duc, ADM, B 1879, fol. 131r; 1907, fols. 2–3; Coulson, *Castles*, 285–90; Girardot, "Les forteresses," 9–16; Girardot, *Le droit et la terre*, 2 :474–78; Servais, *Annales historiques du Barrois*, 1:96, 1:178, 1:261; Villa-Séblin Nicole, *La sénéchaussée*, 190, 192.

47 Luce, *Jeanne d'Arc à Domrémy*, 21–23.

help expand or maintain the fortifications of nearby fortresses and cities during the fifteenth, sixteenth, and seventeenth centuries. The temptation to use them as a cheap source of manual labour simply proved too great.⁴⁸ A notarial act from Maaseik from 1697 lists the complaints of villagers from Haelen, Buggenum, Neer, Heythuysen, and Ophoven, who all had to provide manpower to defend the castle of Horne (the seat of this small county). Most villages had to supply guards, except for Ophoven, which was located at considerable distance and instead had to clean the castle's moat and ponds once a year. Apparently, they now had to obey a new castellan who demanded six guards instead of four, made them stay day and night instead of solely acting as night watchmen, and tripled the fine for disobedience. Moreover, the guards now had to bring their own firewood, and often had to perform chores, such as helping with the harvest, with just one man standing guard.⁴⁹

Such misuse of military obligations encouraged rural populations to maintain or expand their own defences, especially fortified churches, which gave them stronger leverage to refuse newly imposed obligations, but also weakened the organization of defence systems. It is precisely because of its unpopularity that arrested vagrants or beggars were increasingly forced to construct or maintain fortifications from the mid-sixteenth century onwards (see chap. 4). It also reveals the difficulty of organizing and sustaining defence systems in the absence of permanent armed forces.

The imposition of labour duties reflects a fundamental but often overlooked problem: that of maintenance. Every man-made structure will eventually disintegrate due to a combination of factors: decay of organic materials, impact of weather and climate, and processes of ecological succession. Ecological succession refers to phases of vegetation growth, which follow each other after a disturbance, in this case the building of a fortification, until a climax point is reached. In Western Europe this climax stage consists typically of oak-beech forests. If a stone wall is not maintained, soil will start to accumulate on the wall's surface, and in cracks and fissures. This in turn allows different kinds of plants to establish themselves, first grasses and herbs, then woody plants. Their root system adds to the destabilizing of the wall until only ruins remain. Moats filled with stagnant water likewise become shallower over time due to the accumulation of soil and the growth of plants such as reeds.⁵⁰

The results of archaeobotanical research carried out in the former fortress of Lomprez (Duchy of Luxemburg) are very informative in this regard. We know from the

48 Arnhem, GA, Hertogelijk Archief, inv. no. 1580, fol. 11r; Bodard, ed., *Recueil des ordonnances du Duché de Bouillon*, 30, 44, 53–54, 82, 85, 87–88; Cuppens, "Opoeteren," 327–30; de Waha, "Château et village," 423–26; Driessen, *Emundt van Oeteren*, 653–54; Gillessen, ed., *Die ältesten Kellnereirechnungen*, 98; Habets, "Costumen," 167–70; Hasquin, *Une mutation, le "Pays de Charleroi"*, 231; Hoppenbrouwers, "Een middeleeuwse samenleving," 16, 590–91; Kaisin, *Annales historiques de la commune de Chatelineau*, 92, 113, 199; Lefebvre, "Bastogne," 338–39; Roosens, "De invloed van de vestingbouw"; Van den Brand, "Spaanse vestingbouwwerkzaamheden," 82–83; von Below, "Die Leistungen."

49 Hasselt, RAH, Notaris Claessens 1663–1702 (microfilm no. 1462274, item 5) fol. 616: act June 16, 1697.

50 Peeters et al., *Sloten*, 51–55; Segal, *Ecological Notes*, 46–47, 67–75.

chronicler Jean de Stavelot that this house was burned down and abandoned in 1445. Only twelve men defended it. Pollen research now reveals that the banks of the moat originally, in the fourteenth century, supported relatively little vegetation, and that vines and fruit-bearing trees (common walnut and hop) grew close to the moat, presumably in a garden. Over time, aquatic plants, such as meadowsweet (*Filipendula ulmaria*), gave way to weeds such as redshank (*Polygonum persicaria*), which means that the moat turned into land. This process occurred gradually at first, and then accelerated, possibly in tandem with the abandonment of nearby agricultural fields and the use of the moat as a watering trough and for disposing waste.⁵¹ These results can be compared to a study of plant seeds in the castle of Eindhoven from the sixteenth and early seventeenth centuries. This analysis suggests that the moat was quite shallow and polluted by waste from butchering and faeces. Historical sources confirm that when the castle was attacked in 1604 the moat was only 1.26 metres deep and constituted no obstacle to the attackers' assault ladders.⁵²

Medieval fiscal accounts are filled with references to the construction or maintenance of fortifications, but this does not necessarily prove that defences were well preserved. Many fortifications were so extensive, with city walls measuring several kilometres or more in length, that there was always work to be done. The accounts of Venlo note for instance that master Harman Wegge and his attendants needed 137 days to clean the city's moats in 1411. This hardly indicates regular maintenance. The city council did call upon its citizens to clean the moats in 1409, a war year, but this might not have been enough, or the work was not done properly. Cutting a plant above water level was after all not sufficient; it had to be pulled out entirely. Accounts from Maastricht, from 1399–1400, specify that the city bought a hook as well as a scythe to remove grass from the moats.⁵³ The cleaning of the moats of Mons was apparently noteworthy enough in 1523, also a war year, for Antoine de Lusy to include it in his chronicle. He explicitly said that the work came at great cost to the city, but that they also profited from it, because they could sell the grass. The 1581 accounts of the castellany of Longwy mention that seventy-two villagers had to remove trees and bushes from the fortress's moat.⁵⁴

It is indeed revealing for the haphazard character of the preservation of fortifications that authorities might have not proceeded with it if not for external events. Every fortification built next to the Meuse or its main tributaries ran the risk of being flooded after which repairs needed carried out, if only to prevent worse disasters in the future. In most cases, however, an imminent enemy threat provided the most convincing reason for spending money on fortifications.⁵⁵ The accounts from Venlo reveal that in 1388,

⁵¹ de Stavelot, *Chronique*, 555; Heim, "Wellin/Lomppez."

⁵² Luijten, "Zaden en vruchten," 240–44. See also Gillesen, ed., *Die ältesten Kellnereirechnungen*, 98, 109, 111; Moreau, *Bolwerk der Nederlanden*, 58, 63–64, 215; Thomas, "Hygiène," 269–70.

⁵³ de Groot, *De stadsrekeningen*, 1388 fol. 15; 1409 fol. 15; 1411 fol. 16; Koreman, *De stadsrekening*, 148, 155.

⁵⁴ Bar-le-Duc, ADM, B 1936, fol. LXIXv; de Lusy, *Le journal*, 218.

⁵⁵ Bodart, *Société et espace urbains*, 123; Boonen, "De Maaseiker wallen," 52, 58; Driessen, *Emundt van Oeteren*, 656; Kuppers, "De stadsrekeningen," 8–11, 22, 33–39, 220; Lamort and

when a French army attempted to invade, the Count of Jülich sent four knights to inspect the defences.⁵⁶ The cutting of wood in the *Landwehr* that defended the frontier between the Duchy of Limburg against attacks from the Prince-Bishopric of Liège had always been a punishable offence, but in 1468, when Duke Charles the Bold was at war with Liège, an offender risked capital punishment and the confiscation of his possessions, instead of a heavy fine of six Rhenish florins.⁵⁷

Enemy threats thus ensured that military needs came to dominate structures that normally served multiple purposes. The town of Grave, for example, leased several of its towers and gates to private citizens in the fifteenth century. A 1452 contract, copied into the urban accounts, specified that a widow and her son could rent the tower and associated land located next to their own house on condition that they constructed a slate roof. The town reserved the right to take full control over the tower again in case of war.⁵⁸ In an agreement from 1480 the city council of Maastricht similarly let a section of the city wall of Wijck, the part of the city that lay on the eastern riverbank, for four years to a citizen, who could fish in the moat, and pollard the willows.⁵⁹ These willows served as sources of wood, and their roots stabilized the soil. The fact that some towers were named after individual guilds (such as the Lakenmakerstoren in Tongres/Tongeren) suggests that in some cases the latter were responsible for maintenance or defence of specific stretches of the city wall.⁶⁰

Private citizens also owned gardens or fields next to the walls and made posterns to allowed them to go in and out the city without having to pass through one of the main gates. It goes without saying that such entrances had to be filled up with solid masonry if there was any threat of an attack.⁶¹ This in turn created different problems. A municipal act from Namur, dating to 1430, when troops from Liège invaded the county, indicates

Huguenin, *Chroniques*, 539–540; Lhoist-Colmon and Gabriel, “La colline,” 25, 28; Liégeois, “Compte de la recette de Chiny,” 147, 152; Moreau, *Bolwerk der Nederlanden*, 79, 160; Soetaert, *Inondations urbaines*, 33, 36–37; Unger and Bezemer, *Oudste stadsrekeningen*, 63–64, 66; van den Brand and Manders, *Vesting ‘t Gennepshuys*, 386–87.

56 de Groot, *De stadsrekeningen*, 1388 fol. 8.

57 Yans, *Histoire économique*, 106. See also Geldern, Stadtarchiv, A, no. G9, Stadtrechnung, fols. 140r, 177 (1590–1591) (transcript Rien van den Brand); Tongeren, SAT, Resoluties, inv. no. 1, fol. 184r; inv. no. 2, fols. 211v, 266v–267; Bormans, “Table des régistres,” 12:13; Buchin, “Erard de La Marck,” 70; de Groot, *De stadsrekeningen*, 1403 fols. 8, 12; 1409 fol. 15; Roland, ed., “Chronique Namuroise,” 120–21; van der Eerden-Vonk, *Raadsverdragen*, 234, 238.

58 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fols. 194r, 220r, 263r; inv. no. 218, fols. 34r, 43r, 54r, 131r.

59 W.G., “Verpachting.”

60 Grave, SLC, Archief Gemeente Grave, inv. no. 218, fols. 16r, 24v, 49v, 91r; Bormans, “Table des régistres,” 11:270; Koreman, *De stadsrekening*, 148, 154–55, 157, 164; Kuppers, “De stadsrekeningen,” 20, 34, 35, 48, 49, 69, 70, 72, 92, 123, 124, 235, 283, 296, 316; Piérard, *Les plus anciens comptes*, 1:573–76.

61 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 90v; Bormans, “Table des régistres,” 12:13; Douxchamps-Lefèvre, *Inventaire*, 2:271; 3:335, 3:348, 3:363: 5:87; Gaier-Lhoest, *L'évolution topographique*, 48–53; Moreau, *Bolwerk der Nederlanden*, 8, 13, 30; Sartelet, *Mézières*, 12.

that waste kept piling up alongside three houses on the city wall, because the nearby postern had been closed.⁶² A surviving copy of a 1396 charter kept in the archives of the bailiwick of Alden Biesen demonstrates that the city council of Maastricht went a step further and granted the Teutonic Order custody over one of the city gates, located within the gardens of the bailiwick. This privilege still applied in 1784 when the chief engineer of Maastricht ordered his assistants to investigate how a sortie, a small gate, in the commandery's orchard could be secured without violating the institution's rights.⁶³

Responsibility for the upkeep of fortifications lay with bodies or individuals who, at least theoretically, were concerned with the common good. This involved the upholding of law and order, as well as socio-economic concerns and public health. It is unlikely that urban councils, castellans, or high bailiffs would have given priority to military matters above all others unless a specific threat gave them a good reason to do so.⁶⁴ The use of fortifications for other functions besides warfare can be considered as a practical way to ensure basic maintenance. It also means that a considerable part of maintenance work does not appear in fiscal accounts. Gateways and towers typically became living spaces for gatekeepers, gunners, or watchmen, and served as storage places for gunpowder and prisons. Some were even used to store archives (such as a tower in Namur castle). Because urban councils kept fish in the moats or allowed the construction of water mills some citizens had an incentive to clean and deepen the ditches.⁶⁵ A thirteenth-century charter from Liège shows that the city council leased part of the moat to a private citizen on condition that he made sure it remained at least two metres wide.⁶⁶

This ambiguity is mirrored in the contested presence of animals in or near the fortifications. The accounts of Rotterdam from the year 1426–1427, for example, include a payment for the making of a fence to prevent livestock walking on the walls.⁶⁷ This suggests that a considerable part of the city's fortifications was still composed of earth, and that citizens did not respect official regulations against the pasture of animals. Still, when Albrecht Dürer published his fortification treatise in 1527, he also suggested that moats could serve as animal parks as well as shooting ranges. Toponyms in Liège and Maastricht indicate that this advice was based on actual practice, for they imply the presence of rabbit warrens (*Tour aux Lapins* and *Konijnenberg*) in or next to the city walls.⁶⁸ These might even have inspired the miniaturists who made the Maastricht

⁶² Bodart, *Société et espace urbains*, 101.

⁶³ Maastricht, RHCL, 07.E01., inv. no. 1: Guarnisoensboek, B, December 17, 1784; Grauwels, ed., *Regestenlijst*, 3:98–99.

⁶⁴ Reyerson, "Medieval Walled Space," 102–14; Wurtzel, "Defense, Authority, and City Limit," 169–73.

⁶⁵ Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 232v; Boonen, "De Maaseiker wallen," 53; Bormans, "Table des registres," 11:272 and 13:24; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 3:172–73; Gaier-Lhoest, *L'évolution topographique*, 44; Jacquet-Ladrier, "Vivre à Namur," 171; Moreau, *Bolwerk der Nederlanden*, 10–12, 95–96; Thomas, "Hygiène," 269–79.

⁶⁶ Lemoine, "L'enceinte de Liège," 56–57.

⁶⁷ Unger and Bezemer, *Oudste stadsrekeningen*, 55. See also Moulin and Pauly, *Die Rechnungsbücher*, 1:119; van der Eerden-Vonk, *Raadsverdragen*, 119, 202.

⁶⁸ Dürer, *Befestigung*, D; Moreau, *Bolwerk der Nederlanden*, 84; Ulrix, "Le rempart d'Avroy."



Figure 12. Two foxes and a wolf assault a fortress built on top of a rabbit warren, and defended by monkeys. Book of Hours made in Liège or Maastricht, early fourteenth century (© The British Library Board, Stowe MS 17, fol. 244r). Reproduced with permission of the British Library.

Book of Hours (see figure 12). Many rulers, such as the dukes of Guelders, incorporated impressive menageries, which even included lions, in their residences.⁶⁹

Archaeozoological research is far more informative in this regard than written sources. The study of animal bones in fortress moats and waste pits has revealed the remains of animals that lived in or around these noble houses: peafowl, swans, pigeons, dogs, horses, sparrowhawks, and goshawks. Many of these species might have moved around more or less unimpeded, swans' wings usually being clipped, but birds of prey typically stayed in cages when not being involved in a noble hunt. Still, these reports also make clear that most bones found are the remains of species eaten by the occupants and did not necessarily live near the fortifications. Others might come from animals that were just killed and discarded. In the fortress of Franchimont for instance the bones of western jackdaws have been found, deposited in the early sixteenth century. This species is often treated as a nuisance animal or pest because it nests in buildings.⁷⁰

⁶⁹ Marchal, *Inventaire*, 167, 174; Nijsten, *In the Shadow of Burgundy*, 329.

⁷⁰ Boone, De Cupere, and Van Neer, "Social Status"; de Jong, "Huisdieren, jachtwild, vissen en

Incidental references in fiscal accounts corroborate a general impression that unwanted animals were ruthlessly pursued and exterminated. The city of Mons, for example, paid a bounty in 1324 for the killing of an otter, which threatened the extensive fish stocks introduced into the moat. The accounts of the high bailiff of Montfort from 1397–1398 likewise indicate that someone was sent to Maastricht to buy lime for the capturing of house sparrows, which had established themselves in the fortress. The steward of Hambach (Jülich) paid a mouse-catcher for the killing of no fewer than one hundred and eight “large mice,” probably rats, in 1440–1441. Two hundred years later, in 1661, the town council of Maaseik retracted its own prohibition regarding the killing of pigeons, and ordered citizens to shoot those dwelling near the city walls, because their waste damaged the ramparts.⁷¹

Similar remarks can be made about plants. Archeobotanical research becomes ever more important and, as argued above, provides some of the best evidence we have about plant growth in or near fortifications. Their results can be complemented with what scarce written evidence remains. An exceptional inventory of the gardens of the lordship of Chimay in 1606, for instance, lists no fewer than one hundred and twenty different species.⁷² Plants that expanded beyond these controlled contexts might initially have survived relatively unscathed, but sooner or later they would be curtailed just the same. The accounts of Grave thus mention the cutting down of an elder tree that grew next to the town wall in 1453.⁷³ Even more revealing are payments by the city council of Luxemburg to labourers in 1445–1448, 1453–1454, and 1456–1457 for the mowing of grass, herbs, nettles, and thorns, which grew on or next to the city’s (earthen) walls, and prevented guards from conducting patrols.⁷⁴ Exactly because fortifications were well integrated into people’s daily lives proper maintenance was rarely an easy matter.

Imposing Military Perceptions

Fortifications were clearly far more diverse than has traditionally been claimed and have to be studied as part of larger systems of defence. Their multiple functions were simultaneously a response to, and the source of, basic maintenance problems. The logical next step is therefore to consider the reaction of armed forces to these issues: the militarizing of fortifications from the sixteenth century onwards. This eventually cre-

weekdieren”; Gautier, Hoffsummer, and Vanguetstaine, “Faune médiévale,” 78; Gautier and Fiers, “Restes animaux,” 87.

71 Dinstühler, ed., *Die Jülicher Landrentmeister-Rechnung*, 82–83; Driessen, *Emundt van Oeteren*, 133; Gentenaar and Hupperetz, “Personeel en werkzaamheden,” 210; Piérard, *Les plus anciens comptes*, 1:185.

72 Duvigneaud and Mathot, “Description,” 407–15; Luijten, “Zaden en vruchten,” 241; van Haaster, *Archeobotanica*.

73 Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 31r; Dreiskämper, “Thonis Ongewassen en Johan Copper,” 113, 148; Saint-Amand, “Poilvache,” 57–58; Unger and Bezemer, *Oudste stadsrekeningen*, 51.

74 Moulin and Pauly, *Die Rechnungsbücher*, 2:17, 3:60, 3:68, 3:82, 4:33, 4:100.

ated a divergence between a handful of permanent garrisons and a mass of traditional fortifications that were only militarized during armed conflicts.

In the Meuse Region, most settlements only constructed stone fortifications (fortresses, city walls, churches) after the tenth century. A handful had the advantage of being able to lay claim to continuity with a long-distant past (such as Verdun or Tongres). The most important cities in the Meuse Region—Verdun, Namur, Liège, Maastricht, Aachen, and 's-Hertogenbosch—built a series of city walls during the Central and Late Middle Ages as the population grew. It is typically the second city wall, built in the thirteenth to fifteenth century, which remained in use until the nineteenth century.⁷⁵ Given the time, cost, and effort needed to build such elaborate stone structures, it comes as no surprise that in many late medieval cities large parts of the walls were still made of earth rather than stone.⁷⁶

This continuity between the Central Middle Ages and the nineteenth century is remarkable in light of the common emphasis on the supposedly “revolutionary” effects of gunpowder weapons on fortifications, especially in the fifteenth and sixteenth centuries. Medieval walls were not abandoned, but simply became part of early modern defences. There are in fact only two examples of major fortifications where the original medieval fortress was discarded in favour of an entirely new structure: Agimont-Charlemont (Givet, mid-sixteenth century) and Longwy (late seventeenth century).⁷⁷ The famous engineer de Vauban, who was paradoxically also the mastermind behind the reshaping of Longwy, declared in his report of the 1692 siege of Namur that medieval walls were “the best of all.”⁷⁸

This is not to deny the significant effect gunpowder weapons had on fortifications. It is meant to demonstrate that many studies about military architecture, especially those affiliated with the “Military Revolution” thesis, underestimate the continued value of medieval fortifications. Armed forces in the Meuse Region were familiar with gunpowder weapons by the mid-fourteenth century at the latest, as I mentioned in the introduction. The initial, mainly fifteenth-century, adaptations to gunpowder weaponry were relatively simple and consisted of constructing so-called *barbicans* to shield the gates from direct artillery fire, and adding bulwarks to provide firing platforms. When the effectiveness of gunpowder weapons increased, fortification design had to respond as well: by the mid-sixteenth century the famous *trace italienne*, low thick stone walls with bastions intended to eliminate blind angles, was introduced to the Low Countries.⁷⁹

Very few settlements in the Meuse Region, however, could rely on such elaborate defences in the Italian manner; only the fortifications of Jülich, and a few new forts

⁷⁵ Bragard et al., *Namur et ses enceintes*; Lemoine, “L’enceinte de Liège,” 10–27; Moreau, *Bolwerk der Nederlanden*; Rhoen, *Aachen*; van Drunen, “’s-Hertogenbosch,” 171.

⁷⁶ de Waha, “Binche,” 127–28.

⁷⁷ Bertrand, “Une construction continue”; Garcin, *De Longwy et Vauban*.

⁷⁸ de Vauban, *Journal*, 69–71.

⁷⁹ DeVries, “Facing the New Military Technology”; Parker, *The Military Revolution*, 6–16, 26–32, 163–67.

(such as Philippeville and Mariembourg) were built entirely in this style.⁸⁰ In most cases renewal consisted simply of adapting the old medieval walls to new demands, which meant constructing new bastions, lowering the towers to the same height as the walls, and making both walls and towers wider by building an earthen embankment behind them or filling them with earth. Lowering the walls made them more vulnerable to an assault so the moats had to be enlarged and deepened as well. These works required so much earth that household waste, manure, and soil from gardens and cemeteries were used in emergencies to fill the new defences. Practical measures thus lie at the origin of the so-called Old Dutch system of defence, which developed during the Eighty Years War, and combined earthen walls with the extensive use of water and vegetation. Such fortifications are much faster and cheaper to construct than the expensive stone walls of the Italian system, and at least as effective.⁸¹

The literature on military architecture is quite extensive, but surprisingly few scholars have commented on the ecological effects of these changes, or even on the widespread use of plants. Noteworthy exceptions are Philippe Bragard's and Klaus Jordan's studies on the function of plants in fortifications, which also clarify how complex the building of these earthen walls must have been. In the Low Countries labourers used special techniques to construct earthen defences, called *gazonnage* or *placage*, an important detail that is generally overlooked. These methods date back to at least the fifteenth century and consisted of constructing several layers of earth (*placage*) or grass blocks (*gazonnage*) with bundles of branches (*fascines*) in between. The earth had to be fairly thick (black) and was often filled with seeds or roots of plants in order to add to the strength of the whole. These techniques were a prerequisite for constructing walls with a slope of forty-five or sixty degrees, designed to resist both cannon balls and infantry assaults, as such steep walls cannot be constructed by simply making a mound of earth. They also required considerable cost and effort, as the actual construction had to be done by skilled artisans, and blocks of grass had to be dug from nearby meadows. Because of its complexity and cost *gazonnage* was abandoned in the late eighteenth to early nineteenth centuries, and *placage* in the later nineteenth century. From that moment on, the earth was simply piled up and grass was sown later.⁸²

A second, and far-better-known element in the increased use of plants was the planting of trees on the top of the *scarp* or main wall from the late sixteenth century onwards. The most common species were field elm, linden (or lime), aspen, oak, willow, and common walnut. Gunners preferred field elm above all others for the making of gun carriages, and engineers appreciated its extensive root system. During the nineteenth century engineering treatises increasingly recommended planting Lombardy poplars and Canadian poplars, man-made varieties of the black poplar, which have a

80 Neumann, *Zitadelle Jülich*; van den Eynde, "La fonction militaire"; van den Heuvel, *Papiere Bolwercken*, 91–104.

81 Bragard et al., *Namur et ses enceintes*, 45–53; Jacobs, *Justitie en politie*, 148; Moreau, *Bolwerk der Nederlanden*, 48–59, 68–70, 124–30; Nijssen, Vanderbeken, and Wouters, *Loonse ridders*, 37–44; Sartelet, *La principauté*, 25–26, 33, 36.

82 Bragard, "Soldats et jardiniers"; Jordan, "Grün in Festungen."

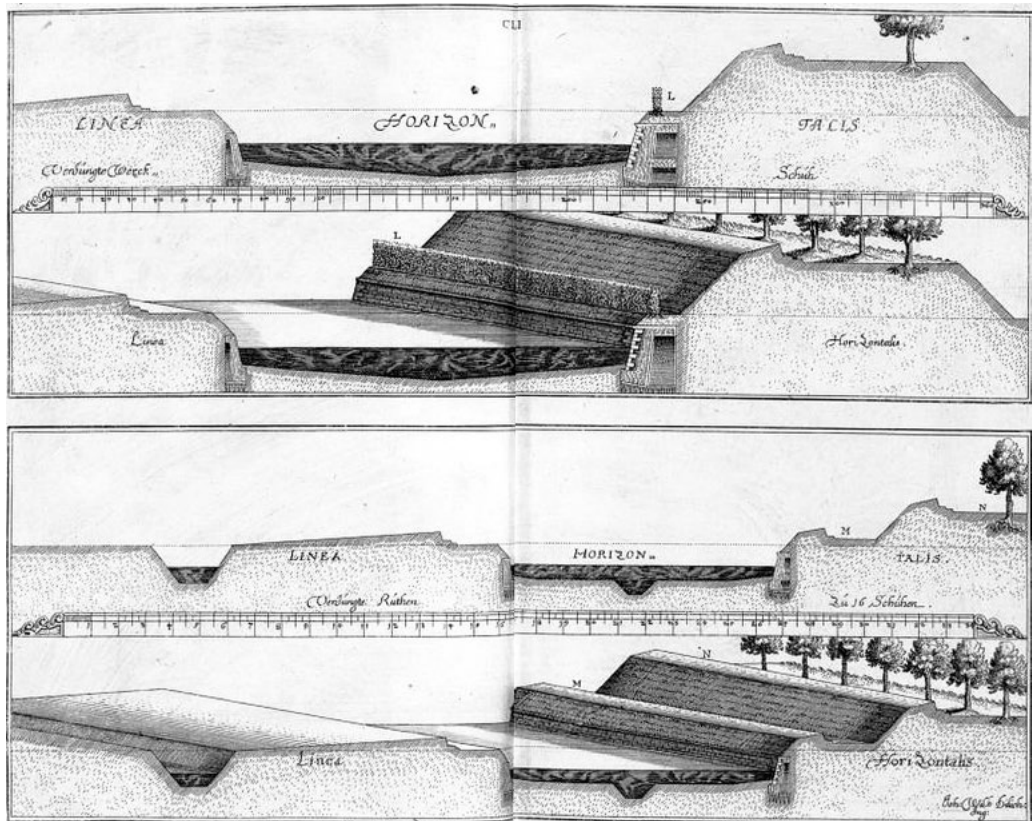


Figure 13. Schematic depiction of the planting of trees and a hawthorn hedge on an earthen embankment, 1640 (Dilich, *Peribologia*, page cli).

very straight silhouette, produced good timber, and grow relatively fast. This large-scale introduction of trees served multiple purposes: their roots reduced erosion, strengthened the wall against artillery fire, and made mining more difficult. The trees' crown denied the enemy a view of the inner city and also provided shade for guards stationed on top of the walls (see figure 13). The trunks also served as a welcome source of timber, especially since many garrisons lacked access to extensive woodlands.⁸³

⁸³ Geldern, Stadtarchiv, A, no. G9, Stadtrechnung, fol. 147r (1590–1591), fol. 221r (1592) (transcript Rien van den Brand); Maastricht, RHCL, 07.E01., inv. no. 1: Guarnisoensboek, December 24, 1771; Belonje, “Beplantingen”; Boonen, “De Maaseiker wallen,” 59; Boosten, Jansen, and Borkent, *Beplantingen*, 38–43; Bragard, “Soldats et jardiniers,” 97–99; Bragard et al., *Namur et ses enceintes*, 42, 51, 54, 73; Freitag, *Architectura*, 26; Hasselbrink, *Manuductio ad Architecturam Militarem*, 178–79; Jordan, “Grün in Festungen”; Lawrence, *City Trees*, 24–26; Merker, *Verhandeling*, 2:163–65; 2:100–110; Moreau, *Bolwerk der Nederlanden*, 68, 128, 152, 223; Muller, “Bouillon,” 71; Spekle, *Architectura*, 27r, 31r, 108v, 109r; van Bavel et al., *De kroniek*, 400; van den Brand and Manders, *Vesting 't Gennepshuys*, 388.

Other considerations, aesthetic ones, played a role as well. When brigadier de Pichard, commander of the citadel of Liège, wanted to convince the Estates, always reluctant to spend any more on military matters than necessary, of the need to provide funding to buy trees in 1744, he mentioned in his request that field elm provided suitable wood for gun carriages. It was only five years later that another staff officer, captain Colson, who lived in the citadel and had his own garden there, arranged with one of the councillors of Liège to buy field elms and lime trees in Amsterdam, and transport them to Liège. By 1750 two hundred and fifty trees embellished the citadel, and were maintained by gardeners. Once these trees grew too big they were sold, for financial reasons, rather than cut down (1786).⁸⁴ Technological improvements thus simultaneously brought about the expansion of fortifications, and a relative increase in the use of plants, though this does not mean that military concerns always governed their exact use.

The gradual encompassment of medieval stone walls in extensive layers of earthen walls and ditches needs to be seen in the context of the history of engineering science. While master carpenters, masons, architects, and artillerymen served as military engineers throughout the Middle Ages, during the fifteenth and sixteenth century the knowledge required for such matters, especially fortress building, became so complicated that it stimulated the development of the engineer as a profession.⁸⁵ The first engineers who appeared in the Meuse Region in the early sixteenth century came from Italy. By the turn of the century the Low Countries and other parts of the Holy Roman Empire supplied engineers of their own. These men were highly sought-after specialists, but not members of the military in the strict sense of the word. Distinctions between “military,” and “civic” engineers only came about in the late seventeenth and early eighteenth centuries.⁸⁶ A major dividing line did exist, however, between architects who designed or improved fortifications (*ingénieurs de places*), and officers who had experience in assaulting them (*ingénieurs de tranchées*).⁸⁷

The development of the engineering profession was of major importance for the ways armed forces interacted with ecological systems, because it provided them with far more tools to influence landscapes, in the form of maps, drainage techniques, canal building, mining, ballistics, and similar. Local hydrography had after all exerted significant influence on the construction of medieval fortifications. The urban accounts of Geldern indicate that in the fourteenth century living hedges, as opposed to fences or a combination of hedge and fence, could only be found on the east side of the city, near the Yssumer and Gelder Tor. Given that the river Niers, which is connected to the town's moats, runs much further to the west, it is likely that the water level in this part of the moat was very low, and could occasionally even have dried up. The planting of living hedges might thus have compensated for a local deficiency of water as a barrier.⁸⁸

⁸⁴ Liège, AEL, Etats, inv. no. 3007; See also de Ville, *De la charge de gouverneurs*, 79.

⁸⁵ Purton, *The Medieval Military Engineer*, 157–64, 181–90, 213–18, 228–33, 243–44, 259–61.

⁸⁶ Bragard, *Dictionnaire*; Roosens, “Habsburgse defensiepolitiek,” 303–27, 411–19; Schäfer, “Krygsvernuftelingen,” 437–60; van den Heuvel, *Papiere Bolwercken*, 6–11, 23–48.

⁸⁷ Blanchard, *Les ingénieurs*, 105–14.

⁸⁸ Koppers, “De stadsrekeningen,” 9, 21, 134, 147, 316; Marwede, *Die Befestigung*, 43; See also

Medieval armies did have knowledge of water management and mining, and certainly applied this during sieges (see below), but this was relatively basic in comparison to the large-scale projects early modern engineers designed. Fortresses located on hills, for example, rarely had access to running water, and thus depended on cisterns or wells. Medieval armed forces could also construct or destroy dams, dikes, and sluices for defensive purposes.⁸⁹ The castellan of Valkenburg, for instance, ordered the building of a dam in the Geul in 1465 to ensure that the water in the town moat remained deep enough during a potential siege.⁹⁰ Difficulties associated with water management probably go a long way to explain why most noble houses were located near streams or waterlogged terrain rather than hills.⁹¹

By the 1700s the principal fortresses in the Meuse Region depended for their defence on floodplains and moats that could be filled with water through complex systems of sluices and canals. Breaching or building dams was easy enough but allowed very little control over the extent of the flooded area, the water level, and the speed of inundation. A major turning point was thus the construction of evermore extensive systems of inundation sluices from the late sixteenth century onwards. Such devices were only effective, however, if they could be secured against enemy attacks as well as local inhabitants who opposed the flooding of their lands. The security of water management systems therefore encouraged the building of ever more fortifications, such as detached forts.⁹²

From the late seventeenth century onwards, engineers also created permanent (masonry) mining galleries in a handful of fortresses (Verdun, Maubeuge, Philippeville, Namur, Maastricht). Mining was already a well-known siege technique in the Middle Ages, but the spread of gunpowder made mining activities far more efficient and dangerous. These galleries were often very extensive, with those of Philippeville, which have still been preserved, measuring about ten kilometres in length. Given the general humidity of these underground constructions, small gaps were left in the walls which could be closed at short notice, as it was impractical to install wooden doors in peacetime. Ventilation shafts, some six metres in length, were indispensable as were small canals designed to dispose of the excess water. The galleries could also be used to store supplies, albeit only for short periods of time due to the humidity, and shield the defenders during bombardments.⁹³

Caminada-Voorham, *Loevestein*, 52; Richer of Saint-Rémi, *Histoires*, 1:94–95.

89 Becquet, "Montaigle," 125, 129; Bragard et al., *La termitière*, 54–56; Desbrière, *Cartes et mémoires*, 25; Genicot, ed., *Les Tours*, 104–6, 163–65, 177–80; Muller, "Bouillon," 44; Saint-Amand, "Les puits"; Thomas, "Hygiène," 256–64.

90 van de Venne, *Het beleg*, 40.

91 Gleue, *Ohne Wasser keine Burg*, 14–18, 25–39.

92 Gilbert, *Le siège de Stenay*, 40; Groussard, "Vauban et l'eau"; Moreau, *Bolwerk der Nederlanden*, 257–66; Nijhof and Steketee, "Sluis," 99–101; Parmentier, *Pays de Charleroi*, 92; van den Brand and Manders, *Vesting 't Gennepershuis*, 279, 320.

93 Bragard et al., *La termitière*; Moreau, *Bolwerk der Nederlanden*, 202, 283–318; Silvertant, *Valckenborgh*, 209–17.

Nevertheless, even engineers had to take into account the environmental constraints posed by the landscapes they sought to defend. Casemates, cellars, and water-filled ditches were common enough, but only two fortresses depended on both inundations and mining galleries: Verdun and Maastricht. Engineers also focused on the tributaries of the Meuse to establish inundations, because its main current proved too strong to control. The Maastricht inundation thus operated with water from the river Jeker/Geer.⁹⁴ The landscape modifications that did succeed came moreover at a very high cost of manpower and resources. The registers of the French Hôtel des Invalides give an original perspective on the difficulties faced when constructing or improving fortifications in the late seventeenth and early eighteenth century. During this period of intensive warfare thousands of soldiers became invalids, which led to writing down service records that would otherwise not have been preserved. These lists reveal that one soldier got affected with rheumatism because he spent long hours constructing sluices in Sedan, another one, a miner, fell down the rocks when making staircases for the fortress of Dinant, and many others got wounded during mine explosions because the hard underground in Givet necessitated their use.⁹⁵

The important role of engineers in the changing relationship between armed forces and the ecosystems with which they interacted lay in their role as government representatives as well as the increased potential of landscape modification that their profession represented. By the eighteenth century appointing military engineers to oversee the preservation of fortifications had become the norm, as revealed by the administration they left us.⁹⁶ The combination of these specialists with the institution of more extensive guard systems (see chap. 4) gave military forces much more leeway in imposing their view on fortifications, and urban defences in particular. The military engineer was the “expert” who knew best how to defend a landscape, and the permanent military garrison provided him with the means to enforce his view, against the wishes of local residents if necessary.

In a minority of cases the authority of military engineers became so all-encompassing that governments charged them with tasks that had very little or nothing to do with military matters. The engineer brigade stationed in the Austrian Netherlands enjoyed a particularly high reputation, and became an important tool of government control. A typical example is the government in Brussels’ order to Philippe De Laing, major-general of the engineers, to devise measures to prevent the flooding of the Meuse in the 1760s.⁹⁷ In the kingdom of France by contrast a military engineering academy was only founded in 1749–1750, later than its civilian equivalent (1747), and in the Dutch Republic control over water was even more strongly concentrated in the civilian hands

94 Moreau, *Bolwerk der Nederlanden*; Groussard, “Vauban et l’eau.”

95 Vincennes, SHD, GR, 2Xy09: Jan La Plaine; 2Xy12: Claude Croissant dit La Jeunesse; 2Xy13: Jean du Bord dit St Jean, Hubert Grangé dit Beaupré; 2Xy14: Jean Du Barry dit Leytoure; 2Xy22: Jean François Bourguignon dit Jassemijn, Antoine Collardon dit Comtois; 2Xy25: François Paquet dit Belmont, Jan Bap.te Mazuret dit La Tulippe (transcript www.hoteldesinvalides.org).

96 See for instance Maastricht, RHCL, 07.E01, inv. no. 1: Guarnisoensboek.

97 Breuer, “Matériaux,” 342, 346, 350.

of water boards. Nevertheless, military engineers were quick to exploit opportunities created by natural disasters. In 1757, when melting ice water from the Rhine and Meuse basins destroyed dikes and flooded large areas of land, Dutch military engineers came to the aid of local governments, and simultaneously charted the regional hydrography to provide the military with a new mechanism of control.⁹⁸ Engineers played a key role in military forces' growing control over landscapes, but their efforts did not go unchallenged nor were without their limitations.

The sheer cost of and complications resulting from adaptations to fortifications have been mentioned repeatedly, but one logical consequence has been left unexamined: the fact that these changes, impressive as they were, only applied to a handful of major fortresses of which Heusden, 's-Hertogenbosch, Venlo, Maastricht, Namur, Givet, Maubeuge, Mézières, Sedan, Longwy, and Verdun were the most important. The growing gap from the sixteenth century onwards between a handful of up-to-date fortresses with permanent garrisons and the great mass of more traditional fortifications, is relatively well known within military history. The main issue is that most scholars assume that these latter defences simply lost their military value altogether.

It cannot be emphasized enough that large armed forces of thousands of soldiers with the latest siege equipment did not constitute the most typical army, even in a zone as strategic as the Meuse Region. For most people up to the eighteenth century the most common, and most direct, threat remained that of relatively small bands of raiders who stole, kidnapped, and burned, or extorted money not to do so. More traditional fortifications, well imbedded in people's daily lives, retained their effectiveness because bringing up artillery was such a complex process. It is revealing that many churches in the French *département* of the Meuse were not fortified in the Middle Ages, but only in the sixteenth or early seventeenth century, when political turmoil created a climate of insecurity.⁹⁹

Another noteworthy example are so-called sconces or *schansen*, forts made from blocks of earth and *fascines* (the word *schans* originally referred to such a bundle of branches), which were commonly used by armed forces of a state to defend strategic routes in the late sixteenth and seventeenth century. They also spread rapidly throughout the Campine/Kempen during the Eighty Years War, as villagers had to find new ways to defend themselves, and their property. Some of the first forts appeared around parish churches, which again confirms these buildings' central defensive role in rural areas. Most, however, were entirely new constructions in the most inaccessible part of the village: marshes or heathlands. These peasant *schansen*, an acre to two hectares large, existed in peace as well as war, and were in fact miniature villages or hamlets, since some villages had several *schansen*, in which every household had a plot of land, and was obliged to help with its maintenance. They only disappeared in the late eighteenth and nineteenth century.¹⁰⁰

⁹⁸ Combeau, *Le comte d'Argenson*, 323; Janssen, *Op weg naar Breda*, 50–53, 79–97; Langins, *Conserving the Enlightenment*, 94–103; Verhagen, "Het Bossche Broek," 51–52.

⁹⁹ Adriaenssen, *Staatsvormend geweld*, 403–4; Girardot, "Les forteresses," 24–25; Jenniges, *Das Land zwischen Venn und Schneifel*, 83–84; Pagnotta, *Les églises fortifiées*.

¹⁰⁰ Brunner, ed., *Reise des P. Reginbald Möhner*, 55; Hansay, "Documents inédits"; Mertens, "Kempense buurtschappen."

The spread of gunpowder did make many medieval fortifications redundant, but this was hardly the linear process traditionally presented. The diary of Splinter Helmich, a citizen from Utrecht who joined the “Sea Beggars” and participated in the taking of Den Briel, is a good example. He fought as captain of his own company in the area around Venlo and Roermond in the 1570s, and regularly encountered medieval fortresses and village churches, which were unable to resist cannon, but remained quite effective against an unsupported infantry unit.¹⁰¹ In the 1700s military treatises still gave practical advice on how to adapt traditional defensive structures, such as hedges, churches, or castles, for use as field fortifications.¹⁰² Medieval fortifications did not lose their defensive value as a result of ineffectiveness, but because violent encounters between soldiers and local residents became increasingly rare (see chaps. 3 and 4). This meant that the general population felt increasingly less pressure to maintain multifunctional structures with respect to defensive needs. So-called *fermes en carré*, built in Hesbaye during the eighteenth and nineteenth centuries, are a good example. These resemble medieval fortresses, but only functioned as fortifications in exceptional circumstances (such as the farm of Goumont/Hougoumont during the battle of Waterloo).¹⁰³

The ongoing importance of more old-fashioned fortifications, despite the spread of ever more effective gunpowder weapons, goes a long way to explain the Prince-Bishopric of Liège’s deviation from a general pattern towards the adoption of ever more extensive fortifications. The great majority of its fortresses and city walls saw few adaptations after the early sixteenth century, the citadel of Liège, constructed in the mid-seventeenth century, being the only modern fortress erected by order of the bishop. The Prince-Bishopric correspondingly retained only a handful of permanent garrisons in the medieval fortresses of Bouillon, Dinant, Huy, and Stokkem, as well as the citadel of Liège. Most of these forces were also quite small to contemporary standards: a surviving muster list of the soldiers stationed in the fortress of Stokkem in 1655 indicates that the garrison consisted of a mere forty-two men: the high bailiff, two lieutenants, and three squads of thirteen men headed by a corporal. By the eighteenth century only one garrison remained: a single infantry regiment of six hundred men housed in the partially demolished citadel of Liège.¹⁰⁴

This exceptional case has its origin in the bishopric’s policy of neutrality, adopted in the late fifteenth century, but is also related to the constant conflicts between the bishops and their own subjects, which made the latter reluctant to provide funds for military forces that would have given their ruler too much power. In 1636 Bishop Ferdinand of Bavaria (1612–1650) even directed the infamous Imperial general Johann von Werth against his own subjects in order to bring them to obedience. The building of the citadel of Liège was a repercussion of this open war. The downside of this policy was the Prince-

101 Helmich, *Journal*.

102 de Cessac, *Le Guide*, 236–41, 268–71, 276–87, 289–92, 308–11, 355–68; de Clairac, *Ingénieur de campagne*; 236–354; Noizet de Saint Paul, *Traité*, 2:239–48; von Gaudi, *Feldschanzen*, 28–35, 51–67.

103 Genicot, “Les fermes en carré”; Pagnotta, *Les églises fortifiées*, 132–35.

104 Liège, AEL, Etats, inv. no. 3001–3007; Buchin, “Erard de La Marck”; de Froidcourt, “La garnison”; Lhoist-Colmon and Gabriel, “La colline,” 34–39; Poswick, *Histoire*.

Bishopric's vulnerability to almost every potentate that sought to take advantage of the strategic value of the Meuse.¹⁰⁵

Attempts by the Habsburgs, French monarchs, and the Dutch Republic to secure their own frontiers, their "garden," came regularly at the expense of the Prince-Bishopric: Givet, Mariembourg, Philippeville, and Bouillon were more or less forcibly ceded to Spain and France for strategic reasons, while the fortresses of Charleroi and Maastricht expanded their defences by encroaching upon the bishop's territory. When the French army occupied large parts of the principality of Liège during the Franco-Dutch War (1672–1678) they turned the towns of Dinant and Maaseik, Stokkem being considered too small, into fortresses capable of resisting modern siege artillery. When they retreated again, in 1678 in the case of Maaseik and 1698 for Dinant, they demolished everything, including large parts of the original medieval defences.¹⁰⁶

Similar processes could be observed in other parts of the Meuse Region that were unfortunate enough to lay on the edges or outside the French and Dutch "gardens." The French army ruined fortifications in the Duchy of Bar-Lorraine and the Spanish Netherlands on a large scale in the second half of the seventeenth century, and the Dutch army demolished parts of the medieval fortress of Valkenburg with explosives in 1672. An undefended fortification is after all a liability rather than an asset. The maintenance of a handful of up-to-date fortresses and settlements as the only proper fortifications within military structures, with the rest being dismissed as either irrelevant or simple field fortifications, was thus not left to chance, but enforced violently. Still, since urban walls and noble houses were too large to be destroyed at short notice, soldiers just created breaches with explosives to make them indefensible. These structures eventually turned into ruins because local residents no longer looked after them.¹⁰⁷

The final demise of all existing fortifications in the Meuse Region, medieval as well as early modern, originated as much in changing political contexts as in technological developments. Emperor Joseph II's wish to expel Dutch garrisons stationed in the Austrian Netherlands, a result of the so-called *Barrière* treaties in 1697–1715, led him to order the demolition of large parts of the fortifications of Namur in 1782. The French takeover of most of Western Europe in 1795–1814 likewise entailed the neglect of almost all remaining fortifications in the Meuse Region. The fortresses of Verdun and Givet for instance simply became gaols for British prisoners of war.¹⁰⁸ The creation of a new kingdom of the Netherlands and the Belgian secession fifteen years later did seem to reverse this trend, since Liège, Huy, Dinant, Charleroi, Namur, and Bouillon were refor-

105 Goorts, *War, State, and Society*; Hagendorf, *Tagebuch*, 59–62; Harsin, *Politique extérieure et défense nationale*; Lhoist-Colmon and Gabriel, "La colline," 27–30.

106 Boonen, "De Maaseiker wallen"; Bouchat, "L'occupation française"; Moreau, *Bolwerk der Nederlanden*, 242; Parmentier, *Pays de Charleroi*, 75; Roosens, *Habsburgse defensiepolitiek*, 122–27.

107 Engelen, "Stokkem," 81; Jenniges, *Das Land zwischen Venn und Schneifel*, 39; Kappelhof, "De heren en drossaarden," 49; Lefebvre, "Bastogne," 356; Mourroux, "Stenay, ville militaire," 37–38; Rorive, *La guerre de siège*, 199–202.

108 Bragard et al., *Namur et ses enceintes*, 69–76; Dereu, "Les armées"; Thewes, *Stände, Staat und Militär*, 85–94.

tified, but these new forts were again replaced by the Brialmont fortresses around Liège and Namur in the last decades of the nineteenth century. The Dutch army also decided to abandon the fortresses of Maastricht and Venlo in the 1860s because of their isolated position, and fell back on the New Hollandic Water Line.¹⁰⁹ These developments did not spell the end of vegetation in fortifications; their use was actually expanded towards the end of the nineteenth century because of an increasing emphasis on camouflage. What matters is that the thread linking medieval fortifications to nineteenth century garrisons had finally been severed.

Conserving Fortifications

Technological change in combination with an increasing distinction between armies and the general population brought about a divergence between a handful of defences that became permanently incorporated into military structures, and the great majority which were only militarized during armed conflicts or lost their defensive value altogether. So, our next object of study turns to how armed forces sought to preserve fortifications, as opposed to fortifications as multifunctional structures maintained by the general population. This focus on military management of fortifications allows the making of a comparison between their current ecological value and historical management practices.

The militarizing of fortifications, the fact that armed forces, initially just soldiers and later military forces in the strict sense of the word, took control over defensive structures, was a very gradual process. Individual watchmen and sentinels were ubiquitous in medieval fortifications, but acted as urban officials or members of noble households (see chap. 4). The first permanent garrisons only became established in the late fifteenth century.¹¹⁰ The number of soldiers engaged in such garrison duty remained relatively limited, rarely exceeding a single infantry company before the late sixteenth century, and more importantly, was restricted to a handful of strategic fortresses and newly constructed forts in frontier contexts (such as Charlemont, Mariembourg, and Philippeville).

Furthermore, even though many such fortifications were closely integrated into urban defences the influence their garrisons could exert was rather small. Particularly revealing is a court record from Stokkem, dating to 1610–1612, regarding a man who built (pig)stables on or next to the walls. The high bailiff had ordered him to tear down the stables on multiple occasions, but the offending citizen claimed that his authority did not extend beyond the old medieval fortress.¹¹¹ Cities were not surprisingly very reluctant to accept garrisons, perceiving them as a threat to their autonomy, until the prolonged and large-scale wars of the late sixteenth and seventeenth centuries (in turn,

109 Bevaart, *Nederlandse defensie*, 145–53; Bragard et al., *Namur et des enceintes*, 81–93; Bragard et al., *Namur, la citadelle hollandaise*, 24–28, 112–138; Moreau, *Bolwerk der Nederlanden*, 205–17, 233–40; Neumann, *Das Ende einer Festung*.

110 Dauphant, *Le Royaume des quatre rivières*, 244–45.

111 Hasselt, RAH, Schepenbank Stokkem, inv. no. 162: Paulus Jeghers.

the French Wars of Religion, the Eighty and Thirty Years' Wars) forced them to give way. The city of 's-Hertogenbosch for instance enlisted soldiers of their own during conflicts between Brabant and Guelders in the fifteenth and early sixteenth century, but by the 1560s it had to accept the presence of Spanish soldiers sent by their monarch.¹¹²

Aspirations of urban autonomy did not stop with the establishment of large permanent garrisons. While soldiers could more or less impose control over the newly established earthen outworks and outlying forts, authority over the original city wall continued to be divided. This was the only part of the fortifications citizens could access, albeit with restrictions: in peacetime they could walk there during the day. The governor of Maastricht, for example, made his soldiers construct the oldest public park of the city next to its main wall in 1653. This park, which still exists, was probably built to gain the citizens' favour, but might have had the additional advantage of keeping them away from the rest of the fortifications. The records kept by the chief engineer in Maastricht reveal that he had to compensate the city council in 1741 for seven trees, which stood on the main wall, that were cut down and used as wood for gun emplacements. In December 1745 he even started an inquiry to find out to whom the trees on the walls actually belonged.¹¹³

Military control of fortifications ultimately rested on two pillars: the imposing of a more extensive guard system and the attribution of responsibility for fortification maintenance to (military) engineers. These engineers in their turn hired contractors to execute the necessary works. A surviving agreement from nineteenth-century Maastricht specified that plants such as rushes had to be removed from the water-filled moats twice a year, which seems like an improvement compared to earlier practices. This outsourcing of government tasks was a characteristic of early modern warfare, but also created obvious security concerns. The constructing and maintenance of underground casemates or mining galleries, the most covert elements in fortifications, thus became the prerogative of military miners during the eighteenth century, as proven by surviving reports from Namur. They were not accessible to anyone else except engineers and high-ranking officers.¹¹⁴

The increasing involvement of soldiers in fortification maintenance can also be seen in this light, although their main function seems to have been that of a cheap labour force. An early example comes from an account regarding the fortification of Geldern in 1597–1598. It includes payments to two soldiers for cutting *fascines*, and digging.¹¹⁵ By the late seventeenth century soldiers regularly worked on fortifications to earn some

112 Adriaenssen, *Staatsvormend geweld*, 37, 42, 46, 111; Gudde, *Garnizoen*, 7, 13–28.

113 The Hague, NA, Raad van State, inv. no. 2057: Garnisoensorderboek, October 2, 1785; Maastricht, RHCL, 07.E01., inv. no. 1: Guarnisoensboek B, December 22, 1741, December 17, 1745; Haanen, "Het eerste stadspark."

114 The Hague, NA, Raad van State, inv. no. 2599: Records concerning the construction of casemates by miners of the garrison of Namur; Maastricht, RHCL, 07.E01., inv. no. 1: Guarnisoensboek, 9: Contracts regarding the maintenance of the fortifications of Maastricht; Moreau, *Bolwerk der Nederlanden*, 286, 289, 296, 299, 307.

115 Maastricht, RHCL, 01.002 Rekenkamer Roermond, inv. no. 385: Accounts fortification Geldern, 1597–1598 (transcript Rien van den Brand).

extra pay, either as day labourers with the contractors or under the direct orders of military engineers.¹¹⁶ Particularly instructive for the low status attributed to this kind of work is that in 1748 in the Dutch army forced labour on the fortifications became the official punishment for desertion (see chap. 4).

The use of large numbers of labourers became a necessity, because of the vulnerability of these steep earthen walls to erosion. The average life expectancy of such a wall, if not maintained, was around three to four years. This explains why military authorities were so concerned with limiting access to the fortifications. A garrison order from Namur, dating to June 1714, even forbade soldiers to lie on the grass. French regulations from 1750 similarly specified that governors could not cut the grass on the walls more than twice a year, and that they had to make sure that no one damaged these structures. A garrison's staff officers were after all entitled to the income generated by the fortifications: hay production and the renting out of fisheries in the moats.¹¹⁷

Two contracts from Maastricht, dating to 1710 and 1716, reveal that a representative of the garrison commander rented a considerable part of the outworks along the river Jeker/Geer to a sheep merchant.¹¹⁸ Such agreements must have been quite common, but they have rarely been preserved, possibly because officers considered them part of their private archive. Sheep are quite agile, and in contrast to cows or horses, would not have damaged earthen walls in any significant way. Other governors, such as those of 's-Hertogenbosch, cut the grass as much as possible, which in turn prompted the Dutch government to buy off their entitlements, and grant contractors the right to cut the grass instead.¹¹⁹

This renting out of the fortifications in peacetime was, unfortunately for the military officers involved, not the only remnant of medieval practices. Local residents continued to perceive fortifications as multifunctional structures, but instead of an accommodating city council, they now saw themselves confronted with an organization that had little patience for such matters. Many citizens considered fortifications as an appropriate, perhaps the only suitable, place for pasturing livestock, for waste disposal, bleaching or drying linen, fishing, and playing games.¹²⁰ The French engineer de Vauban lamented in a letter sent to the French Minister of War, Chamillart, in 1703 that the fortifications

116 Maastricht, RHCL, 01.E01, inv. no. 1: Guarnisoensboek; Engelen, "Stokkem," 77; Kappelhof, "Les dépenses," 296–303; Rorive, *Les misères de la guerre*, 293; Van den Brand, "Spaanse vesting-bouwwerkzaamheden," 84–85, 98, 108–9.

117 The Hague, NA, Raad van State, inv. no. 2079, order June 28, 1714; *Ordonnance du roi* (June 25, 1750) article DCLCIV; Vallée and Pariset, eds., *Carnet*, 82; Vermeesch, *Oorlog, Steden en Staatsvorming*, 222–25.

118 Maastricht, RHCL, 07.E01, inv. no. 40: Archief garnizoenscommandant, Pachtcontracten January 29, 1710, and May 1, 1716.

119 's-Hertogenbosch, BHIC, 178, inv. no. 188, fol. 632r; inv. no. 326, fol. 301r; inv. no. 331, fol. 20r; inv. no. 332, fol. 124r; Maastricht, RHCL, 07.E01, inv. no. 1: Guarnisoensboek B, June 1, 1756; *Ordonnance du roi* (June 25, 1750) article DCLCIV; Caminada-Voorham, *Loevestein*, 51–54; Sangers and Simons, *Geschiedenis*, 94–95, 105.

120 Caminada-Voorham, *Loevestein*, 93–94; Gaber, *Les fortifications*, 30–32; Moreau, *Bolwerk der Nederlanden*, 76–77, 149; Parmentier, *Pays de Charleroi*, 67, 79, 114.

of Namur were in a horrific state. Everyone and everything could access them at will, they were filled with gardens, and groups of dogs assembled there and chased mice and moles. Medieval walls were already closely associated with such activities, and low earthen embankments were even more appealing.¹²¹

Yet soldiers were also not without fault where the damaging of fortifications was concerned. Aside from fishing, hunting, and digging for loam (see chap. 4), many also created gardens in or near the fortifications. The governor of the fortress of Gennepe, which controlled the junction of the Niers and the Meuse, gave two subordinate officers on May 5, 1650 permission to establish gardens in the empty space behind the guard-house. Their example inspired others and less than a year later, in March 1651, when government representatives (*gecommitteerden*) inspected the defences, citizens and soldiers had already expanded their gardens to such an extent that in many places the walls had become too small to accommodate cannons. They had to be removed immediately, but appeared again during the 1654 and 1671 inspections.¹²² This example makes clear that officers had no issue with gardens as such; they recognized the value of having access to fresh vegetables, but wanted to ensure that they did not impede defensive efforts. This meant in practice that generally only officers and military hospitals had their own gardens. Some of these would still have been quite large. The officers' gardens in the eighteenth-century fortress of Montmédy measured no less than six hundred square metres.¹²³

Remarkably enough, given the importance of plants in fortifications, it is quite unclear to what extent military officers, and engineers in particular, had the minimum of botanic knowledge necessary to ensure their wellbeing. The French engineer de Cormontaigne gave some brief advice on how to remove worms and moss from the trees standing on walls in a 1741 treatise, but this was quite uncommon. The French military engineering school in Mézières, founded in 1748–1751, did not consider botany to be a very important subject, and put it only occasionally on the curriculum.¹²⁴ Some of the most detailed instructions regarding the cultivation of plants come from a journal on military engineering, which published an article on tree planting in 1829. This piece listed existing regulations applied within the garrison of Verdun, and addressed an apparently widespread concern among engineers at that time: that the planting of trees in fortifications often failed. The author, an engineering captain, blamed the carelessness and ignorance of the contractors and labourers who had to carry out this task. His own directives are relatively basic. He mentions, for instance, that plants raised in nurseries might have difficulty adapting to the soil of the fortifications and recommends

121 Bragard, *Dictionnaire*, 312–13.

122 van den Brand and Manders, *Vesting 't Genneperhuys*, 384–88.

123 Liège, AEL, Etats, inv. no. 3007; Barbe, "Rocroy," 119–20; Bragard, "Soldats et jardiniers," 87–88; Mourroux, "Stenay, ville militaire," 42; Muller, "Arlon, Bastogne, Laroche, Marche," 264; Muller, "Bouillon," 76; Sartelet, *La principauté*, 60, 61, 63; See also Ottersbach, "Der Garten in der Festung."

124 Blanchard, *Les ingénieurs*, 108, de Cormontaigne, *Architecture militaire*, 1:118–19; Jordan, "Grün in Festungen," 106–17.

specific species for different soil types. The rarity of this captain's interest in botanical matters is corroborated by the fact that his name also appears in a horticultural journal, in which he describes a rare apple variety found at Verdun.¹²⁵

Surviving records from the nineteenth-century garrison of Maastricht confirm this impression. The stronghold, like many other large garrisons at this time, had its own plant nursery that occupied more than one acre. In the year 1824 the director of the fortifications offered a contract for the delivery of five thousand field elms, sixteen thousand willows, eight thousand birches, eight thousand alders, two thousand hazel shrubs, two thousand oaks, and one thousand beech trees. Most of these were planted as coppice wood near the Boschpoort, on the northwest side of the city. Another fourteen baskets with acorns and thornapple seeds, seven pounds of alder and birch seed, eight thousand young ash trees, and three thousand Canadian poplars had to be supplied for the garrison's nursery. Even if one takes into account the sheer size of the fortifications and that the garrison initiated a major planting program in this period, the number of plants that perished on a yearly basis must have been enormous. The year 1825 again saw the planting of at least one thousand six hundred and seventy trees (nine hundred and fifty Canadian poplars, four hundred and fifty field elms, one hundred and seventy-five ash trees, seventy Lombardy poplars and twenty-five nut trees), and the planting of forty-four thousand young trees and shrubs in the nursery.¹²⁶ Military forces considerably expanded their control over fortifications, but they never fully succeeded in imposing their grip on a complex ecological reality.

Maintaining fortifications was clearly no easy matter, neither for medieval urban councils and high bailiffs nor for early modern military organizations. It was far from obvious that armies could enforce their views on how fortifications should be managed. We will now turn to the one, perhaps the only, circumstance in which military views predominated at the expense of all others: an actual siege. The term siege is interpreted here as a formal blockade of a fortification with the object of conquering it through attrition or direct assault, not a sudden attack. This means that our next focus will be on the most extensive and stereotypical fortifications: fortresses and cities.

An actual siege was a rather rare event: the cities of Maastricht and Namur, both key locations for controlling the Meuse River, experienced only fourteen and eight sieges respectively in the entire period from 1250 to 1850. This was a consequence of the difficulties associated with the transport of artillery, and the financial cost a siege entailed. An additional consideration in medieval contexts was that only a limited number of people, mostly residing in major urban settlements, had the experience necessary to construct or maintain complicated siege equipment.¹²⁷ For instance, the siege of the fortress of Sampigny in 1358 necessitated the transportation of "two large machines," and a battering ram from Verdun to Sampigny on ten wagons, thirty carts, and the mobiliza-

125 Piérard, "Instruction"; Piérard, "Rapport."

126 Maastricht, RHCL, 07.E01, inv. no. 9: Performance specifications concerning the maintenance of the fortifications of Maastricht, no. 76; Lienard, "Le fort," 103.

127 Purton, *The Medieval Military Engineer*, 184–90, 213–18.

tion of six hundred *sergents de pieds* (infantrymen) as guards.¹²⁸ When the urban militia of Aachen participated in the siege of the fortress of Reifferscheid in 1385 they had to move a trebuchet, broken down into its constituent parts, over a distance of about sixty kilometres, a task that took sixty-one horses, fourteen wagons, and five days. Reassembling and erecting the device before the besieged fortress took another six days and twelve skilled artisans, and the stones had to be specially brought from Nideggen. The burden of using this equipment was in fact so considerable that the cities of Aachen and Cologne shared the costs.¹²⁹

When a siege did happen, however, it produced ecological effects that can only be compared to a natural disaster. At first glance, it thus appears that the only occasion armed forces could really control defence structures was also the moment their very existence was threatened. This can best be described as succeeding steps of increasing intensity. Simple preparation for an enemy attack, not necessarily a siege (see chap. 4), entailed all vegetation and structures in the immediate surroundings of a fortress or city that could benefit the enemy, such as trees, hedges, buildings, ditches, and even hollow lanes, being demolished or flattened. Such destruction initially applied to everything within bowshot range, but later to the effective reach of a gun or cannon.¹³⁰ On the night of January 25 to 26, 1407, for example, watchmen from Maubeuge observed fires near the fortress of La Buissière. One of the town's messengers went there the next day to investigate. It turned out that the fortress' occupants had set fire to the hedges and bushes around the defences as a precaution.¹³¹ The actual carrying out of such orders must often have met with strong opposition, for resolutions of the city council of Liège reveal that mayors were permitted to enlist guards armed with halberds to accompany them on their inspection tours in 1568. We know that such defensive measures were quite often only partially performed, or even not at all, because of resistance from local inhabitants.¹³²

It is precisely because of the reactions such orders generated that permanent garrisons in the eighteenth and especially nineteenth centuries imposed restrictions in peace as well as wartime. The French Republic codified and expanded existing regulations when it stipulated in 1791 that nobody could build anything within a radius of two hundred and fifty metres around the outermost defences. Structures that could be easily destroyed, such as wooden buildings or vegetation, were allowed within a radius of four hundred and fifty metres, but these could be destroyed in wartime without compensa-

128 Kraemer, "Arme et refuge," 51; Servais, *Annales historiques du Barrois*, 1:68–69.

129 Laurent, *Aachener Stadtrechnungen*, 287–95.

130 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 277v; Tongeren, SAT, Resoluties, inv. no. 1, fol. 291r; Boonen, "De Maaseiker wallen," 79; Hanssen, *Inventaris*, 451; Jacquet-Ladrier, "Vivre à Namur," 170; Marchal, *Inventaire*, 165; Moreau, *Bolwerk der Nederlanden*, 42, 50, 56, 102; Sabron, *De oorlog*, 1:xxv–xxvii, 2:60, 2:63; Ubachs, *Van tricolore tot driekleur*, 5; van de Venne, *Het beleg*, 15–18; van Zuijlen, *Inventaris*, 2:1001, 2:1015, 2:1055.

131 Deloffre, "Guerres et brigandages," 272. See also Gentenaar and Hupperetz, "Personeel en werkzaamheden," 186.

132 Bormans, "Table des régistres," 11:268; d'Haynin, *Mémoires*, 1:165; Larosse, "Le siege," 51–53.

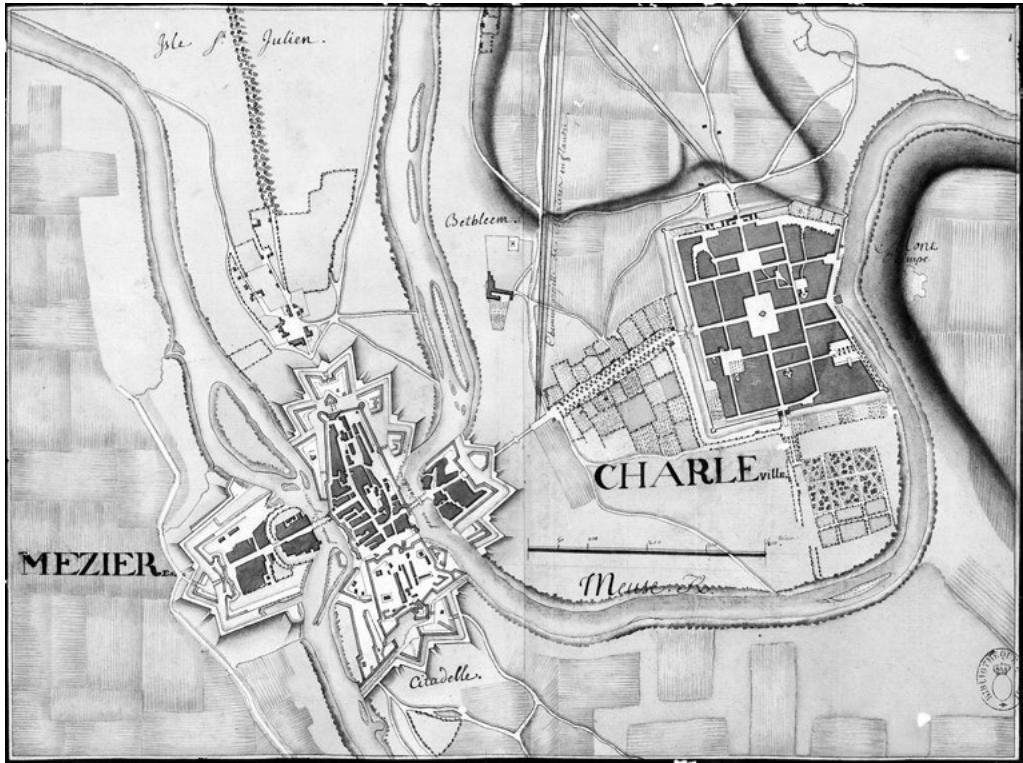


Figure 14. Military map depicting Mézières and Charleville in 1753
(Paris, BnF, Cartes et plans, GE D-14449).

tion.¹³³ Especially instructive of the ecological effects of such a policy is a military map from 1753, which depicts Mézières and Charleville (see figure 14). These towns have very different street patterns because the former had a medieval origin while the latter was constructed according to a set plan in 1606 by Charles I Gonzague, duke of Nevers and Rethel, as capital of his new principality. The most important difference between them is not their street pattern, however, but rather that Mézières was a key fortress in the defence of France's northern frontier, while Charleville lost its defensive value in the late seventeenth century.¹³⁴ Wide-open fields thus encircled Mézières, while Charleville counted numerous gardens in its immediate surroundings.

133 *Ordonnance Corps du Génie* (1776), 31–32; Delalleau, *Traité de servitudes*; Muller, “Bouillon,” 57; Parmentier, *Pays de Charleroi*, 77; van der Woud, *Het lege land*, 369–72, 476–77.

134 The French army initially constructed a fort (*Mont Olympe*) on the Meuse's left riverbank, opposite Charleville, to make sure the city could not serve as a stronghold against France. This fort lost its military value simultaneously with Charleville, but its remnants still appear on the 1753 map (upper right corner). Hubert, *Histoire de Charleville*.

Making sure that a potential enemy would be unable to find cover was only the first step in preparing for an adequate defence. The defenders also had to restore or expand the fortifications, store sufficient supplies, and otherwise prepare for a substantial increase in the number of occupants, man and beast, for an unknown length of time. This inevitably entailed further encroachments on nearby woodlands (see chap. 3). Two members of the garrison of Montaigle, near Dinant, received a financial reward in 1465 to remove large amounts of compost and waste from the fortress, that had accumulated there as result of the many men-at-arms who came to garrison it, in combination with the livestock brought there for safekeeping. It filled the courtyard and soiled the water of the well.¹³⁵ When Waultrin de Fillers, general receiver and forester of Longwy, organized this fortress for a potential siege in 1474–1475, he ordered the construction of a horse-drawn mill and the cleaning of the well and the latrines.¹³⁶

The construction of horse-drawn mills, also attested in fifteenth-century Valkenburg, was a practical response to the fact that defenders could lose access to the wind or water mills they normally used. Towns and cities sometimes constructed windmills on their walls, which safeguarded them against a direct enemy attack, but still made them very vulnerable to a bombardment (see the raid on 's-Hertogenbosch in 1397 above).¹³⁷ If mills became unusable, grain could no longer be turned into flour, which effectively made available grain stocks next to useless. The Burgundian army forced Tongres/Tongeren to surrender after only eight days in 1482 by damming the river Jeker, on which the city's water mills depended. An earlier attempt by Liégeois troops besieging Maastricht in 1408 failed because the citizens constructed new water mills on the Meuse, which was too large to be diverted.¹³⁸ Military garrisons also ran into conflicts with millers because water mills slowed down watercourses, which in turn obstructed defensive inundations. The French governor of Maastricht thus forbade the millers of Tongres/Tongeren to work in July 1678 until the inundation of the fields to the south of Maastricht, which also depended on the Jeker, was complete.¹³⁹

Inundations were a regular feature of many sieges, and as argued before, became increasingly complex through the involvement of engineers. One of the most famous engineering feats was the siege of 's-Hertogenbosch in 1629, where Dutch engineers nullified the defenders' main ecological advantage: the waterlogged soil around the city, aggravated by the deliberate inundation of the rivers Aa, Dieze, and Dommel. The besiegers built twenty-one horse-drawn mills, connected them to the inundation by special canals, and then drained the area surrounding the fortress. They also rechanneled the Aa and Dommel to create a new inundation between themselves and a Spanish relief army. This event has become one of the most renowned feats of the Eighty Years War,

135 Becquet, "Montaigle," 104, 106. See also Dreiskämper, "Thonis Ongewassen en Johan Copper," 181.

136 Bar-le-Duc, ADM, B 1879, fols. 130v–141r.

137 Barbe, Laverdine and Parizel, *Moulins*, 18; Marchal, *Inventaire*, 328–29; Milot, "Les garnisons," 733; Parmentier, *Pays de Charleroi*, 65; Sartelet, *Sedan*, 77; van de Venne, *Het beleg*, 18.

138 de Stavelot, *Chronique*, 115–16; Molinet, *Chroniques*, 1:376–77.

139 *Ordonnance Corps du Génie* (1776), 33–35; van den Brand and Manders, *Vesting 't Genneperhuys*, 415; Vandewal, *Moerenpoort*, 14.

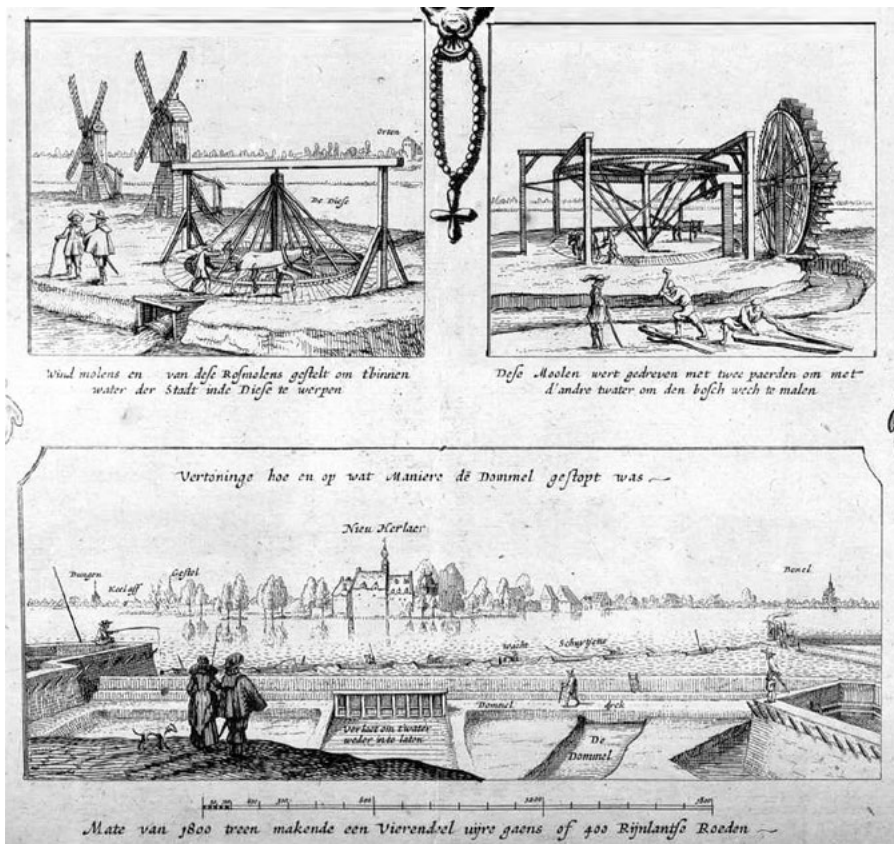


Figure 15. Etching of the Dutch siege of 's-Hertogenbosch in 1629 (detail), by Cornelis Danckerts, 1630 (Amsterdam, Rijksmuseum, RP-P-OB-77.706).

but was actually not that exceptional. Dutch forces already used similar drainage techniques during the 1593 siege of Geertruidenberg.¹⁴⁰ The fame of the 1629 siege is probably based on the numerous prints and paintings made to commemorate it (see figure 15). A noteworthy detail is that the bottom image depicts a soldier fishing. This seems to have been a common practice, even though it could be dangerous. The chronicle of the Sint-Geertuiklooster mentions that a soldier was hit by a cannon ball and lost both his legs whilst fishing in the Dommel.¹⁴¹

Such inundations could serve both defensive and offensive purposes. The siege of Aachen in 1248 for example saw the besieging army, joined by pilgrims from the Low Countries, build a huge dam in the river Wurm in order to flood a considerable part

¹⁴⁰ De Cauwer, *Tranen van bloed*, 76, 125; De Graaf, *Oorlog*, 237–41, 527–32; van Bavel et al., *De kroniek*, 331–43; Verschure, *Overleven*, 134–36.

¹⁴¹ van Bavel et al., *De kroniek*, 335.

of the city. The expertise for building this huge dam has traditionally been attributed to pilgrims originating from Frisia, but the *Chronicon Regia Coloniensis* indicates that they only arrived after the dam had been built. More landlocked areas might therefore still have had their own experts in hydrology.¹⁴² Chronicles from the Prince-Bishopric of Liège in particular indicate that miners were regularly involved in attempts to divert watercourses during sieges. They undoubtedly used their experience in digging coalmines.¹⁴³ As late as 1826–1827 the Netherlands regiment of sappers and miners, which was stationed in Grave and recruited most of its personnel in the Maastricht and Liège area, saved the city from the flooding of the Meuse by reinforcing the river dikes.¹⁴⁴

The emphasis on establishing a breach or diverting streams was primordial, for sieges were governed by rules designed to limit unnecessary suffering. It is indeed suggestive that few sieges, medieval or early modern, lasted longer than two months after the initial encircling. (The siege of Aachen in 1248, which lasted almost six months is exceptional.) This also meant that starvation rarely became the main motivation for capitulating, although many marginalized groups did suffer from hunger. Disaffected citizens could be an important cause for surrendering early, since holding out until a besieging force fought its way into a fortress or city meant risking pillage, violence, and possibly massacres. The citizens of Saint-Mihiel thus diverted the watercourse that fed the garrison's gunpowder mill in 1635 so that the governor had no choice but to yield to the besieging French army.¹⁴⁵ By the seventeenth century the aim of most sieges was simply to breach the main wall, which was sufficiently large to allow a potential assault to be made. At that point most defenders surrendered.¹⁴⁶

As a result of such de-escalation measures, sieges were in themselves rarely sufficient to cause the destruction or abandonment of fortifications, despite their similarity to natural disasters. The demolition of major defences, such as the town walls of Dinant in 1466 or those of La Mothe in 1645, was time-consuming and labour-intensive, and therefore a highly symbolic political act that should be clearly distinguished from simple attempts to make a fortification indefensible, typically by creating a breach.¹⁴⁷ Even so, repairing the damage of a siege could still be a long drawn-out process. The *Sentence de Lille*, the peace treaty between Liège and Burgundy from 1408, specified that the citizens of Tongres/Tongeren had to fill the trenches dug during the siege of Maastricht (1407–1408), or pay others to carry out this task. The city council of 's-Hertogenbosch paid a contractor to supply trees in 1632, and again bought one thousand willows, four hundred field elms, and two hundred linden (lime) trees in 1636 to plant on the walls,

¹⁴² Rhoen, *Aachen*, 41–46; Waitz, ed., *Chronica*, 293.

¹⁴³ Gaier, "Aux origines"; Moreau, *Bolwerk der Nederlanden*, 102.

¹⁴⁴ van Hoof and Roozenbeek, *Grave*, 50.

¹⁴⁵ Abel et Bouteiller, eds., *Journal*, 238.

¹⁴⁶ See the collection *How Fighting Ends. A History of Surrender*, ed. Holger Afflerbach and Hew Strachan (Oxford: Oxford University Press, 2012).

¹⁴⁷ Brouwers, "La reconstruction"; Genicot, ed., *Les tours*, 41–44; Paviot, "La destruction"; Rorive, *La guerre de siège*, 199–214; Stercken, *Königtum und Territorialgewalten*, 130–35.

which suggests that it took seven years to fully replace the trees cut down during the siege of 1629.¹⁴⁸

Although most trenches might have been filled again relatively quickly, the disturbances they caused changed the structure of the soil permanently. Archaeological research has benefitted significantly in the last decades from the study of soil and crop marks, particularly differences in soil colour and vegetation growth. These are observable from the air and allow the identification of former fortifications as well as siege trenches. Furthermore, some structures remained a visible part of the local landscape for decades, sometimes even centuries. French engineers who charted the lands between the Sambre and Meuse in 1787, for instance, still depicted old retranchements made in 1689. Four earthen hills constructed within Mézières as artillery platforms (*cavaliers*) during the siege of 1521 also survived into the eighteenth century.¹⁴⁹ Sieges evidently left scars in the landscape, but they were on their own rarely sufficient to cause fortifications' destruction.

Studying the ways armed forces sought to preserve fortifications, or indeed threatened their very existence, is very helpful for understanding these structures' ecological impacts, but it still does not allow a convincing comparison to be made between the historical management of fortifications and the current importance environmentalists attribute to them. It is for this reason that we will now examine an exceptional source, whose value has been mostly ignored up till now: nineteenth-century studies by naturalists of fortifications still actively managed by the military. There are many natural histories or botanical works available for earlier periods, but these rarely provide detailed information where a specific species could be found.¹⁵⁰ This is not to say that the information these sources provide is unproblematic. Many naturalists exclusively focus on vascular plants, which means that animals, mosses, lichens, and fungi are underrepresented. Latin names have also changed markedly in the last hundred and fifty years, and some plants identified by these scholars are no longer recognized as a separate species. It is also unclear to what extent such studies provide evidence about biodiversity in fortifications before the nineteenth century.¹⁵¹

Still, there can be no doubt these naturalist studies, when put together, offer us a unique glimpse of the species that lived in fortifications when military organizations were still managing them. It is far from obvious that they would have been permitted

148 Chevalier, "Les 'attres' fortifiés," 41; van Bavel et al., *De kroniek*, 366; van Zuijlen, *Inventaris*, 2:1375, 2:1398–99.

149 Feller, "Toponymie," 100; Lemoine-Isabeau, *La cartographie*, 53–54; Moranvillé, "Un incident," 346; Renard, *Toponymie*, 90–91; Sartelet, *Mézières*, 28; Vanderbeken and Wesemael, "De belegeringen."

150 Weeda, "Over de betrouwbaarheid van oude literatuurgegevens."

151 See however, Dodoens, *Cruijdeboek*, bk. 4, chap. 47, 555–56. Bellynck, *Flore de Namur*; Biot et al., *Nouveau dictionnaire*, 35; de la Fontaine, *Faune*; Dumoulin, *Guide du botaniste*; Godron, *Flore*, 62, 258–59; Graatsma et al., eds., *De flora*; Lejeune, "Flore des environs de Spa"; Liénard, "Catalogue"; Liénard, "Addendum"; Maujean-Denis, "Flore de la Meuse," 214; Mutel, *Flore française*, 414–15, 418; Pierrot, Cardot, and Vuillaume, *Catalogue*; van Hoven, *Flora van 's-Hertogenbosch*; Vieillot et al., *Faune française*; Wachter, "De mossen."

to do so. Outsiders had limited access to defensive structures, with officers especially concerned about enemy spies. Antoine de Lusy, a citizen of Mons, wrote down in his journal that a man from Brittany was arrested and executed in 1525 for inspecting the moats of the city (a war year). The eighteenth-century regulations of the garrison stationed in the castle of Namur also state that sentries had to arrest anyone found writing or drawing something near the fortifications, and the published results of a botanists' excursion in Givet, dating to 1867, explicitly comment that the naturalists were only able to pass through the fortress of Charlemont after they obtained permission. A captain of the garrison, an amateur botanist himself, served as their guide.¹⁵² It is likewise hardly a coincidence that a military doctor, F. J. J. van Hoven, wrote the oldest guide to the flora of 's-Hertogenbosch or that the pharmacist L. J. G. Dumoulin published his flora of Maastricht in 1868, the same year the fortifications lost their military status (see the appendix for a full overview of species found). Even members of the military had limited or no access to the more restricted parts of the fortifications, which might explain why van Hoven only considers lichens growing on trees and not those on the walls themselves (except one species on the outlying Fort Isabella).¹⁵³

The plant and animal diversity in nineteenth-century fortifications, as revealed by these naturalists' publications, can be explained by drawing attention to the military desire to close off access to these areas, as well as the very landscape diversity these fortifications generated. Military forces' concern with maintaining an open field of fire in combination with their methods of grassland management—mowing the grass only twice a year or pasturing sheep—would in effect have stimulated plant diversity.¹⁵⁴ This diversity in turn could have attracted different kinds of creatures, such as butterflies and moths. The naturalist Félix Liénard explicitly referred to the ditches of the fortifications and fields near the citadel of Verdun as the best locations for catching lepidoptera.¹⁵⁵

Fortifications were also home to a wide range of water plants, a reflection of the fact that plant growth develops more easily in still or slow-moving water. Dr. van Hoven identified no fewer than three plants that could be found specifically near the inundation slush of Heusden. Mining galleries by contrast have a similar ecological function to caves because of their high humidity and constant temperatures.¹⁵⁶ French naturalists identified the fortress of Charlemont as a hibernation place for rare bats, such as the Geoffroy's bat (*Myotis emarginatus*) and the barbastelle (*Barbastella barbastellus*), as early as 1806. Finally, even plants typically associated with woodlands could be found in some fortifications, as Dumoulin discovered a very rare orchid, the violet helleborine

152 The Hague, NA, Raad van State, inv. no. 2078, Orders Castle of Namur, art.2; de Lusy, *Le journal*, 358; Devos, "Compte rendu," 321–22.

153 van Hoven, *Flora van 's-Hertogenbosch*, 31–32.

154 Godron, *Flore*, 62, 258–59; Graatsma et al., eds., *De flora*, 105; van Hoven, *Flora van 's-Hertogenbosch*.

155 Liénard, "Catalogue," 377–78;

156 van Hoven, *Flora van 's-Hertogenbosch*, 5, 8, 9.

(*Epipactis purpurata*) in the coppice wood planted in the outworks beyond the Boschpoort in Maastricht.¹⁵⁷

The most striking element in fortifications, however, proved to be neither of these environments. Stone walls are home to relatively few species, but the species that they do accommodate can be found nowhere else. Steep stone walls, like those of fortresses, churches, or city walls are, ecologically speaking, quite similar to a rock or mountain environment. A typical example of such a rare species is tower mustard (*Arabis glabra*), a herb that grew on the medieval city walls of Maastricht in 1868. Another typical wall plant, perennial wall-rocket (*diplotaxis tenuifolia*) could be found plentifully on the fortifications of Montmédy, Sedan, Givet, and Rocroy in the nineteenth century. Fortifications were especially important for these plants because only a small part was effectively used on a daily basis for living purposes (simply the towers, gates, and guard houses). If a wall gets heated from the inside the variations in temperature became too extreme for such plants during the colder seasons.¹⁵⁸

The importance of stone walls lies indeed not only in their specific construction, but also in the creation of warm microclimates. The term microclimate refers to a local variation of the general climate, from a few square metres to several hectares. This variation can be caused by differences in soil structure, as the presence of stone typically generates higher temperatures, but also by vegetation coverage or the presence of water (both of which have a cooling effect), the angle of the incoming sunlight, and the wind. These microclimates are essential for biodiversity, because they can support a far greater range of species than a uniform climate.¹⁵⁹

One of the most significant environmental impacts of the characteristic star-shaped fortifications of the early modern period might therefore be that they created a mosaic of microclimates, given the variations in sunlight (different angles), humidity (wet or dry moats), and vegetation (trees and hedges). This is confirmed by the study of botanist André Devos from 1870, which records that hyssop grew abundantly in the ditches on the southwestern flank of the fortress of Charlemont and on the south side of the fortress of Montmédy, locations where the sunlight was most intense and winds could only exert limited influence. Many of the lepidoptera found in or near the citadel of Verdun were likewise typical of warmer climates.¹⁶⁰

Hyssop is not native to the Meuse Region, but had been introduced as a garden plant in the late Middle Ages, being well known for its medical properties. Given that many other plants closely associated with the fortifications can be identified as archaeophytes, it is likely that gardens had a major role in the spread of herbs and flowers to

157 Biot et al., *Nouveau dictionnaire*, 35, 472; Dumoulin, *Guide du botaniste*, 56; Geoffroy-Saint-Hilaire, "Mémoire," 196–97.

158 Dumoulin, *Guide du botaniste*, 19; Francis, "Wall ecology"; Pierrot, Cardot, and Vuillaume, *Catalogue*, 78–79; Segal, *Ecological Notes*, 48–50.

159 Stoutjesdijk and Barkman, *Microclimate*.

160 Devos, "Deux jours d'herborisation," 124–26; Devos, "Les plantes naturalisées," 20, 89; Liénard, "Catalogue," 399, 415, 419, 420, 426, 448, 466, 481; Liénard, "Addendum," 290, 295, 297, 300.

defensive structures.¹⁶¹ These transfers, deliberate or not, would have been facilitated by the suitability of stone walls for plants of a Mediterranean origin: a rock environment, warm microclimates, and calcareous soils. The fact that limestone constituted one of the most important building materials in the Meuse Region is a crucial element in the fortifications' ecology, because in northern Europe the diversity of calcareous soils is much higher than those of an acidic nature. This is a result of a historical bottleneck: the Ice Ages. During these periods of global cooling the Mediterranean, with its numerous calcareous soils, provided a refuge for species linked to warmer climates, while Europe north of the Pyrenees and Alps experienced a massive extinction. Fortifications might thus have assisted in the gradual recovery of Northern European ecosystems, a process that started after the last Ice Age and continues to this day. Their role might have been especially important in the context of the so-called Little Ice Age (during the sixteenth to nineteenth centuries).¹⁶²

While the connection between gardens and fortifications is quite strong, it is far from certain who managed them. Devos identified gardens in or near the fortresses of Charlemont, Dinant, Namur, and Huy as the origin of some typical garden plants that could be found there in the nineteenth century.¹⁶³ This brings us to the nub of the problem: there were many gardens in or near fortifications, but their cultivation was not a military prerogative. One cannot be certain for instance that hyssop or other garden plants that grew in the fortresses of Charlemont and Montmédy had a military origin, for even these fortresses housed small communities that were not part of the garrison as such.¹⁶⁴

In some cases garden plants established themselves despite intense opposition of the armed forces. Engineers stationed in Maastricht had to devise new inundation basins in 1764, since the old ones, constructed by French forces in the late seventeenth century, had become unsuitable because citizens used them for gardening. They thus made new basins, demolished the gardens in the process, and then used the lands for inspecting the units of the garrison in battle order to ensure no one tried to cultivate these lands again. When Dumoulin gave a lecture about the flora of Maastricht in 1832, however, he still mentioned the presence of wild daffodils (*Narcissus pseudonarcissus subsp. pseudonarcissus*) on the dikes of the inundation basins, remnants of the gardens destroyed in 1764.¹⁶⁵

161 Devos, "Compte rendu," 303, 306; Devos, "Les plantes naturalisées," 88, 93, 95, 99; Dumoulin, *Guide du botaniste*, 16, 18, 19, 42, 59; Lejeune, *Flore*, 21, 136; van Hoven, *Flora van 's-Hertogenbosch*, 12; Zeven et al., *De introductie*, 83.

162 Ewald, "The Calcareous Riddle"; Segal, *Ecological Notes*, 58–67.

163 Devos, "Deux jours d'herborisation," 124–26.

164 Belyncx, *Flore de Namur*, 10, 12, 21, 22, 24, 27, 32, 50, 59, 70, 76, 79, 120, 124, 136, 163, 167, 208, 263, 279, 285, 296, 312–316, 318–19; Bragard, *Le château*, 43, 57, 101; Caminada-Voorham, *Loevestein*, 95–96; Douxchamps-Lefèvre, *Inventaire*, 5:241; Leestmans, *Soldats*, 198; Richer, *Abrégé chronologique*, 135.

165 The Hague, NA, Raad van State, inv. no. 2057: Garnisoensorderboek, October 5, 1785; Graatsma et al., eds., *De flora*, 37, 47, 85; Moreau, *Bolwerk der Nederlanden*, 258–62.



Figure 16. The Hoge Fronten in Maastricht, now a nature reserve (photograph by the author).

These daffodils were far from the only species that survived in fortifications despite attempts to remove them. One of the officers of the Maastricht garrison filed a request with the forestry department in the 1820s to put fox traps in the mining galleries. He claimed that the animals could damage these underground corridors with their burrowing. This might have been a common attitude, for Eduard Lenz, a sapper lieutenant in the Bavarian army, also recommended the eradication of hole-digging animals in his treatise *Ueber technische Truppen* (1827).¹⁶⁶ Contractors tasked with executing basic maintenance tasks similarly had to cut down caterpillar nests and remove nettles or thistles. Bats seem to have survived relatively unscathed, being considered just a minor nuisance. Lenz simply specified that droppings of bats and other creatures had to be cleared from the mining galleries.¹⁶⁷

The biological diversity these naturalists encountered was therefore to a large extent unintended. It does not follow, however, that the role of the military in bringing about these ecological results was negligible. Military forces created and maintained landscape diversity because it had military value, and this variety in turn made a remarkable

166 Pelzers, de Rijk, and Thissen, "Zoogdieren," 168; Lenz, *Ueber technische Truppen*, 33–34.

167 Liège, AEL, Etats, inv. no. 3007; Maastricht, RHCL, 07.E01, inv. no. 9: Performance specifications concerning the maintenance of the fortifications of Maastricht, September 6, 1825; Caminada-Voorham, *Loevestein*, 52; Hasselbrink, *Manuductio ad Architecturam Militarem*, 177.

diversity of species possible. This can best be illustrated by taking the fortifications of Nijmegen as an example. This city was the subject of two different botanical studies, one from 1848, the other in 1888, which allow a systematic comparison to be made between plant diversity before and after the city's defences lost their military value (1874). While some typical wall vegetation survived in those parts of the walls that had not yet been broken down, in most cases ruderal plants ("weeds") had replaced them.¹⁶⁸

The parts of the fortifications that survived onslaughts of urban development typically became incorporated into parks. Others joined older defence structures that had become isolated ruins in the middle of woodlands. Such abandoned fortifications still have ecological value, but their importance mainly lies in the fact that they are green islands in the middle of landscapes that were transformed as a result of industrialization, population growth, and an intensification of agriculture.¹⁶⁹ Instead of allowing trees and shrubs to take over former fortifications, which eventually contributes to their destruction, many conservationists now opt for maintenance that strongly resembles historical management practices. Sheep graze in the largest surviving part of the early modern fortifications of Maastricht, the Hoge Fronten, and most woody plants have been removed (see figure 16).

Nevertheless, even ruins of medieval fortresses, abandoned for several centuries, could still play an important ecological role. A recent study of former castle mottes in French woodland environments has demonstrated that they exhibit significant differences in the composition of plant species, compared to the woodlands that surround them. These ruins act as ecological islands that are valuable from a biological viewpoint because they add diversity to the landscape. They contain more species typical of calcareous and nutrient rich soils, as well as more competitive ruderal species and epizoochore. A similar study regarding molluscs in the Czech Republic has confirmed these results. Even though these medieval fortifications had been abandoned for centuries the chemical changes in the soil structure they brought about retain their influence till this very day.¹⁷⁰

Conclusion

The current variety of plants and animals in disused fortifications is a logical consequence of these structures' ecology when they still had military value. Neglect is not a prerequisite for fortifications to be biologically significant. Up to a certain point it is even counterproductive, for the landscape diversity typical for fortifications depends on human involvement and regular maintenance. Plants, earth, and natural stone remained the main components of fortifications until concrete and barbed wire replaced them in the later nineteenth century. In the case of the Meuse Region continuity was so strong

168 Dirkse, Hochstenbach, and Reijerse, *Flora*, 191, 283, 289, 336.

169 Cremers, Kaaij, and Steenbergen, *Bolwerken*, 125–29; Lawrence, *City Trees*, 195–98; van der Woud, *Het lege land*, 324–40.

170 Closset-Kopp and Decocq, "Remnant Artificial Habitats"; Jurickova and Kucera, "Ruins of Medieval Castles."

that many stone fortifications built during the Central Middle Ages retained their defensive role into the nineteenth century. Their presence defined militarized landscapes across the centuries.

The biodiversity value of fortifications, as reflected in the studies of nineteenth-century naturalists, was directly related to the defensive value of preserving various landscape elements in a relatively compressed space. At the same time numerous species spread to fortifications unintentionally, or even despite military opposition. This chapter consequently does not claim that armies deliberately made fortifications a suitable place for numerous species of plants and animals, only that the need for military defence created circumstances that allowed flora and fauna to thrive. Many conservationists actually manage former fortifications in a manner that strongly resembles pre-modern practices. A ruin in the middle of woodlands, on the other hand, can also have ecological value. Everything depends on local circumstances and establishing priorities. Leaving a former fortress covered with woody plants alone might be preferable if forest ecosystems are very rare in that specific area. One just has to keep in mind that in such instances abandoned fortifications become valuable because humans have over-exploited ecosystems to such an extent that every green island in a sea of grey becomes significant. This is quite distinct from the historical contribution of fortifications to landscape diversity.

Part Two

BIOTIC COMMUNITIES

Chapter 3

DISTURBANCES

Armies: An Ecological Disaster?

Consider a seventeenth-century German pamphlet depicting a “merciless, awful, horrible and atrocious animal that has destroyed, consumed and corrupted most of Germany in a few years time” (figure 17). It denounced the suffering and misery armed forces caused during the Thirty Years War (1618–1648). This beast combines features from different creatures: a wolf’s head, a bear’s rump, a rat’s tail, a lion’s paw, a human arm, an armoured foot, and a horse’s leg. It carries weapons and a torch, while eating gold, trampling an armed man, and leaving a trail of burning buildings behind. Snakes, toads, locusts, and snails follow in its wake, and destroy the crops and vines depicted in the foreground. The woodcut represents armies as a destructive force, as a catastrophe, and serves as a leading thread throughout this chapter.

Studying disturbances means analyzing disruptive impacts of armies on ecological systems, in peace as well as war, thereby engaging prevailing arguments about the destructive role of armies directly. It also entails moving to a different level within the concept of an ecosystem: biotic communities, or interactions between living beings amongst themselves rather than with environmental factors (the landscape level). This should not be interpreted as a strict dividing line, but more as a shift in emphasis, as the ecosystem concept implies that living beings and their non-living environment are intrinsically connected to each other. The following chapter examines to what extent armies contributed to ecological change by disturbing biotic communities, in both the short and the long term; one has to take resilience into account, the ability of an individual, species, or system to absorb shocks without losing any of its essential characteristics. A distinction will thus be made between disturbances as temporary shocks and as contributing factors to long-term shifts in biological communities.¹

A disturbance can be defined as “any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.”² Disturbances are a vital element in the functioning of an ecosystem and encompass everything from floods, storms, and volcanic eruptions to simple grazing. Ecosystems constantly change; there is no such thing as a delicate “balance” that can be upset by external events. The calcareous grasslands for which the Meuse valley itself has become famous, for instance, can only be preserved through regular disturbances, in practice mowing and grazing.³ The maintenance of fortifications is also a series of disturbances, for it involves the removal of vegetation from ditches and walls.

1 Campbell, “Nature as Historical Protagonist,” 307–10.

2 Pickett and White, *The Ecology*, 6–9.

3 van Dijk, Graatsma, and van Rooy, *Droge stroomdalgraslanden*, 6–10.



Figure 18. Miniature from a fourteenth-century French Bible depicting warfare disturbances (Paris, BnF, MS français, 160: *La Bible hystoriaus*, fol. 203v).

Drawing attention to the multiple functions of disruptions is vital for challenging current assumptions about army–ecosystem interactions. The study of “environmental destruction” during warfare has been a major stimulus in bringing about a rapprochement between military and environmental history, but it also suffers from the vague terminology most scholars employ. Many analyses, whether they concern historic events, or contemporary effects of warfare, use the term “destruction” indiscriminately, thereby obscuring different gradations of damage. The word destruction should be reserved for a specific kind of disturbance; those instances when a community or ecosystem has disappeared or is permanently degraded.⁴

Establishing exact distinctions between different degrees of disruption is problematic, however, since comparatively few historical sources allow a detailed study of the

⁴ See especially Brauer, *War and Nature*, 19–26.

actual extent of damage caused. Administrative sources (fiscal accounts, correspondence, court records, notarial acts) are generally more accurate than chronicles or literary works, but they still tend to focus on the economic value of destroyed property rather than giving explicit evidence about the area of land affected or the number of plants and animals stolen or killed. Many of these documents were created to prove that a settlement, institution, or individual should receive some sort of support or was unable to pay taxes or rents.⁵ As early as the Central Middle Ages rulers or cities could be obliged to recompense their former adversaries as part of a peace settlement. In 1179, for example, the bishop of Liège agreed to make peace with the count of Loon on condition that he did not owe the count anything for damage caused to the count's lands. This suggests that paying some sort of compensation was the norm. Such practices might not only have provided a strong motivation for keeping records, but also encouraged fraud.⁶

What these sources do provide is ample evidence about the diverse forms of disturbance: armed forces cut down or burned trees, shrubs, and vines, mowed or trampled grasslands, harvested, trod or burned agricultural fields, damaged ponds and took the fish, stole or killed livestock and game, demolished buildings, and caused human communities to experience a sharp demographic decline. Contemporaries, particularly those involved in agriculture, portrayed warfare as a catastrophe, and more importantly as a shock that had similar effects to a natural disaster. A fourteenth-century miniature leaves little doubt about the nature of medieval warfare (see figure 18). It portrays a party of men-at-arms burning a castle, stealing sheep, and cutting down a tree. A notarial act from Sautour, near Philippeville, in 1597 provides an equivalent portrait in writing, for it included a clause that the tenant of a major forge was not obliged to pay rent when affected by war or another kind of disaster.⁷

While warfare in general did have a similar role to a natural disaster, there were still major differences, depending on the exact geographical and chronological context. As argued in the introduction, armies evolved from forces that primarily aimed to damage property, often relatively small groups of a few dozen or several hundred men, to massive entities of tens of thousands of people who generally refrained from attacking local populations, but still caused considerable damage because they required food and shelter and built or attacked fortifications. These changes reflected a growing divergence between armies and general society, but also mounting problems regarding the basic maintenance of the former. Early modern rulers raised larger forces than their medieval predecessors, and also kept them in the field for longer periods of time. This put a heavy burden on their administrative apparatus, so much pressure in fact that warfare could only be conducted by outsourcing it almost entirely (especially the recruiting and supply). By the early seventeenth century medieval extortions under threat of burning down property (*brandschatting* / *Brandschatzung*) had developed into a complex sys-

5 Goorts, *War, State, and Society*, 290–91, 299–300; Gutmann, *War and Rural Life*, 66; Theibault, “The Rhetoric of Death and Destruction”; van Houtte, *Les occupations*, 1:44–47.

6 de Borman, *Chronique*, 1:78–79.

7 Sautour, 6931: February 18, 1597 (transcript Généamag).



Figure 19. Cavalrymen gather fascines and make gabions (left foreground), late seventeenth century (Guérard, *L'Art militaire*).

tem of contributions according to which local populations had to supply passing armies with everything they needed or face reprisals.⁸

Let us now analyze the first aspect of the horrible animal depicted on the seventeenth-century woodcut: the burning, killing, and pillaging. Such activities are closely associated with warfare in general, regardless of its exact geographical and chronological context, but need to be broken down into their constituent parts. This section will accordingly examine warfare's ecological effects in terms of cutting down wood, loss of harvest, raiding of livestock, poaching, and demographic decline.

It would be very difficult to overstate the significance of woody plants in premodern Europe, for basic survival, as fuel, raw material, or for their fruit. Armed forces continued to slash or burn them, whether individually or in groups, whether forests, hedges, orchards, or vineyards, throughout the period from 1250 to 1850. Still, when chronicles or administrative sources declared that combatants cut wood or damaged forests they did not necessarily mean that entire trees were destroyed. In 1636, for example, the steward of the lordship of Rijckholt near Maastricht looked into complaints about sol-

⁸ Bothe, "How to 'Ravage' a Country"; Gutmann, *War and Rural Life*, 41–46, 61–66; Parrott, *The Business of War*; Strickland, *War and Chivalry*, 268–77.

diers and their wives leaving the forest with oak branches. While cutting them off one of them fell down the tree.⁹ Forty years later, in 1677–1678, French troops felled woodlands near Charleroi claiming that Dutch troops had used them earlier as cover when attacking the fortress. In 1684 the woodlands still did not yield any returns because pigs could not be sufficiently fed with their acorns. In other words: the woodlands were not destroyed, but they did need time to recover.¹⁰

These men and women contributed to more general processes of overexploitation, which is why these infringements on entitlements were so significant to contemporaries, but the ecological damage of their actions was in itself quite limited. From the Middle Ages onwards most trees and shrubs in the Meuse Region were managed as pollards or coppice wood. The former practice involved the removal of a tree's crown, the latter cutting down the plant at ground level. Both forms of management encourage the regrowth of a multitude of new branches that could be harvested every few, typically seven, years.¹¹ Soldiers certainly took advantage of these practices since manufacturing *fascines* (bundles of branches) or *gabions* (cylindrical wicker baskets filled with earth) was a basic prerequisite for building temporary fortifications from at least the fifteenth century onwards. It is depicted in Guérard's seventeenth-century *L'Art militaire* (see figure 19), as well as in photographs made on the eve of the First World War, and appears regularly in military handbooks.¹²

This does not diminish the extensive harm done to woodlands in other circumstances, but does draw attention to the fact that there is considerable variety behind vague expressions such as "damaging" or "cutting down" woodlands.¹³ The amount of wood required by garrisons and mobile armies alike certainly must have been enormous: the fiscal accounts of the counts of Hainaut reveal that the defence of Binche in 1334 necessitated at least 1786 *fascines*, or the felling of seventy-two large oak trees, for the construction of small forts or large barricades (*fortérechies*), another six hundred *fascines* for the men of war who stayed in the city, and four hundred and seventy-six *mer rains*, wooden staves, for the making of *hourds* (wooden battlements built as an exten-

9 Maastricht, RHCL, 16.0502 Familie de Bounam de Ryckholt, inv. no. 598.

10 Hasquin, *Une mutation, le "Pays de Charleroi"*, 233–34.

11 Warde, *Ecology, Economy and State Formation*, 76–77; Vera, *Grazing Ecology*.

12 de Keralio, Lacuée, and Servan, *Encyclopédie méthodique. Art militaire*, 2:345, 2:489–80; Fallot and Lagrange, *Cours d'art militaire*, 157–70; Guérard, *L'Art militaire*.

13 Geldern, Stadtarchiv, G9 Stadtrechnung, fol. 67v (1586–1587) (transcript Rien van den Brand, <http://www.scriptoriumempeje.nl>); Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 291r (transcript Rien van den Brand); Adriaenssen, *Staatsvormend geweld*, 106; Bouwer, *Een notabel domein*, 106; Delcourte Debarre, "Espaces forestiers," 107, 138, 372–75; de Stavelot, *Chronique*, 251; Douchamps-Lefèvre, *Inventaire*, 1:194, 2:177, 3:23, 3:280, 4:231, 4:419; Habets, "Drie chronijkjes," 407–8; Kaisin, *Annales historiques de la commune de Chatelineau*, 217–24; Marchal, *Inventaire*, 77, 162, 272, 315, 316; Petitot-Bellavène, "Verdun," 86–87; Pionnier, *Essai sur l'histoire*, 257, 270; Poncelet, "Nouveaux documents," 501–2; Remmers, "Een schadelijst"; Rorive, *La guerre de siège*, 159, 163, 166, 177, 203–4; Stévenin, "Une fatalité," 169; Teunisse, *Onderdaan in Oranje's oorlog*, 69, 77; van den Brand and Manders, *Vesting 't Genneperhuys*, 376–77.

sion of walls or towers).¹⁴ This consumption grew even worse in later centuries. The defence of Geldern in 1701 required the procurement of seventy thousand pallisades and thirty-four thousand *fascines*.¹⁵ Preparing a fortification for a potential attack further entailed the destruction of any vegetation within bowshot, and later cannon range (see chap. 2). Demand of firewood could also be very substantial: accounts from the general receiver of Limburg and Outre-Meuse specify that the nobleman Carselis de Eupen and his retinue of eleven men stayed in the fortress of Argenteau, between Liège and Visé, from the end of August 1410 to the first of February 1411 to defend it. They consumed thirty-six wagonloads of firewood, taken from the lordship's own woodlands.¹⁶

Contemporaries particularly dreaded the harming of the few remaining trees with a full crown (in orchards, high forests, or as isolated individuals). This was undoubtedly a less common occurrence than the harvesting of coppice woods or pollards, but then these trees were also relatively rare because of the constant pressure on wood as a limited resource. The citizens of Fosses near Namur, for instance, had to declare in a 1276 charter that they had only cut down trees belonging to the collegiate church of Saint-Pholien because they had had to strengthen the city's defences and no suitable trees could be found in their own woodlands.¹⁷ Wenceslaus, Duke of Brabant (1355–1383), similarly declared in a 1365 charter that the citizens of Aachen could keep a siege tower with battering ram (*ein evenhoge ende ein catte in einem werke*) because they paid for its construction, but since the wood came from his forests in the Duchy of Limburg, he reserved the right to borrow the tower.¹⁸

These needs are fairly practical, in the sense that they are connected to a combatant's health (firewood) or core activities (combat). Yet army members also burned or cut down woody plants and vines to punish their owners and affect their economic base, as in 1393 when Jan Uten Campe saw his house (castle), orchard, and willows, located near Woudrichem, destroyed. This was an act of retaliation for Uten Campe's support of Willem van Oostervant against his father, Albert of Bavaria, Count of Holland (1358–1404).¹⁹ Early modern soldiers saw wood as a commodity that could be easily appropriated for their own ends, for instance to gain some extra income. The Spanish government singled out its own soldiers as perpetrators in legislation issued to protect woodlands in the Netherlands, and Louis XIV issued similar regulations for his own forces in the late seventeenth century.²⁰

14 Devillers and Pinchart, *Extraits des comptes*, 12–13; Raynaud, "Défenses annexes."

15 van den Brand, "Spaanse vestingbouwwerkzaamheden," 102–8.

16 Gaier, "L'approvisionnement," 573–74.

17 Poncelet, "Nouveaux documents," 501–2. See also Roland, "Les seigneurs de Morialmé," 58–59.

18 Berens, *Territoriale Entwicklung & Grenzbildung*, 163.

19 De Boer, Faber, and van Gent, eds., *De rekeningen, 1393–1396*, 4. See also de Stavelot, *Chronique*, 111; Douxchamps-Lefèvre, *Inventaire*, 4:342, 4:372; Girardot, "La guerre," 6; Lefèvre, "Documents relatifs aux dégâts," 44; Maguin, "Economie, politique et viticulture," 196; Richer, *Abrégé chronologique*, 212; Servais, *Annales historiques du Barrois*, 2:329; van Doorninck, "Inneming," 230.

20 Maastricht, RHCL, 01.004 Hof van Gelder te Roermond, inv. no. 1636; *Reglements et ordonnances du roy pour les gens de guerre*, 9:228 (August 28, 1695); Delcourte Debarre, "Espaces forestiers,"

Such disturbances are meaningful because they were part of long-term infractions resulting in the overexploitation of forests and the obstruction of regrowth. Villagers in effect took advantage of the turmoil armies created, and the resulting breakdown of authority, to evade the laws regulating the conservation of woodlands: regulations passed in 1559, regarding the use of woodlands in the County of Namur, explicitly mentioned that earlier legislation was being ignored because of the war with France. The year 1747 saw a similar renewal of legislation in the principality of Liège, during another French invasion.²¹

The widespread practice of villagers taking refuge in the most inaccessible locations when confronted with an invasion (often forests, but caves, hedges, ditches, marshes, and islands are also mentioned) exacerbated the disruption of combat itself. It caused a sudden and very substantial rise in human presence in areas that were normally left more or less alone. The seventeenth-century County of Namur, for example, saw several lawsuits about damage done to privately owned woodlands and meadows by refugees and their livestock. In one instance the barriers protecting a forest were broken down in order to gain access. In 1686 Gilles Marteleur, fifty-eight years of age, testified during his interrogation by the councillors of Pesche, near Couvin, that he had grown up in woodlands, in a house separated from the village by an hour's walk, because of the wars.²²

In a few instances quite precise data is available and these sources make it clear exactly how much damage premodern armies could inflict, even with the relatively basic tools at their disposal. French armies of about twenty-five thousand men settled near Tongres/Tongeren in 1746 and 1747 to build field fortifications. This involved the digging of trenches and the construction of batteries, but also procuring firewood. During their two stays, which lasted about a month each, every tree in the direct neighbourhood of the encampment seems to have been cut down, including those on the walls of Tongres and local orchards. The priors of the local hospital (*gasthuis*) claimed in their institution's narrative of the events to have lost more than a thousand trees, mostly poplars and birches. In the nearby village of Overrepen, which encompassed one of the few remaining woodlands in the area (the forest of Kolmont), French soldiers took one thousand trees as well. Because the French king promised to compensate the popula-

374; Laurent et al., eds., *Receuil des ordonnances des Pays-Bas*, 2:24; Berkvens, *Plakkatenlijst Overkwartier*, 1:228–29; Bodard, ed., *Receuil des ordonnances du Duché de Bouillon*, 7; Goblet d'Alviella, *Histoire des bois et forêts*, 1:344–47; Jacquet-Ladrier, "Vivre à Namur," 178; Rorive, *Les misères de la guerre*, 347; Schoetter, "Etat du Duché de Luxembourg," 398–99; van Zuijlen, *Inventaris*, 2:1155.

21 's-Hertogenbosch, BHIC, 5121 Schepenprotocolen Sint-Michielsgestel, inv. no. 45, fol. 240r; Hasselt, RAH, Notariaat, Rekem, Caenen (microfilm no. 1462471, item 9): act October 26, 1748; Boosten et al., *Bosgeschiedenis*, 211–18; Goblet d'Alviella, *Histoire des bois et forêts*, 2:229; Laurent et al., eds., *Receuil des ordonnances des Pays-Bas*, 8:35–36; Marchal, *Inventaire*, 154; Rouché, "Journal de l'entrée," 70–72.

22 Pesche, 6361: May 22, 1686 (transcript Gèneamag); Douxchamps-Lefèvre, *Inventaire*, 3:195–96, 3:217, 4:106, 4:117, 4:123, 4:132, 4:186, 4:275, 4:346; see also Tongeren, SAT, inv. no. 1, fol. 46r–v; Cuppens, "Opoeteren," 85–96; Delcourte Debarre, "Espaces forestiers," 101, 333; Faujas de Saint-Fond, *Histoire naturelle*, 40–41, 43, 50; Jacob, *Bruyères*, 105; Marchal, *Inventaire*, 166

tion for their losses, an exact survey was made. This reveals that in the forest itself three hundred and eighty-four oaks and ash trees had been cut down. The other major loss concerned the village's fruit-bearing trees, with willows and coppice wood being considered less valuable.²³ Still, even though the French army acted as a disaster, a shock, they did not destroy the local ecosystems. If the term destruction is appropriate, it is only in the short term, for the 1777 Ferraris map indicates that the area had by then recovered from this disaster.²⁴

One should indeed be careful to distinguish theory from actual practice: commanders may have given orders to procure a certain amount of palisades or cut down a particular number of trees, but that did not necessarily mean that these orders were carried out, at least not to their full extent. This can be proven by letters kept in the prefect's archive in Maastricht regarding the preparation of the fortresses of Grave, Venlo, and Maastricht for the Allied invasion in December 1813. French engineers calculated that this required between eighty-five and ninety thousand palisades as well as tens of thousands of *fascines* and storm poles, or the cutting of about five thousand four hundred trees. Initially, they intended to use oak trees as well as conifers, but in order to preserve the remaining oak forests, and because transportation would be too expensive, these edifices were to be made from pinewood. Despite the use of more than two hundred wagons and a multitude of labourers, and to the growing frustration of the French director of fortifications, the desired production rate of three thousand palisades a day was never reached and large numbers of felled trees had to be left behind. Accounts from the forest administration in 1814–1815 comment on the selling of wood left by the French in Rekem and by the Swedes, who blockaded the fortress of Maastricht, in Gronsveld.²⁵

Military officers were well aware of the problems affecting the supply of wood, especially in periods of crisis. This is one of the reasons why they started taking control over woodlands and planting trees themselves (see chaps. 1 and 2). If possible, timber was brought from other areas and stored. The Meuse itself was after all a major transportation route for wood. During the siege of Utrecht in 1345, for example, the count of Holland bought thousands of planks and poles of different sizes in Dordrecht, a significant part of which came from the Meuse Region. The construction of pavises alone consumed hundreds of planks which put together would have been more than three thousand metres long.²⁶ Records kept by the chief engineer in the fortress of Maastricht in the second half of the eighteenth century reveal that several thousand to tens of thousands of palisades were kept in store and that about two thousand were planted each year in the fortifications to replace rotten ones. In case of necessity, major entrepreneurs were

23 Tongeren, SAT, Schepenbank Overrepen–Kolmont III; De Harzé, “Manuscrit relatif aux batailles de Rocour et de Lafeld,” 265–67, 287–88.

24 Brussels, KBR, Cartes et plans, MS IV 5.567: Carte de Ferraris. See also Buridant, “Le rôle des forêts,” 238; Verbois, *Rekem*, 315.

25 Liège, AEL, Fonds Hollandais, inv. no. 396; Maastricht, RHCL, 04.01, inv. no. 81; 07.E01, inv. no. 17; Frans Archief, inv. no. 1177.

26 Pavises are large shields behind which crossbowmen could hide while reloading. Hamaker, *De rekeningen*, 3:457–65, 3:476.

contracted to supply thousands of palisades, *fascines*, poles, or *gabions* in a matter of weeks.²⁷ The demands armed forces placed on wood as a scarce resource could certainly have devastating results, but they were in themselves rarely sufficient to cause long-term damage.

While woodlands are relatively well studied and their disturbances significant, the same cannot be said about a very different kind of community: grasslands. Grasslands had a central role in contemporary agricultural systems either for pasture or for producing hay (meadows). Chronicles, fiscal accounts, and notarial or court records sometimes remark that these were trampled or mowed by, or for, passing armies but provide no further specifications. Often, they simply comment that an army “foraged.”²⁸ In a charter from 1286 Jan, lord of Cuijk, declared that he would not raid the lands of the count of Guelders that lay west of the Meuse River, on condition that his lands were not damaged either. “Damage” is specified here as burning, stealing, and taking forage (*voderigge*).²⁹ Providing for an army’s animal component was plainly a factor of major importance.

A horse can be fed with green forage (freshly cut grass, herbs, grains) or dry fodder (hay, oats, straw). Procurement of the latter is an important requirement to keep up a horse’s strength or get it through the winter. A single horse needs about twenty-five kilograms of forage or twelve kilograms of fodder each day.³⁰ The area that this forage is procured from would of course differ according to local circumstances but seems to be quite considerable. The marquis de Puységur (1665–1743), a French marshal, calculated in the first half of the eighteenth century that a single horse required about one hundred and fifty square metres of grassland each day. One half was needed for forage and the other half was trampled and eaten in the process of collecting it, or simply left on the field.³¹ Even a small raiding party, or a cavalry company of a few dozen horses, could therefore have significantly affected a village’s grass and agricultural lands. Still, grasslands recover faster than any other aspect under consideration here. Unless they were damaged repeatedly, because soldiers used them as training grounds or sources for the grass blocks incorporated in fortifications, these disturbances only lasted weeks or months. Besides, during the eighteenth century provisions of dry fodder, from supply depots or local villages, increasingly replaced “foraging,” at least until the army entered enemy territory.³²

²⁷ Maastricht, RHCL, 01.E01, inv. no. 1; Berens, *Territoriale Entwicklung & Grenzbildung*, 163; Suttor, *La Meuse*, 404–6.

²⁸ Geldern, Stadtarchiv, A, no. G9, Stadtrechnung, fols. 48r, 75v, 76r (transcript Rien van den Brand); Gonrieux, 4087: July 13, 1636 (transcript Gënëamag); Douxchamps-Lefèvre, *Inventaire*, 1:250, 1:276, 3:171, 4:35, 4:239, 5:28, 5:120; Habets, *Chronijk*, 39–40; Richer, *Abrégé chronologique*, 192, 195; Vandewal, “De kroniek,” 233; Verschure, *Overleven*, 138.

²⁹ van Helen, *Rymkronyk*, 444–45. See also Boffa, *Warfare*, 189–90; Gaier, “L’approvisionnement,” 556, 563–64; Servais, *Annales historiques du Barrois*, 1:460.

³⁰ Bachrach, “Animals”; Haldon, “Introduction”; Harari, “Strategy and Supply,” 305; Perjés, “Army Provisioning,” 14–17.

³¹ de Puységur, *Art de la Guerre*, 1:398–402 and 2:63–65.

³² Engelen, “Stokkem,” 68–69; Lhoist-Colmon and Gabriel, “La colline,” 40; van Houtte, *Les occupations*, 1:70–71; van Nimwegen, *De subsistentie*, 11–12, 58–60.

The disturbance of agricultural fields, most of which are also considered as grasslands from an ecological perspective, was in many ways related to the aforementioned meadows and pastures, but being more valuable, they are better documented. Harvests were stolen, burned, or trampled by armies simply passing through, using scorched earth policies, procuring food for men and horses, or protecting themselves from the elements (see chap. 5).³³ A particularly striking case is a letter written by a farmer living near Maas-tricht in 1794 to his son, a corporal in a Dutch cavalry regiment. He responded somewhat angrily to his son's earlier comment that he was looking forward to war by listing its effects on the villagers. He wrote that they had to seek refuge with their livestock in the quarries of the Sint-Pietersberg and that "no green leaf" was left in the fields. French and Imperial troops had trampled the "potatoes, clover, oats, vetches and other crops."³⁴

Agricultural fields illustrate that the sources under consideration here do not just focus on economic concerns, but show that military disturbances primarily cause economic rather than environmental damage. The role of warfare as a major cause of harvest losses is well known within the history of agriculture, but burning agricultural fields or leaving them fallow for a few months or years also enriches the soil.³⁵ Historical studies that reflect on agricultural systems in a long-term perspective agree that they normally recuperated fairly quickly from disturbances brought about by warfare, often within a few years or a decade at most. Farmers could go hungry or use their remaining financial reserves in order to plant again, but their ability to withstand shocks was permanently reduced if forced to sell equipment, which affected their ability to work the land. Major landowners might also resort to reducing rents or share cropping to ensure the continuous occupation of their farms.³⁶

Numerous lawsuits have been preserved from the County of Namur in the late sixteenth and seventeenth century regarding tenant farmers no longer able to pay their rent due to external circumstances, often a combination of warfare and undesirable weather. Most agricultural systems do seem to have experienced their worst crises when several factors, such as the aforementioned two, coincided. These lawsuits also show, however, that landowners did not necessarily accept depredations by armies as an excuse for failing to pay rent. They apparently did not recognize their tenants' predic-

33 Adriaenssen, *Staatsvormend geweld*, 131–35; Cauchies, *La législation princière*, 369; De Cauwer, *Tranen van bloed*, 110–11; Engelen, "Stokkem," 235–36, 253, 258; Foullon, *Chronique*, 216; Genicot, *La crise agricole*, 9–10, 19–20, 98; Gutmann, *War and Rural Life*, 75; Hasquin, *Une mutation, le "Pays de Charleroi"*, 233; Richer, *Abrégé chronologique*, 235; Rorive, *Les misères de la guerre*, 353–54; Servais, *Annales historiques du Barrois*, 1:178; Sivery, *Structures agraires et vie rurale*, 2:379; Thielemans, "Une source d'histoire rurale," 409–10.

34 The Hague, MC, Collectie Doesburg, letter no. 45–83. I am grateful to Renaat Gaspar for providing me with a transcript of this letter.

35 Thoen, "Oorlogen en platteland." See also Driessen, *Emundt van Oeteren*, 740.

36 Campbell, "Nature as Historical Protagonist"; Driessen, *Emundt van Oeteren*, 744–52; Genicot, *La crise agricole*, 109–11; Gutmann, *War and Rural Life*, 75–102, 197–200; Hoffmann, "Warfare, Weather, and a Rural Economy"; Jansen, *Landbouw en economische golfbeweging*, 82–101, 154–61, 185–90, 195, 205; Slavin, "Warfare and Ecological Destruction". See also Hanson, *Warfare and Agriculture*.

aments as “unprecedented calamities,” which historians often associate with the seventeenth century.³⁷ Armies’ devastations must have had a tragic impact on farmers’ lives, but their effects on agriculture as a whole were mostly transitory.

The trampling and burning of agricultural fields is closely connected to the ecological consequences of livestock raiding. Livestock theft remained a general feature of warfare up to the late seventeenth century, to supply armed forces with food, and because it represents a very considerable, and mobile, form of wealth. After 1700, references become increasingly rare, which is connected to the changing relationship between armies and local populations.³⁸ The records kept by the prévôt of Longwy regarding his income and expenses during the *chevauchée* against Verdun in 1318 reveal, for example, that of the 481 sheep eaten by his followers, only about one in four was purchased. According to a book of fiefs from the County of Namur, written down in the 1340s, the count’s marshal was similarly entitled to all kinds of animals with greyish hair (*touttes manieres de vaires bestes*) taken in enemy territory, to half the compensation paid for horses given up to the count because they were sick or wounded, and to the skins of the horses that died while in the count’s care.³⁹

Particularly instructive is a fiscal account kept by Willem IV van Egmont (1412–1483), brother of the Duke of Guelders, on his income and expenses in 1435, when campaigning in the area around the fortress of Herzogenrath during the war between Guelders and Jülich. It provides a good example of the maxim that “war feeds itself,” for Willem’s income included extortions under threat of fire, ransoms, and stolen goods (*geroefder haven*). His men had taken one hundred pigs at the village of Baesweiler, “some pigs” and “two skinny cows” near Linden and Hoyngen (to the north of Aachen), and seven bags and three casks of salt. His expenses mostly concerned the purchase of food for man and horse. As revealing as this source is, the information it provides is rather incomplete. The account in fact explicitly states that part of the second herd of pigs, taken near Linden and Hoyngen, was eaten. The amount booked suggests that about thirty-six animals were sold.⁴⁰

37 Douxchamps-Lefèvre, *Inventaire*, 1:178, 1:181–86, 1:188, 1:190, 1:192–93, 1:196, 1:198–207, 1:210–26, 1:230–44, 1:261–80, 1:299–314, 1:325–41, 2:20–22, 2:29, 2:41–45, 2:49–50, 2:64–65, 2:73–77, 2:84, 2:103–4, 2:112, 2:154, 2:181, 3:56, 3:90, 3:252, 4:24, 4:65, 4:130, 4:133, 4:212, 4:228, 4:258, 4:269, 4:419–20, 5:21–22, 5:33, 5:37; Parker, *Global Crisis*.

38 Arlon, AEA, 062, 1121: Correspondance entre le Conseil de Luxembourg, le duc de Lorraine et le capitaine de Sedan; Maastricht, RHCL, 01.075 Landen van Overmaas, inv. no. 1487; Couvin, 529: May 26, 1636 (transcript Génomag); Adriaenssen, *Staatsvormend geweld*, 146–47; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 4:186; Borgnet, *Cartulaire*, 12–13; Deloffre, “Guerres et brigandages,” 358–59; de Stavelot, *Chronique*, 363, 555, 569, 588; Girardot, “La guerre,” 7, 9, 10, 26; Hagendorf, *Tagebuch*, 60; Helmich, *Journal*, 248, 255; Hoeckx et al., eds., *Kroniek van Molius*, 178–79; Jenniges, *Das Land zwischen Venn und Schneifel*, 67; Kraus, *Regesten*, vol. 6, no. 481; Le Bouvier, *Le livre*, 112; Lefèvre, “Documents relatifs aux dégâts,” 42–43, 48, 50, 53; Liégeois, “Compte de la recette de Chiny,” 159; Macaré, ed., “Dagverhaal,” 298; Mengels, *Chronyk*, 26–27; Richer, *Abrégé chronologique*, 194, 197, 250; Salzmann, “La petite guerre,” 193–97; van Doorninck, “Inneming,” 230; van Heiningen, *Tussen Maas en Waal*, 74.

39 Bormans, *Les fiefs*, 1:28–29; Collin, “Le travail,” 27–28.

40 Arnhem, GA, Hertogelijk Archief, inv. no. 445, fol. 1. See also Luce, *Jeanne d’Arc à Domrémy*, 144–45, 171.

Even if one takes this source-criticism into account, it is clear that a considerable part of livestock herds was traded rather than killed, and in some cases the original owners actually got the option of ransoming their animals back. An inquest made by the castellan of Stokkem has been preserved, which gives an exceptional insight into what happened to the livestock stolen by Imperial troops during the taking of the *schans* of Opoeteren in 1636. The investigation mainly concerned the attack itself, involving the taking of animals and goods, and the death of several villagers, but also included villagers' testimonies that they managed to get some of their livestock back by purchasing it from a local nobleman, tenant farmers, Spanish soldiers, and even one of the castellan's own men, named Peter Colen. It is unclear whether anyone was actually pursued for purchasing stolen goods. Colen still served in the garrison of Stokkem in 1655.⁴¹

Nevertheless, in many areas livestock decline was a substantial problem. This can be proven because the Spanish Habsburg government taxed livestock ownership. We thus have access to relatively good overviews of the number of horses, cattle, and sheep present in specific communities. In the Prince-Bishopric of Liège by contrast such information only became available after the French takeover in 1795. In Bastogne for example, in the Duchy of Luxemburg, the number of sheep decreased by eighty-two percent between 1624 and 1656, and the number of cattle and horses was reduced by about half. Villagers were forced to lend animals because their own flocks had been stolen or died of disease.⁴²

Assessing the ecological consequences of the killing of fish and game is fraught with its own problems. The right to kill or own fish and game was carefully guarded by a small number of privileged persons, predominately nobles, which made poaching or illegal fishing a direct assault on their privileged status rather than just another form of pillaging. Army members therefore not only engaged in such practices to procure food, but were also asserting their social status and undermining a lord's authority by attacking the environmental symbols of his lordship.⁴³ The accounts of Grave mention for instance that swans were captured during a military expedition in 1463 to Herpen, a more or less independent lordship close-by. Given that the right to keep swans was a carefully guarded privilege, this action should be seen as symbolic for a larger conflict over jurisdiction. The specification that the count of Egmont, two high bailiffs, and the city council of Grave all attended this operation, confirms this impression.⁴⁴

The close association of noble status with hunting is borne out as well by the fact that contemporaries repeatedly singled out military officers for their poaching activities. For officers, hunting was part of a noble lifestyle, but apparently they did not feel

41 Liège, AEL, Etats, inv. no. 3006: Muster list of the garrison of Stokkem, 1655; Cuppens, "Opoeteren," 85–96.

42 Jacob, *Bruyères*, 115–117.

43 Medieval rulers often brought their hunting dogs and falcons with them on military campaigns. See for instance Lyon, Lyon, and Lucas, *The Wardrobe Book*, 219, 225, 235. Bonet, *L'Arbre des batailles*, 96; De Dynter, *Chronique*, 3:860; Delcourte Debarre, "Espaces forestiers," 454; van Helen, *Rymkronyk*, 155; van Werveke, *Die Erwerbung*, 20.

44 Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 136r (transcript Rien van den Brand).

obliged to respect property rights.⁴⁵ The accounts of the high bailiff of Souilly specify that he investigated the killing of a “large deer” by a local squire and several captains of the garrison of Verdun in 1627.⁴⁶ This example demonstrates that local populations also played a role in unlawful hunting. It was quite common for citizens and villagers to offer game to commanders as a bribe or as part of a larger spectrum of services.⁴⁷

Illegal fishing is similarly well attested in the immediate surroundings of military garrisons, and near armies’ marching routes. Nicolas d’Ischen, citizen of Arlon and leaseholder of seven ponds near the town, petitioned the Conseil de Luxembourg on August 30, 1624 because soldiers of the garrison took fish from his ponds on a daily basis. He already asked their commander to intervene, but this request was apparently ineffective. He now sent a more or less veiled threat, arguing that if no effective measures were taken he would be obliged to end his lease, which would be particularly unfortunate in light of the government’s already precarious finances.⁴⁸ Because freshwater fish and game were often kept in carefully controlled, but isolated, locations (ponds, rabbit warrens, and hunting parks), they were very vulnerable to the “shocks” warfare brought about.⁴⁹

At the same time, the effects of these poaching activities should not be overestimated. The argument of Jan Hendrik de Rijk, for instance, that the Eighty Years War caused the extinction of the common crane (*Grus grus*), great bustard (*Otis tarda*), and black grouse (*Tetrao tetrix*) in large parts of the Northern Netherlands as early as the 1570s is tenuous because it is only based on indirect evidence provided by the withdrawal of their names from hunting regulations. If these birds became extinct only a few years after the start of the Eighty Years War, then they must already have been on the verge of extinction when the fighting started. The famous Dutch hunting treatise *Jacht-Bedryff* from 1636 blames habitat changes as a result of changes in agriculture rather than warfare for the disappearance of many species.⁵⁰ The disastrous impact of warfare is on its own insufficient to explain permanent changes in animal populations.

Moving from animal to human demographics, it is worth noting that even though more reliable sources are available for the latter, it is still very difficult to pinpoint exact causes. Battlefield losses could be massive, particularly if involving locally recruited armies, but they were also relatively exceptional events. A surviving tax record suggests, for example, that the city of Liège might have lost more than half its adult male popu-

45 's-Hertogenbosch, BHIC, 178, inv. no. 193, fol. 86v; Maastricht, RHCL, 01.01. Staten van het Overkwartier van Gelre, inv. nos. 552, 556; Berkvens, *Plakkatenlijst Overkwartier*, 1:167; Bouwer, *Een notabel domein*, 102; Helmich, *Journal*, 289; Illaire et al., eds., *Les cahiers de doléances*, 589.

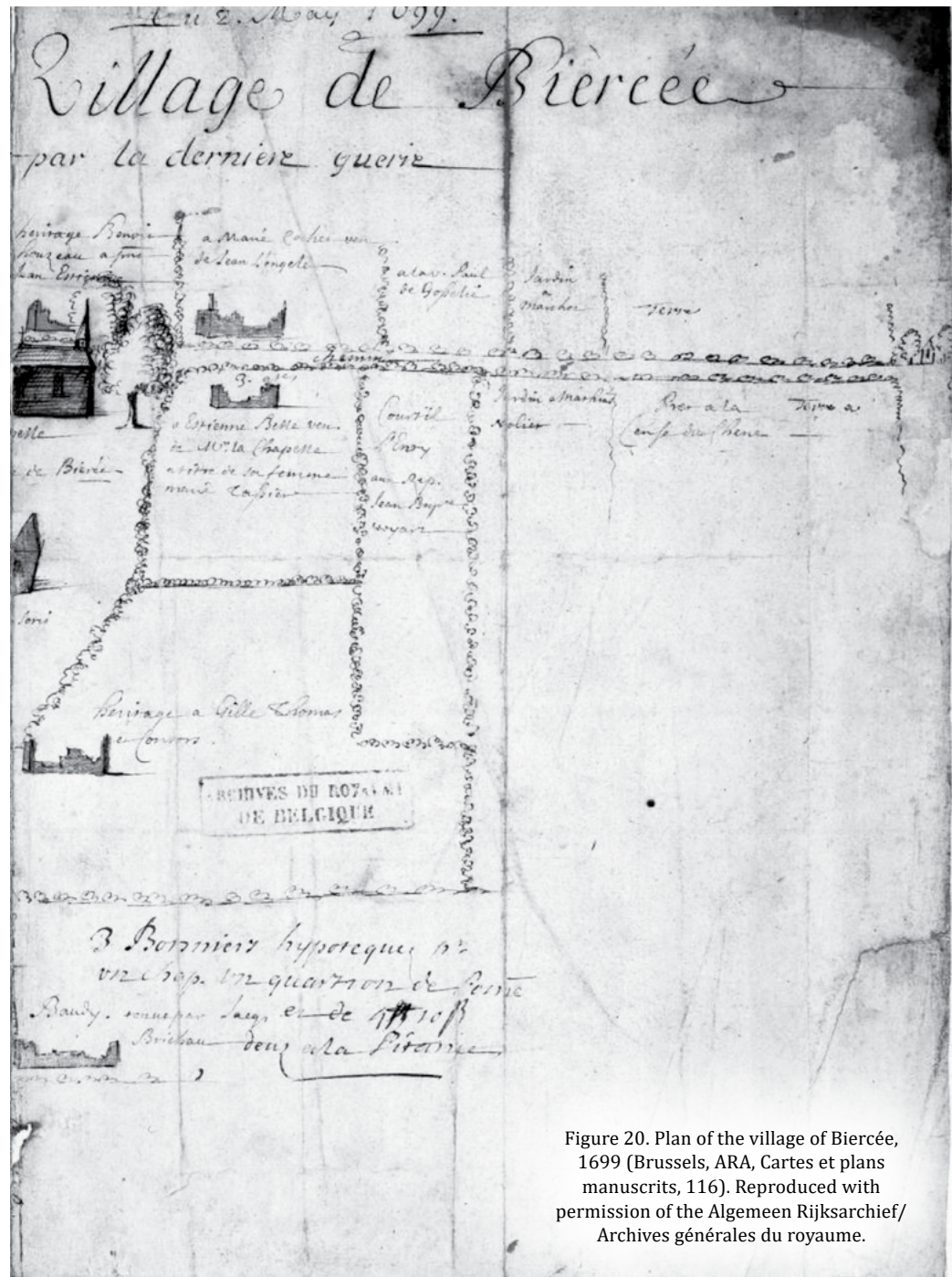
46 Bar-le-Duc, ADM, B 1280, fol. LXXVIII.

47 Jappe Alberts, “De eerste Bourgondische bezetting,” 63; Kaisin, *Annales historiques de la commune de Chatelineau*, 153, 164, 191, 235; Verschure, *Overleven*, 198.

48 Arlon, AEA, 062, 1287: Plainte de Nicolas d’Ischen. See also Vandermarliere, *De troebele jaeren*, 57. See also Maastricht, RHCL, 04.01, inv. no. 81; Aimond, *Les relations*, 58; Ceyssens “Les premières hostilités,” 90; d’Haynin, *Mémoires*, 1:136; Girardot, “La guerre,” 3; Lefèvre, “Documents relatifs aux dégâts,” 48; Neirinckx, “A Letter,” 10–11; van Zuijlen, *Inventaris*, 2:796; Verbois, *Rekem*, 312.

49 Delcourte Debarre, “Espaces forestiers,” 448, 451, 454; Marchal, *Inventaire*, 166, 180.

50 de Rijk, “Vogels en mensen,” 64–65; van Heenvliet, *Jacht-Bedryff*, 1.



lation at the battle of Brustem (1467).⁵¹ Furthermore, the armies under consideration here rarely engaged in large-scale massacres outside the battlefield. The few references to mass killings come from very specific circumstances, such as fortifications taken by storm or rulers setting an example (e.g., Dinant in 1466), contexts where armed resistance was perceived as illegitimate or unnecessary.⁵²

Such spectacular examples do tend to obscure the fact that, compared to other factors, major battles had a relatively limited long-term impact (if we ignore the possible exception of chapels or cloisters built on the site of medieval battlefields).⁵³ It is well established in historical studies that warfare-induced demographic decline was related to disease, migration, and reduced fertility rather than fighting in the strict sense of the word. Warfare caused widespread insecurity, increased financial pressures, and encouraged the spread of epidemics (see chap. 5), but it was not the only factor influencing such patterns. The relative importance of warfare compared to economic conjunctures or the weather in particular is far from clear, especially before we are able to consult parish records. Assessing demographic developments up to the middle of the seventeenth century largely depends on hearth lists, that is, numbers of households in a specific year.⁵⁴

Given the fiscal nature of these sources and the ambiguous meaning of the term household, calculating population growth can be difficult. A comparison between hearth lists from the Duchy of Brabant in 1480 and 1496, a period of political instability and warfare, indicates for instance that 's-Hertogenbosch grew by eighteen percent, while the number of households in nearby villages and towns declined. Helmond and Eindhoven lost almost seventeen and fifteen percent of their population in the same period. This suggests the demographic decline in the countryside during armed conflicts is at least partially caused by massive emigration to (larger) cities, where mortality rates are on average higher.⁵⁵ Hearth lists from other areas confirm this pattern for the 1570–1715 period. They also demonstrate that communities in the worst affected areas, such as the Duchy of Bar-Lorraine, typically lost between thirty and sixty percent of their inhabitants, compared to their population levels before a particular war. These losses could be even higher for single settlements. Recovering from this decline was often a drawn-out process, lasting at least several decades.⁵⁶

51 Balace and Gaier, "Catalogue," 128–29.

52 Brouwers, "La reconstruction"; Kroener, *Les routes*, 114; Kroener, "Antichrist, Archenemy, Disturber of the Peace"; Lemoine, "L'enceinte de Liège," 80–83.

53 Nijsten, *In the Shadow of Burgundy*, 377; van den Brand, "Oprichting van een Augustijns klooster," 51–54; Villa-Séblin Nicole, *La sénéchaussée*, 51.

54 Girardot, *Le droit et la terre*, 2:501–4; Gutmann, *War and Rural Life*, 149–95; Jenniges, *Das Land zwischen Venn und Schneifel*, 50–52, 122–26; Mertens, "Oorlog, epidemie en emigratie," 129–35; Miart, "La population," 84–108; Outram, "The Socio-Economic Relations"; Rorive, *Les misères de la guerre*, 65–70; Van Caulaert, "Domaine de Golzennes," 18–19.

55 Cuvelier, *Dénombrements de Foyers*, CXVI–CXXIII, CCXXXVI–CCXXXVII.

56 Adriaenssen, *Staatsvormend geweld*, 269–277; Arnould, *Les dénombrements de foyers*, 198–201, 245–51, 257–58, 268–71; Dahm, "Verluste der jülich-bergischen Landmiliz"; Gutmann, *War and Rural Life*, 142–50; Jacob, *Bruyères*, 112; Kroener, *Les routes*, 206; Laperche-Fournel, *La Population*, 109–33, 162–84; Mertens, "Bank van Pelt," 95–106; Miart, "La population," 126–60; Schoetter, "Etat du Duché

These demographic developments have also to be interpreted in the context of the destruction of buildings. Setting fire to buildings was a significant impact from warfare because it contributed to an already extensive overexploitation of wood. The duke of Burgundy, for instance, allowed villagers from the County of Namur in 1439–1440 to cut no fewer than two thousand oaks and eleven hectares of high forest to rebuild their houses, destroyed by forces from the Prince-Bishopric of Liège in 1430.⁵⁷ This example is significant because it provides precise data. Many sources mention that buildings were set on fire, arson being a core element of warfare up to the seventeenth century, but they are rarely specific about the number of houses affected. Furthermore, one also has to take into account that extortion under threat of fire was an important source of income for armed forces (for example, the account of 1435 cited above). Fiscal accounts do show that raiders often targeted mills: mills represented wealth, had a crucial energy function, including the grinding of grain for passing armies, and were vulnerable because of their location on the edge of or outside their settlements.⁵⁸

Fortunately, there is one source that provides very detailed information: a report from 1657 written by lieutenant colonel Jean Ernest de Terwel about the resources of each settlement in the governments of Reims, Rethel, and Sainte-Menehould. This document would serve as the basis of a tax reform, intended to apportion the tax burden more equally. It indicates that in frontier areas, such as near Rocroi, houses had been burned down in almost every settlement, but also that few communities had no houses left. Here villagers lived in huts or their fortified church. A handful of settlements, mostly hamlets, had been abandoned completely.⁵⁹

Still, it is revealing that de Terwel did not necessarily advise a significant tax reduction. In some instances he actually believed taxation should be increased. This suggests that he considered this war damage to be a merely temporary phenomenon. How representative this report could be for other areas and periods is unclear, but hearth lists from the Hohes Venn and Ardennes from the same period confirm this image of partial destruction (around fifty percent of the houses). This also goes some way in explaining why complaints or petitions emphasize the economic cost of the destruction rather than its exact nature. A depiction from 1699 of the village of Biercée, between Maubeuge and Charleroi, ruined during the Nine Years War (1688–1697) has still been preserved (see figure 20). The houses had been demolished, but the hedges and even a few trees near the church remained standing.⁶⁰

de Luxembourg,” 344–45; Stévenin, “Une fatalité,” 163–65, 168–77; Terwel, *Les notices cadastrales*.

57 Brouwers, “Indemnités pour dommages de guerre,” 89, 92.

58 Carolus-Barré, “Benoit XII,” 186–190; Engelen de Stavelot, *Chronique*, 112, 116; Douchamps-Lefèvre, *Inventaire*, 1:183, 1:185, 1:187, 1:191, 1:220, 1:281, 1:341; 2:21, 2:43, 3:260, 3:269, 3:284, 4:44, 4:378; Girardot, “La guerre,” 3, 5; Hoeckx et al., eds., *Kroniek van Molijs*, 212–213; Hoppenbrouwers, “Een middeleeuwse samenleving,” 26; Jenniges, *Das Land zwischen Venn und Schneifel*, 72; Kroener, *Les routes*, 142; Luce, *Jeanne d’Arc à Domrémy*, 84–86; Marchal, *Inventaire*, 91, 105, 155, 164, 167–168; van de Venne, *Het beleg*, 11; Verschure, *Overleven*, 174.

59 Terwel, *Les notices cadastrales*.

60 Brussels, ARA, Cartes et plans, no. 116: Plan du village de Biercée, détruit par la dernière guerre, du 2 may 1699.

While deliberate disturbances such as these became more and more rare from the eighteenth century onwards, damage done during sieges seems to have increased because of technological developments. Bombardments with incendiary missiles were common in the Middle Ages, but it is unlikely that they were as devastating as eighteenth-century artillery fire.⁶¹ In 1794, during the siege of Grave, French besiegers shot about two thousand and four hundred cannon balls and bombs into the city, killing only eight people and wounding another six, but damaging every single building.⁶² Several cities in the Prince-Bishopric of Liège experienced major fires in 1672–1714, either because soldiers set buildings on fire (e.g., Huy and Tongres/Tongeren) or bombarded them with incendiary devices (Liège). In all cases legislation was passed to ensure that houses were rebuilt in stone. Nearby Maastricht and Roermond, both of which had permanent garrisons, issued similar legislation several decades earlier since they ran a higher risk of being besieged.⁶³ Warfare destroyed people's and animals' lives and homes, but it was rarely able to overcome the resilience exhibited by biotic communities as a whole.

Wolves and the Creation of Wilderness

Given that disturbances make nutrients available, one should keep in mind that for every species being affected negatively, there could be another taking advantage. The image at the beginning of this chapter depicts a beast that combines features of different animals (wolf, bear, lion/leopard, rat), and is associated with toads, locusts, snails, and snakes. All these species shared an association with negative traits, or even symbolized evil. This pamphlet suggested that armies' depredations were a direct assault on human control over their environment, whether this was a deliberate act or not, and consequently gave unwanted species a chance to migrate and reproduce. In other words: warfare encouraged the spread of wilderness or uncontrolled nature.⁶⁴

The association between warfare and wilderness was particularly strong for one of the creatures depicted here, not coincidentally the animal that became the model for the beast's head. Chronicles in particular comment on an increased presence of wolves as the result of armed conflicts. The famous *Journal d'un bourgeois de Paris* (1421–1423), which recounts that wolves entered Paris and attacked humans, is one of the best-known examples, but this association is much older than the fifteenth century.⁶⁵ The *Dialogus miraculorum* by Caesarius of Heisterbach, dating to the early thirteenth century, tells

⁶¹ The Count of Holland, for example, bought one thousand three hundred fire arrows for the siege of the house (castle) of Altena in 1393. De Boer, Faber, and van Gent, eds., *De rekeningen, 1393–1396*, 56; Hoeckx et al., eds., *Kroniek van Molius*, 154–55.

⁶² Sabron, *De oorlog*, 2:81–96. See also De Cauwer, *Tranen van bloed*, 223–26; Roland, ed., "Chronique Namuroise," 125, 131.

⁶³ De Rycke, "L'architecture," 204–5; Douxchamps-Lefèvre, *Inventaire*, 5:252; Martin, "Maastricht," 63; Rorive, *Les misères de la guerre*, 85–90; van Beurden, *De handeligen*, 129; Vandewal, "Tongeren," 179–83.

⁶⁴ These effects are also recognised in modern wars, but tend to be neglected in favour of the detrimental effects of warfare. Brauer, *War and Nature*, 166–68.

⁶⁵ Moriceau, *Histoire du méchant loup*, 21; Siemer, "Wölfe in der Stadt."

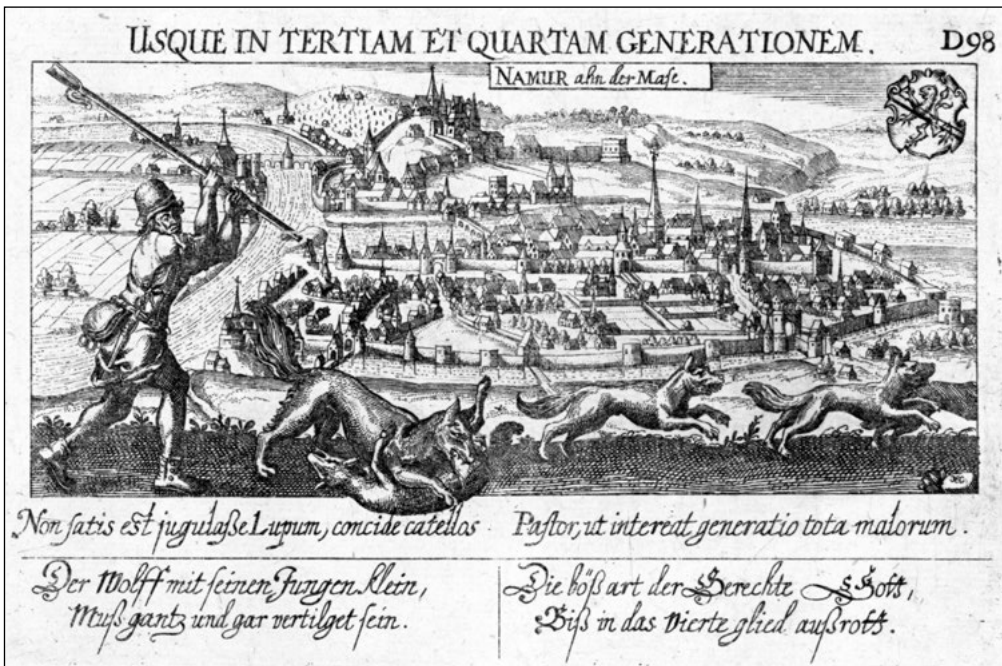


Figure 21. Shepherd killing a wolf and its young, mid-seventeenth century (Meisner, *Sciographia Cosmica*, Namur).

the tale of a man who lived near Aachen and had three children, all killed by wolves. The connection between wolves and warfare is made twice. The narrator claimed that at the time Philip of Swabia was crowned, in 1198 and 1205, a time of major political unrest, there were many wolves in the area around Aachen. The third child also disappeared during a war, when his parents left him to guard the house and fled to Aachen, and it was assumed that wolves took him.⁶⁶

The *Dialogus miraculorum* might just be a collection of stories to educate novices of the Cistercian Order, but hunting treatises confirm this perception: according to Gaston Phoebus' famous hunting treatise, *Livre de la chasse* (1387–1389), unburied corpses in war-affected lands gave wolves a taste for human flesh resulting in real attacks on humans. Edward Duke of York wrote an English translation of this work between 1406 and 1413, *The Master of Game*, to which he added his own observation that wolves also follow armies to scavenge for the horse cadavers they leave behind.⁶⁷ Wolves do feed on human remains if given the chance, the most famous example of which is the body of

⁶⁶ Heisterbach, *Dialogus miraculorum*, 2:260–261; Ortalli, *Lupi genti culture*, 69–70.

⁶⁷ Cummins, *The Hound and the Hawk*, 132–33; Phoebus, *Le livre de la chasse*, 66; See also De Lisle de Moncel, *Méthodes et projets*, 47–49; Moriceau, *L'Homme contre le loup*, 50–59.

Charles the Bold, discovered two days after the battle of Nancy in 1477.⁶⁸ The same can be said about dogs, however. The priest Petrus Treckpoel observed in one of his chronicles that the citizens of Bilzen were very afraid of local dogs in 1483, because they ate the corpses left there after the massacring and burning of the town in February that year. The surviving citizens had in fact left the town, and only started to come back in June.⁶⁹

It is often unclear whether the associations made in these sources provide evidence about the ecological impacts of armies or are simply part of a rhetoric of destruction. The above-mentioned woodcut portrays warfare as both natural and social disorder. There is a clear religious undertone in these narratives, which is made very explicit in the image of "Namur ahn der Mase" by Daniel Meisner (1642), depicting a shepherd killing a wolf and its young "to the fourth generation" (see figure 21). It was also a clergyman, Egbert of Liège, who wrote down in the early eleventh century one of the oldest versions of a folk tale now known as "Little Red Riding Hood." In this account the girl's baptism protected her from wolves.⁷⁰ Jean-Jacques Moriceau, who studied historical wolf attacks in France, argues that the fear that a single attack generates goes far beyond the actual damage done. It is quite possible that the climate of insecurity brought about by war fed this fear. His findings for the *départements* of the Meuse and Ardennes indeed indicate that rabies, rather than predation, was responsible for the majority of attacks.⁷¹

Most of Europe's largest animals, symbols of wilderness, had already become extinct in the Meuse Region by 1250, or were on the verge of extinction: aurochs disappeared in the Early Middle Ages, and bears, already very rare around 1250, were gone by 1500. Wild boar and red deer enjoyed protection because their killing was a noble prerogative but were also restricted to major hunting parks. The Capitulary of Quierzy (877) suggests in fact that game had been severely depleted in the Carolingian heartland (citing Hesbaye and the Ardennes) by the late ninth century as result of overhunting.⁷² The wolf was the only large animal still present in most of the Meuse Region as late as the 1700s, despite centuries of intensive hunting by humans. Hunters killed the last wolves in the Meuse Region only about a hundred years ago in the Ardennes and Argonne and only now is the animal making a tentative comeback.⁷³

68 Vaughan, *Charles the Bold*, 432.

69 Paquay, "Kroniek der stad Bilzen," 39.

70 Ziolkowski, "A Fairy Tale."

71 Consider also the study of Jay M. Smith, which makes a direct connection between the mythic status of the "Beast of the Gévaudan" and France's defeat in the Seven Years War. Kling, "War-Time, Wolf-Time," 19–27; Moriceau, *Histoire du méchant loup*, 492–98, 511–12; Siemer, "Wölfe in der Stadt," 353–65; Smith, *Monsters of the Gévaudan*.

72 Boone, De Cupere, and Van Neer, "Social Status," 1393; Boretius and Krause, eds., *Capitularia regum Francorum*, 2:355 (no. 281); Eryvynck, "De bruine beer"; Garnier, "La peau de l'ours," 264–69; Gautier, Hoffsummer, and Vanguetstaine, "Faune médiévale," 78; Gautier and Fiers, "Restes animaux," 87; van Vuure, *Retracing*, 56–59.

73 Butzeck, Stubbe, and Piechocki, "Der Wolf," 280–91; Delcourte Debarre, "Espaces forestiers," 441; Luyts, *Met vryaerts en resoelen*, 41–51, 240–57; Molinier and Molinier-Meyer, "Environnement et histoire," 236–37.

Moreover, the connection between armies and wolves went further than the idea that warfare leads to an increase in wolf populations: not only were combatants themselves sometimes compared to raving wolves, but in seventeenth-century Lorraine gangs of armed men who used the woods as cover were referred to as *loups du bois* ("wolves of the woods"). Wolves and outlaws were already associated with each other during the Middle Ages because they lived in the same spaces: woodlands and border-areas.⁷⁴ There were also many similarities between the defence mechanisms directed against armies and wolves: the seventeenth-century accounts of Maastricht called pits dug out under the drawbridges *wolfskuilen* or "wolf pits," hedges protected villagers against wolves as well as raiding parties, and hunting wolves was the last surviving medieval form of armed service, being still required of the general population as late as the nineteenth century. Peasants also used the presence of wolves as a pretext for walking around armed.⁷⁵

Remarkably enough, soldiers did not have a significant role in hunting wolves. Nicolas de Moncel's extensive account of officers from the garrison of Verdun chasing a wolf that approached the city walls in 1766, published in his hunting treatise from 1768, says more about his ambitions for the military in this regard, himself a former cavalry captain who became a lieutenant of the *louveterie*,⁷⁶ than it does about the contribution French soldiers made to wolf hunting. His proposal to create a special corps of trained hunters to exterminate wolves was likewise inspired by his military background. Members of the *maréchaussée* or *gendarmerie* did occasionally kill wolves or led hunting parties in the eighteenth and nineteenth century, but their role was generally of minor significance.⁷⁷ The *sous-préfet* of Roermond's request for soldiers in 1810 to hunt down a predatory wolf, or wolves, primarily reflects the general panic that these attacks generated as well as the traditional association of such assaults with warfare. He apparently believed that this wolf came from Germany where she had grown accustomed to human flesh during the recent wars. At some point a plan was made that involved the mobilization of no fewer than six thousand local men and more than two hundred soldiers. Military officers did not even consider using their soldiers for such a purpose.⁷⁸

74 Barbier, "La Grande Pitié," 256; Habets, *Chronijk*, 30; Helsen, *De woorden*, 10–15; Isaac, "Le loup et le mercenaire"; Laperche-Fournel, *L'Intendance de Lorraine et Barrois*, 116, 191–92; Pluskowski, *Wolves and Wilderness*, 185–90; Siemer, "Wölfe in der Stadt," 359–64; Toureille, *Vol et brigandage*, 54–56, 162.

75 Adriaenssen, *Staatsvormend geweld*, 405; Delguste-van der Kaa, *Histoire des loups*, 67, 78–88; Geerlings and Schrijnemakers, "Wolvenplaag," 118–21, 127–35; Kolodziej, "La louveterie," 295–97; Moreau, *Bolwerk der Nederlanden*, 17, 66; Verschure, *Overleven*, 227.

76 From the Middle Ages onwards rulers in the southern half of the Meuse Region (southwards from Hainaut and Namur) designated a specific official with the task of organizing wolf hunts: the *louveter*. These officials also served briefly in the northern half of the Meuse Region during the French Republic and Empire (1795–1814).

77 Delguste-van der Kaa, *Histoire des loups*, 20, 72; De Lisle de Moncel, *Méthodes et projets*, 30–31, 115, 135; Kolodziej, "La louveterie," 291–94.

78 Geerlings and Schrijnemakers, "Wolvenplaag," 134–37.

There are additional sources, however, that provide stronger grounds for assessing whether the link between wolves and warfare is based on actual ecological impacts. Regulations regarding wolf hunting are well known from the reign of Charlemagne onwards. Because humans perceived wolves as a threat to livestock, game authorities paid bounties for each confirmed kill. This means that one can reconstruct the historical presence of wolves and their numbers in a way that is impossible for most animals before the nineteenth century. This approach has its difficulties: an increase in bounties does not necessarily prove that the population grew, just that more wolves died by hunting. Moreover, hunters often went around settlements near the location the animal was killed to claim a reward. In this way, an examination of accounts from neighbouring villages is likely to inflate the real number of wolves in the area, at least until the French government completely reorganized the issuing of bounties in 1795.⁷⁹

Despite these problems, it is still possible to establish a direct link between warfare and increased presence of wolves. In 1486 Emperor Maximilian granted the inhabitants of the Meijerij district of 's-Hertogenbosch special permission to hunt down wolves (normally only ducal hunters being allowed to chase them) and organise a call to arms by sounding the church bells. This suggests that wolves became a major problem in the Campine/Kempen during the period of warfare following the death of Charles the Bold in 1477. There is no record of a wolf presence near the Meuse estuary during the late Middle Ages or sixteenth century, but in 1598, during the Eighty Years War, dozens appeared in the Langstraat, the area between Geertruidenberg and 's-Hertogenbosch, on the Brabant-Holland frontier. Local fishermen had to make nets in order to catch them.⁸⁰

Evidence from outside the Meuse Region, from the kingdom of France in the 1430s, the area around Bruges in the 1490s and late 1500s, the Veluwe (Guelders) in 1596–1630, and Ireland in the 1650s, confirms this connection. Despite assertions of contemporaries about unburied corpses, this expansion of wolf populations mainly ties in with the ceasing of wolf hunting during periods of intensive warfare. Hunting wolves was a labour-intensive activity and could include digging pits, making nets, or weaving hedges, using poison, maintaining packs of specially trained dogs, and mobilizing local villagers. These activities either stopped during armed conflicts or became much reduced.⁸¹ The *Journal officiel du Grand-Duché de Luxembourg* (October 19, 1815) explicitly attributed the more prominent presence of wolves to military movements, which is confirmed by a sharp decrease in the number of bounties claimed during the invasion years of 1813–1814.⁸²

⁷⁹ Bernays, "Les loups"; Delguste-van der Kaa, *Histoire des loups*, 68–72, 93–94; Devillers and Pinchart, *Extraits des comptes*, 36, 58, 86–87; Luyts, *Met vryaerts en resoelen*, 68–80; Moriceau, *L'Homme contre le loup*, 67–72, 253–78, 349–61.

⁸⁰ Lith-Droogleever Fortuijn, Sanders, and Van Syngel, eds., *Kroniek*, 261; Verschure, *Overleven*, 262–68.

⁸¹ Contamine, "Scènes de chasse"; de Rijk, "Wolven op de Veluwe"; De Schepper, "De geschiedenis," 57–67; Hickey, *Wolves*, 68–70; Luyts, *Met vryaerts en resoelen*, 174–84; Moriceau, *L'Homme contre le loup*; Ott, *Die besiegte Wildnis*, 128–32; Rheinheimer, "The Belief in Werewolves," 41–42.

⁸² Delguste-van der Kaa, *Histoire des loups*, 34, 166; Molinier and Molinier-Meyer, "Environnement et histoire," 239–40.

The ability of wolves themselves to adapt to different circumstances and grasp the opportunities brought about by warfare should not be underestimated either. The capability of wolves to cover hundreds of kilometres in a matter of days is well known. It is likely that the Meuse Region, and more particularly the Ardennes and Argonne, had an important role as a reserve from which wolves could spread to other regions. This is at least argued by Louis Gruau in his 1613 hunting treatise.⁸³ Wolf populations reached their highest density in France in the Ardennes and Argonne in 1795–1815, as proven by the surveys of wolves killed in a specific département, recently made on the basis of the French government's extensive records, and these areas also figured prominently among their last places of refuge in Western Europe.⁸⁴ Wolves can thrive in very varied environments, but likely started to favour more secluded spaces, such as woodlands, because of constant pressure from hunting.⁸⁵

Nevertheless, this link between the spread of wolves and warfare was not universal: an examination of accounts from the Campine/Kempen in the eighteenth century reveals that wolves were killed on an almost yearly basis, but warfare did not have any significant effect on this pattern. This might have something to do with the changing character of warfare, but the available evidence from the seventeenth-century Campine is too incomplete to support or deny this hypothesis.⁸⁶ In nearby Hesbaye toponyms referring to "wolf pits" confirm the existence of (relict) wolf populations in the Late Middle Ages, but there is no substantial evidence that its inhabitants perceived wolves as a major problem in subsequent centuries. The testimony of Petrus Treckpoel about fear for local dogs in Bilzen is noteworthy in this regard. Apparently, in this densely populated area, wolves were more or less exterminated during the Central Middle Ages and never managed to re-establish themselves afterwards.⁸⁷ While wolves profited from warfare to spread and multiply on many occasions, there were still limits to their agency.

The emphasis on wolves is of particular interest because wolves were one of the few animals in Western Europe, aside from bears, which considered humans as prey, albeit in exceptional circumstances. This actually reinforced their general perception as symbols of wilderness. The role of wolves in the Meuse Region was in this sense quite similar to that of tigers in Southeast Asia, a species that is known to have profited from warfare as well.⁸⁸ Many historical sources, hunting treatises as well as chronicles, indi-

83 Gruau, *Nouvelle invention de chasse*, 47. See also De Lisle de Moncel, *Méthodes et projets*, 49–50, 62–63.

84 Molinier and Molinier-Meyer, "Environnement et histoire," 232–33; Moriceau, *L'Homme contre le loup*, 35–45.

85 Ott, *Die besiegte Wildnis*, 128–32; Pluskowski, *Wolves and Wilderness*, 11.

86 I am grateful to Leon Engelen for providing me with an overview of bounties paid for killed wolves in the accounts of Stokkem (1748–1759), Achel (1684–1779), Bocholt (1680–1780), and Bree (1679–1779). The originals are kept in the state archives of Hasselt. Cremers, "De wolf," 157–58; Luyts, *Met vryaerts en resoelen*, 232–35.

87 Mengels, *Chronyk*, 9–10. Helsen, *De woorden*, 5–10; Ulrix and Paquay, *Zuidlimburgsche plaatsnamen*, 15, 16, 24, 47, 62, 69, 78.

88 Boomgaard, *Frontiers of Fear*.

cate a general belief that warfare not only stimulated the spread of wolf populations, but also caused an increase in wolf attacks. The data published by Jean-Jacques Moriceau do show a rise in wolf attacks during some war years, but more research is required to confirm this link.⁸⁹

Still, it is significant that contemporaries sometimes attributed attacks to werewolves because this kind of behaviour was considered abnormal, even unnatural. Wolves generally avoid humans, a fact people who lived side by side with wolves would be well aware of. The few trials concerning werewolves that occurred in the Meuse Region all date to the late sixteenth and early seventeenth century, a period of intensive warfare, and come from areas where wolves were common: Arlon, Namur, Limbourg, Liège, and Maaseik. This was of course also the heyday of witch trials in the Meuse Region, werewolves being treated as a specific kind of witch or sorcerer.⁹⁰

The association between wolves, or wolf attacks, and warfare points to a specific influence of armies on ecological systems: the ecology of fear. This concept refers to the idea that predators, such as wolves, influence ecological systems in ways that go far beyond the actual number of prey taken. Their presence ensures that potential victims are on constant alert, which reduces damage done to local vegetation. In other words, the presence of wolves stimulates the regrowth of woodlands because it reduces the time deer or other herbivorous animals can spend grazing. The sources examined here in effect suggest the same thing: the anxiety caused by armies reduced the pressure of local populations on their environment. To what extent this reduced pressure was offset by the ravages of armies themselves, is open to debate, but it is an effect that cannot be ignored.⁹¹

Wolves were only one species in a long list of “nuisance animals,” species that were considered unwanted or harmful and could therefore be killed with impunity and by any means possible. In some instances one could actually get a bounty. Changes in wolf populations may not always have been representative for other animals, but theoretically every species on this list, which shows considerable local variation but generally included all members of the *Mustelidae* (badgers, weasels, etc.) and *Corvus* (crow) genera, most rodents, foxes, birds of prey, owls, sparrows, moles, caterpillars, and even woodpeckers, could have profited from warfare.⁹² It is no coincidence that the merciless animal described at the beginning of this chapter has a rat’s tail. In the government of Bastogne, part of the harvest had to be left on the fields in 1636, during an invasion, due to a lack of manpower. Mice invested the fields the following year. A plague such as this also gave expanded wolf populations a more secure food base than corpses left on the battlefield.⁹³

89 Moriceau, *Histoire du méchant loup*, 25–26, 300–329.

90 Briggs, *The Witches of Lorraine*, 123–126; Brouette, “La sorcellerie,” 374; Moriceau, *Histoire du méchant loup*, 311–19; Vanhemelryck, *Het gevecht*, 178–80.

91 Ripple and Beschta, “Wolves and the Ecology of Fear.”

92 De Schepper, “Geschiedenis,” 88–93, 96; Kolodziej, “La louveterie,” 67–84; Verbois, *Rekem*, 164, 264.

93 Jacob, *Bruyères*, 119–22; Laperche-Fournel, *L’Intendance de Lorraine et Barrois*, 123, 186.

Warfare also allowed harbour seal populations in the North Sea to recover, simply because seal hunters did not dare to leave port.⁹⁴

Aside from a reduction in wolf hunting, one of the most widespread effects of warfare was agricultural land left uncultivated because farmers were too afraid or not numerous enough to work their fields. The afore-mentioned chronicler Petrus Treckpoel notes that in the County of Loon the land was left fallow for four years during the 1490s due to the depredations of Evrard de La Marck's horsemen, and this resulted in the fields being overgrown with "thistles, hedges, hedgerows and thorns, foul herbs; it turned into a wilderness."⁹⁵ A species such as hawthorn is certainly capable of rapidly colonizing abandoned land, and can actually hinder the growth of coppice wood, particularly if already present as hedges on the edges of those properties.⁹⁶ When Bartholomaeus Macharii, a clergyman from Tongres/Tongereren, requested Charles the Bold in a poem from 1466–1467 to refrain from destroying his patria's garden, and only remove the enemy thorns, he might therefore be referring to actual ecological consequences of the ongoing war.⁹⁷ The Dutch word *verwildert* ("become wild") is again used in accounts from the same area dealing with farmland still left fallow in 1623, after having been deserted during the siege of Maastricht in 1579.⁹⁸

Fiscal accounts from the Duchy of Bar in the mid-seventeenth century similarly mention fields overgrown with shrubs, and ponds turning into dry land for want of maintenance. Foresters patrolled with armed guards or postponed the felling of trees because of the general insecurity. They also suspended the planned fishing of ponds or moats.⁹⁹ In the area around 's-Hertogenbosch by contrast the term *vogelweide* denoted agricultural fields left fallow, a reference to the fact that wild birds, such as geese, used them for grazing or foraging. These changes could have long-lasting effects: in 1618 a man got permission to construct a bird trap on his lands, which had been left fallow for more than forty years. This was probably an *eendenkooi*, a rather complex trap to catch ducks, very common in the area, comprising a large pond, associated brooks and fences, all surrounded by woodland. Such traps could easily occupy several hectares, and so significantly altered the local landscape.¹⁰⁰

⁹⁴ Martens, *De zalmvisser*, 171–74; 't Hart, "Zeehondenjacht," 77–78, 89–107, 151–68.

⁹⁵ "Ende binnen dien vier jaren en waert nie vele corns noch vruchten geseit, soe dat het lant verwassen was met distelen, heggen, hagen ende dornen, quaet cruyt oft een wildernisse geweest hadde." Paquay, ed., "Kroniek der Luiksche Oorlogen," 240–41.

⁹⁶ Delcourte Debarre, "Espaces forestiers," 356; Douchamps-Lefèvre, *Inventaire*, 3:127; Molemans, "Graafschap Loon," 139–40.

⁹⁷ Boeren, *Twee Maaslandse dichters*, 31.

⁹⁸ Tellingly, the connection between warfare and the creation of wilderness was still being made during the American Civil War. Brady, *War Upon The Land*, 130–37; Nijssen, Vanderbeken, and Wouters, *Loonse ridders*, 50–51.

⁹⁹ de Terwel, *Les notices cadastrales*, 60; Marchal, *Inventaire*, 76, 89, 90, 137, 182, 205, 274, 293, 349, 372, 408; See also Delcourte Debarre, "Espaces forestiers," 101, 106, 320, 321, 398, 472; Douchamps-Lefèvre, *Inventaire*, 3:47; Servais, *Annales historiques du Barrois*, 1:233.

¹⁰⁰ Adriaenssen, *Staatsvormend geweld*, 294–98; Karelse, "Eendenkooi en kooibedrijf."

Contracts passed between landowners and their tenants are very informative in this regard as well: the commandery of Alden Biesen, near Maastricht, consented in a 1581 contract that the new occupant of one of its major farms was allowed to cut wood and pasture pigs in its forest. In this way the coppice wood around his farm could be left standing, which made it less vulnerable to attacks from marauding soldiers. In 1650 Anne Pennas from Vireux (near Givet), who owned the right to fish in the Meuse, asked for a reduction of her rent because her employees had been unable to fish in 1635. A French cavalry regiment had been encamped next to the Meuse at that time and stationed guards at strategic points. The best time to fish, according to this testimony, was before sunrise and after sundown, but when fishermen approached the river under cover of darkness, the sentries unsurprisingly raised the alarm and shot at the intruders. A similar request, dating to 1322–1323, has been preserved from Namur, which suggests that armed conflicts regularly led to declining rates of catch.¹⁰¹ Warfare thus encouraged the spread of wilderness through the widespread fear it generated as well as through its direct action.

The spread of wilderness serves as a remarkable counterweight to armies' depredations examined earlier, but it still does not illustrate long-term ecological effects. Precisely because wolves figured as symbols of wilderness and disorder, their extermination became a top priority as soon as peace returned. The French government passed special legislation to this end after the Wars of Religion (1583, 1597, 1600, and 1601) and in Champagne in 1660. Regulations concerning the reestablishment of wolf pits in Bar-Lorraine and Luxemburg in the second half of the seventeenth century can also be read in this light.¹⁰²

The above-mentioned revival of wolves in the Langstraat, on the Brabant-Holland frontier, was likewise short-lived: seventy-seven of the ninety-five bounties were disbursed in 1609–1621, during the Twelve-Years Truce. Although war broke out again in 1621, no more than two bounties were paid; the last one in 1631. The hunting treatise *Jacht-Bedryff* from 1636 indeed notes that there were no more wolves in the County of Holland. In the Campine/Kempen so many wolves were killed in 1611 that the authorities reduced the amount of the bounties. From a more practical viewpoint, the financial rewards paid for killed wolves were probably a welcome addition to the income of local villagers, often impoverished by the war. One could argue, however, that without the constant warfare in the Meuse Region up to 1714 wolves would have disappeared centuries before they actually did.¹⁰³

The consequences of these military disturbances can therefore be overstated. There is little evidence for instance to support the statement made by J. R. McNeill that warfare

101 Namur, AEN, Chartier des comtes de Namur, inv. no. 448; Majewski, "Pêches contrariées"; See also Hoppenbrouwers, "Een middeleeuwse samenleving," 23–24, 270–271; Thoelen, "Damereis," 112–13.

102 *La vie quotidienne dans les Ardennes*, 40–41; Delguste-van der Kaa, *Histoire des loups*, 18; Kaisin, *Annales historiques de la commune de Chatelineau*, 125, 134, 192, 199, 217, 226, 272; Kolodziej, "La louveterie," 300; Moriceau, *L'Homme contre le loup*, 82–93, 365–82.

103 Luyts, *Met vryaerts en resoelen*, 71–72; van Heenvliet, *Jacht-Bedryff*, 1; Verschure, *Overleven*, 269.

could lead to a spontaneous resurgence of forests.¹⁰⁴ This is a literary topos typical of chronicles and petitions.¹⁰⁵ Alain Girardot's study of the late medieval Prince-Bishopric of Verdun documents hedges evolving into woodlands during the fourteenth and fifteenth centuries, but these were cleared again in the early sixteenth century. Furthermore, many of these changes were very localized: in the 1480s the cathedral chapter of Verdun refused a squire's request to turn lands of the uninhabited village of Forbeuvillers into a rabbit warren, because it feared that these rabbits would damage nearby fields. The squire released some rabbits anyway, which consequently multiplied and caused considerably damage. In 1501 the woodlands were cut down and the rabbits put in an enclosed warren next to the castellan's house (castle). Girardot claims in effect that in the Prince-Bishopric of Verdun the entire landscape structure changed as a result of wartime disturbances, with agricultural fields, ponds, and forests being established in places most suitable for them.¹⁰⁶

Not only does the pressure on woodland appear to increase rather than decrease, trees also mature much more slowly than shrubs or bushes. The seventeenth-century inhabitants of Bastogne and Chaumont thus had to use heath as fuel due to a lack of wood, even though many fields lay deserted. The administrative sources examined here indicate that lands were brought under cultivation again as soon as possible, and that changing agricultural practices prohibited the growth of forests. The villages of Romerée, Hanzinelle, and Cornelle, near Givet, saw several disputes during the first half of the seventeenth century about farmers keeping sheep on common land for commercial gain. The village of Sevenum, near Venlo, likewise saw a massive increase in the number of sheep (from 1579 to 3037) in the period 1595 to 1680. This was probably an economic response to a declining population, abandoned fields, and an increasing demand for meat from armies themselves.¹⁰⁷

The combination of armies' mobility and their disruptive force could have had another ambiguous effect on ecosystems, an influence that is well known in twentieth-century wars. As early as the Franco-Prussian War of 1870–1871 botanists remarked that warfare caused the introduction of new species, species that could become invasive. Making similar observations about the pre-1850 period is very difficult, because of the nature of the evidence: while it is possible to trace the appearance of a species to a general period or area, by historical or archaeological sources, the exact manner of this migration is open to interpretation. The crusades are traditionally credited with the introduction of herbs from the Eastern Mediterranean to Western Europe, but a recent archaeological study about the spread of spinach indicates that Muslim Spain, and trade, would have been at least as important factors. The fact that most armies operating in the Meuse Region came from similar ecosystems does not help either, because it means that any plants transported in their wake would have served to promote genetic diversity

104 McNeill, "Woods and Warfare," 401.

105 See for instance Deloffre, "Guerres et brigandages," 336, 411–12.

106 Boutruche, "The Devastation"; Girardot, *Le droit et la terre*, 2:518–20, 2:524, 2:799–801, 2:830, 2:834.

107 Billen, "Het Waalse platteland," 264; Jacob, *Bruyères*, 112; van den Munckhof, "Jeneverbessen," 192.





Figure 22. Print of a failed Dutch attempt to isolate Spanish troops on an island in the Meuse in December 1585, made by Frans Hogenberg in 1586 (Amsterdam, Rijksmuseum, RP-P-OB-78.784-250).

rather than become new introductions. Tracing genetic diversity is an important part of ecological studies but is next to impossible to do based on historical sources.¹⁰⁸

In 1814, for example, Russian troops carried seeds of *Corispermum Marschallii* westwards, to Baden and Fontainebleau. To what extent they are responsible for the establishment of warty cabbage (*Bunias orientalis*) in the fortress of Namur is far less clear. The botanist André Devos noted the abundance of this plant in the grasslands of the citadel of Namur in 1870. He concluded that Russian soldiers brought seeds with them when they stayed in Namur during the 1813–1814 campaigns against France, but also claimed that the plant was deliberately introduced as forage in the Southern Netherlands in the 1820s. Given that studies from later wars are quite consistent in arguing that most of these exotic species disappear as soon as the disturbances to which they are related cease, warfare does not seem to be the main factor in the spread of this species. Dutch or Belgian troops might instead have introduced the plant in a more peaceful manner.¹⁰⁹

The destruction of dikes by contrast makes a strong case for long-term effects. Breaching dikes is a well-known phenomenon of medieval warfare near the Meuse estuary. The accounts of the high bailiff of 's-Hertogenbosch specify, for instance, that he ordered the breaching of the dike at Maasdriel to force troops from Guelders to stop the siege of the fortress of Ammerzoyen in 1387.¹¹⁰ It is a very good example of army-induced disturbances functioning as a disaster as well as the spread of wilderness. After all, damaging dikes results in rivers adopting a more natural behaviour, which includes flooding. In December 1585 the Dutch army managed to isolate several thousand Spanish infantrymen, the elite of the Army of Flanders, on an island in the Meuse by breaching the dikes and conducting patrols with warships. The trapped soldiers would have either had to surrender or die from exposure and lack of food, but were eventually saved through the intervention of Count Peter Ernst von Mansfeld and the garrison of 's-Hertogenbosch, who used artillery to drive off the Dutch ships. The freezing of the Meuse complicated the latter's retreat, however, and several were destroyed (see figure 22).¹¹¹

It should be emphasized, nevertheless, that larger conflicts about water management were often more important than strategic considerations, especially when it came to repairing war damage.¹¹² The count of Holland, for example, prohibited extracting peat near the sea dikes of the Meuse–Rhine estuary (the Grote Waard) in 1375 because it increased the risk of flooding. All noblemen, cities, and settlements received permis-

108 Hallavant and Ruas, "The First Archaeobotanical Evidence"; Thellung, "Stratiobotanik"; Zeven et al., *De introductie*, 67–91.

109 Devos, "Les plantes naturalisées," 20, 62; Istasse, "Un mois"; Thellung, "Stratiobotanik," 330–31.

110 Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. no. 2783, 7.1.1.7–7.1.1.11 (transcript Henk Beijers). See also Herborn, "Die sogenannte Fischmeisterei-Rechnung," 88.

111 Schulten, "De strijd bij Empel."

112 *Enquete ende informatie* (1494), 196; *Informacie up de staet faculteyt ende gelegentheyt*, 433; Adriaenssen, *Staatsvormend geweld*, 104, 372–75; Coun, *Geschiedenis*, 129–32; De Graaf, *Oorlog*, 237–41; Driessen, *Emundt van Oeteren*, 43–44; Hasquin, *Une mutation, le "Pays de Charleroi"*, 237; Helmich, *Journal*, 177–78; Jacquet-Ladrier, "Vivre à Namur," 168; 't Hart, *The Dutch Wars*, 105–6; van Heiningen, *Tussen Maas en Waal*, 24, 105; Verbois, *Rekem*, 194–97.

sion to destroy new dikes constructed to facilitate peat-cutting (*moerdijken*), and chase away the diggers. In 1379 the urban militia of Dordrecht actually launched an attack on the lord of Zevenbergen and destroyed his new dikes. Short-term financial gain proved to be stronger than security concerns, however, and the peat-cutting simply continued. This eventually contributed to the infamous St. Elizabeth's flood of 1421.¹¹³

Perhaps most enlightening about the nature of the disturbances examined here is that there is very little evidence to suggest that settlements were deserted permanently because of army-induced disturbances. Some individual farms, mills, and hamlets were abandoned for decades, probably never to be rebuilt again, but armies very rarely caused entire villages or cities to disappear.¹¹⁴ There is one exceptional example: the fortress of La Mothe, the second largest city in the Duchy of Bar, which was besieged by a French army in 1634 and 1644–1645. It was systematically destroyed after its second surrender to set an example for anyone daring to challenge French authority in the area again. Its population dispersed; most settled in nearby parishes. The French government eventually divided the land between two neighbouring villages, but ruins continued to overshadow the plateau on which it was located for at least another century. Girardot's study from late medieval Verdun also demonstrates that the lands of "abandoned" settlements continued to be cultivated, either by landowners living somewhere else or by neighbouring villages. This was what actually prevented the rebuilding of the original settlement.¹¹⁵ There are therefore few indications that warfare-induced wilderness had permanent effects.

Long-Term Consequences

Up till this point we have evaluated a wide range of disturbances caused by armies, but also the paucity of evidence regarding long-term impacts. Assessing such shifts in ecological systems will be the main subject of this section. Consider the woodcut described at the beginning of this chapter again and especially one particular detail still left unexamined: the beast eats gold. The idea that the economic consequences of these disturbances could have been more important than ecological ones has been noted before. This does not imply that armies' disturbances lacked long-lasting ecological effects, only that these impacts were often of a more indirect nature. The first factor that needs to be taken into account is the impoverishment brought about by warfare, or rather transfers of wealth.¹¹⁶ Rising taxes, for instance, appear to have been a more important cause for permanent emigration from the Campine/Kempen during the Eighty Years War than insecurity.¹¹⁷

I 13 Gottschalk, *Stormvloed en rivieroverstromingen*, 1:436, 1:452–55, 1:468–69, 2:35, 2:280, 2:731, 2:756, 2:785, 2:791, 3:238, 3:258.

I 14 Genicot, *La crise agricole*, 92–98; Girardot, *Le droit et la terre*, 2:520–34; Laperche-Fournel, *La Population*, 37–55, 133–36; Miart, "La population," 162.

I 15 Marchal, "Description"; Martin, *Une guerre*, 284–87; Villa-Séblin, *La sénéchaussée*, 98–100.

I 16 *Enquête ende informatie (1494)*, 198, 214, 216; Adriaenssen, *Staatsvormend geweld*, 225–52; Carolus-Barré, "Benoit XII"; Engelen, "Financiële en fiscal repercussies"; Rorive, *Les misères de la guerre*, 219–61.

I 17 Mertens, "Bank van Pelt."

Land represented a major financial reserve, especially woodlands because the right to cut wood could be sold separately from the actual ownership of the land. It comes as no surprise therefore that rulers, ecclesiastical institutions, and villages traded access to woodlands to pay off debts brought about by armies, generally through warfare.¹¹⁸ The duke of Bar, for example, granted five of his fiefholders the product of two and a half hectares of forest in 1403, because they were wounded while serving him, and the town of Mouson gave up the profits of the annual cuttings in their woodlands for twenty-five years in 1730 in order to pay for the construction of barracks and stables.¹¹⁹

Actual selling of land was a more complex phenomenon. It affected common lands and peasants more than anyone else, but could produce very dissimilar results because there were significant differences in land ownership throughout the Meuse Region. Historical studies regarding the effects of warfare on agriculture note that major tenants were generally less affected than peasants. Landowners took care to ensure that their lands continued to be cultivated, for instance by resorting to sharecropping. They were far less willing to show comparable leniency for small tenants, unless these were in short supply. Peasants also had to bear a disproportional part of the tax burden, including wartime contributions, as absentee landlords owned a considerable part of agricultural land, but refused to pay their share. The previously mentioned report made by lieutenant colonel de Terwel was specifically meant to put taxation on a more secure and equal footing.¹²⁰

In this way warfare actually reinforced or accelerated existing economic transformations resulting in the proletarianization of a significant part of the rural population. In the counties of Holland and Hainaut, villages and individual peasants were increasingly forced to sell their (common) lands to wealthy farmers or inhabitants of nearby towns during the seventeenth century. This resulted in the establishment of large commercial farms. The area around Namur likewise experienced an evolution towards enclosing common lands, very much to the displeasure of the governors of the city (see chap. 1). In the Campine/Kempfen, the area between Liège and Maastricht, and the Ardennes, by contrast, peasants mostly managed to hold on to their (common) lands until the nineteenth century, the result of the dominance of small-scale land ownership in these areas. The fact that these peasants had various sources of income (cf. protoindustrialization)

118 Dinant, Archives Ecclésiastiques, inv. no. 312, fol. 100: January 1, 1323; Gimnée, 3939: February 15, 1624; Grand conseil de Malines, Luxembourg, no. 400 c, August 14, 1636 (transcript Généamag); Tongeren, SAT, Sint-Jacobsghasthuis, charter June 9, 1491; Belhoste, "Une sidérurgie frontalière," 18–19; Bodard, ed., *Recueil des ordonnances du Duché de Bouillon*, 74, 208; Borgnet, *Cartulaire*, 107–8; Bouwer, *Een notabel domein*, 52–53; Desbrière, "Le bois," 248; Douchamps-Lefèvre, *Inventaire*, 2:107–8, 4:43, 5:41, 6:49–50; Gutmann, *War and Rural Life*, 52; Illaire et al., eds., *Les cahiers de doléances*, 169; Jacob, *Bruyères*, 31–35; 48–49; Kaisin, *Annales historiques de la commune de Chatelineau*, 74, 78, 98; Lemoine, "L'enceinte de Liège," 37; Vera, "Gemene gronden," 219–20, 229–33.

119 Richer, *Abrégé chronologique*, 330; Servais, *Les Annales historiques du Barrois*, 2:339, 2:391.

120 Roosen, "De rurale economie," 53, 148, 153–61; Terwel, *Les notices cadastrales*, 23–24; Thoen, "Oorlogen en platteland"; van Bavel, *Goederenverwerving en goederenbeheer*, 331–32, 368, 376, 393–94, 401, 470.

also gave them a stronger financial reserve to overcome calamities. Wealthy citizens buying land in the Campine/Kempen in the seventeenth and eighteenth century continued to exploit these as individual farms or turned heathlands into forests or parks, as part of a rhetoric of making such lands fertile again.¹²¹

Notarial acts and court records reveal how the selling of land in sparsely populated areas could have very divergent results: in the seventeenth-century Ardennes villages saw themselves forced to sell part of their common lands, often woodlands, to owners of forges or local noblemen. There can be no doubt that in the first instance trees were cut down and ended up in furnaces, but most noblemen had a vested interest in preserving these woodlands, for example as hunting parks. Some noblemen definitely took advantage of crisis periods to expand the environmental symbols of their lordship, such as forests or ponds (see the squire's rabbit warren above).¹²²

Aside from contributing to transformations in landownership military disturbances also acted as a catalyst or contributor to other long-term processes, the most famous of which is the Meuse's declining importance as a transportation route. The Eighty Years War saw a multiplication of tolls and tariffs along the Meuse because of the need to finance states' military endeavours. Remarkably enough, these charges initially did not impede transportation. Traffic actually increased in the early seventeenth century, reaching far higher levels than before, because of the Dutch Republic's blockade of the Scheldt.¹²³ In the long run, however, these tolls contributed to a significant decrease of traffic along the Meuse, reducing it to a route of only regional importance by the early eighteenth century. Changes in the volume of transportation on the Meuse River had major ecological significance because efforts to ensure the continuous navigability of the river would have been either expanded or neglected. These included the construction and maintenance of dams and sluices, but also the clearance of vegetation next to the river. Boats could only move upstream along the Meuse, and sometimes downstream as well, when pulled by horses. These horses needed a towpath to walk on.¹²⁴

The disappearance of vineyards from the northern half of the Meuse Region in the sixteenth and seventeenth centuries by contrast was primarily caused by climate change, and more specifically a relative decrease in average temperatures commonly known as the "Little Ice Age."¹²⁵ In 1469, for instance, Burgundian soldiers testified in the context of a judicial inquest opened to prove that a nobleman from Hainaut died

121 Bouwer, *Een notabel domein*, 172–87; Brouette, "Notes," 109–10; Gutmann, *War and Rural Life*, 108–10; Krings, *Wertung und Umwertung*, 46–47; Peudon, "Le droit de clôture," 266–68; 't Hart, *The Dutch Wars*, 107–8, 113, 118–21, 178–81.

122 Gimnée, 3939: February 15, 1624 (transcript Génémag); Buridant, "Le rôle des forêts," 236; Douxchamps-Lefèvre, *Inventaire*, 1:298; Kaisin, *Annales historiques de la commune de Chatelineau*, 216; Jacob, *Bruyères*, 144–46; Krings, *Wertung und Umwertung*, 30–31.

123 Breuer, *Die Maas*, 78–86; Knoors, "Maasvaart en Maashandel," 20–29; Suttor, *La Meuse*, 536–41.

124 Driessen, *Emundt van Oeteren*, 214–31; Harsin, "Etudes sur l'histoire économique," 118–37; Steegen, *Kleinhandel en stedelijke ontwikkeling*, 39–52, 78–85; Suttor, *La Navigation*, 58, 116–17.

125 Vineyards have reappeared in the northern half of the Meuse Region in the last decades, an economic development made possible by global warming. Bormans, "Table des régistres," 12:13; Dinstühler, ed., *Die jülicher Landrentmeister-Rechnung*, 91: Habets, "Over den wijnbouw," 386–92;

during the siege of Liège (1468), and more specifically during the famous night assault on their encampment. A recurring aspect in these statements is the omnipresence of vineyards in the immediate surroundings of the city, which might have had an important role in hiding the attackers' advance from Burgundian sentries. The Burgundian army attempted to destroy these vineyards after the surrender of the city, but many of them had recovered as early as 1470.¹²⁶ Even though armed conflicts might have contributed to and accelerated the demise of vineyards, their impact was too limited to actually initiate their decay.¹²⁷

The decline of the Dutch herring fisheries, a major activity in the Meuse estuary, on the other hand, can best be explained as a mixture of ecological, political-military and economic factors (tariffs). Technological developments (e.g., the herring buss) in the fifteenth century gave Dutch fishermen an advantage initially, because it allowed them to catch herring further from the coast. This is important given the migratory behaviour of the species as well as its changing geographical distribution due to climatic fluctuations. But this expansion on the North Sea also brought them into mounting conflicts with English and Scottish fishermen and made them more vulnerable to privateers. Fishermen from the Meuse estuary suffered major losses during the Eighty Years War and the three Anglo-Dutch Wars (1652–1654, 1665–1667, 1672–1674), and finally had to give way to their English and Scandinavian counterparts.¹²⁸

As important as these combat-related effects were, there is another set of impacts that is often overlooked, but might have been more significant in the long run than any of the impacts analyzed so far: the ways that an army actually obtained its teeth, particularly arms manufacturing, gunpowder production, and ship building. The wood consumption of these activities was immense, and in contrast to the depredations mentioned before, did not act as an exceptional event, but as a constant in peace as well as war. Although it can be difficult to connect specific ecological impacts to the demands of armies (general iron production as opposed to arms manufacturing, for example), there is no doubt that most of the disturbances examined here were closely associated with military needs.

Arms production was a major economic activity in the Central and Late Middle Ages. The area between Givet and Maastricht in particular had a key role in this regard, and also exported weapons. The St. Odilia shrine, from the late thirteenth century, provides one of the oldest surviving depictions of the kind of flat-bottomed boats typically used for river transport in the middle of the Meuse basin (see figure 23). Customs regis-

Halkin, *Etude historique*, 22, 24, 26, 27, 38, 42, 49, 81, 93, 101–2, 123–24; Pauls, "Zur Geschichte des Weinbaus," 242–48.

126 Halkin, *Etude historique*, 25–27; Poncelet, 'Le combat'; Lemoine, "L'enceinte de Liège," 67.

127 Douxchamps-Lefèvre, *Inventaire*, 1:218, 5:41; Genicot, *L'économie rurale*, 4:198–200; Girardot, *Le droit et la terre*, 2:551–58; Maguin, "Economie, politique et viticulture," 195–96; Pauls, "Zur Geschichte des Weinbaus," 194, 198; Rorive, *Les misères de la guerre*, 353–54. See also Hanson, *Warfare and Agriculture*, 68–71.

128 Poulsen, *Dutch Herring*, 33–34, 54–60, 141–42, 217–36; Sicking and van Vliet, "Our Triumph of Holland"; van Vliet, *Vissers en kapers*, 108–16, 145–57, 165–69, 174–77, 215–18, 243–48.



Figure 23. Detail of the Shrine of St. Odilia, made in the Meuse valley for the house of the Crosiers ("Crutched Friars") in Huy, late thirteenth century (© KIK-IRPA, Brussels, cliché X059109).

ters from fourteenth-century Dordrecht note single vessels carrying several hundred to two thousand lance or pike shafts downstream to the city. These ended up in the hands of combatants in Holland, Zeeland, or Flanders, and possibly even England. The fourteenth-century Tower of London stored several hundred pieces of armour made in Maastricht in 1337–1338.¹²⁹ The Meuse Region also started to export yew bows to England as early as the late thirteenth century, for a list of tariffs from Dordrecht (1287) already mentions bow staves.¹³⁰ Custom registers dating to the late fourteenth century mention the passage of ships carrying hundreds to more than a thousand bow staves, but only a minority of these originated from the Meuse Region, which means that yew trees must already have become very rare by this time.¹³¹

It is unclear to what extent armed forces within the Meuse Region used bow staves made of yew, given the predominance of crossbows, and the fact that other kinds of wood could be used as well. As far as crossbow bolts are concerned, some numerical data is available: in the late Middle Ages every city and fortress of some strategic importance had at least one crossbow and bolt maker at its disposal, who was primarily occupied with supplying local arsenals with weapons and ammunition. City accounts and castle inventories show that these specialized craftsmen produced several hundred to several thousand bolts a year in times of necessity, and that thousands of bolts were kept in

¹²⁹ Niermeijer, *Bronnen*, 1:411, 1:419, 1:582, 1:589; Richardson, *The Tower Armoury*, 24–25, 55.

¹³⁰ Gaier, *L'Industrie*, 212–16; Suttor, *La Meuse*, 406–14; van de Wall, *Handvesten ... der stad Dordrecht*, 1:78.

¹³¹ Niermeijer, *Bronnen*, 1:210, 1:311, 1:475, 1:551–52, 1:601; Schnurmann, *Kommerz und Klüngel*, 129–47.

store.¹³² These numbers should be seen in light of the huge consumption of ammunition: Geldern sent three crossbowmen in 1387 to the siege of the fortress of Middelaar, near Cuijk, according to its accounts. They left the city for fifty-six days in total and spent eight hundred bolts.¹³³

The environmental damage caused by arms production was thus already very substantial before the spread of gunpowder weapons. There are signs that craftsmen tried to limit wood consumption, for instance by making crossbow bolts out of old wine barrels. Technological changes further contributed to and transformed an existing overexploitation. The construction of a large gun weighing about four thousand seven hundred kilograms for the city of Mons in 1378 required no less than two thousand kilograms of charcoal (or six thousand kilograms of wood), and sixteen thousand kilograms of coal. In this context it is hardly surprising that Gilles le Bouvier, also known as the herald Berry, notes the scarcity of woodlands in Namur and Liège, especially near the Meuse River, as early as 1451. Most people were forced as a result to use coal for fuel.¹³⁴

Given the need for woodlands or coalmines as a source of energy, mineral deposits for raw materials, and streams as a source of biopower and for transportation, metallurgy, including arms manufacturing, became concentrated in the southern parts of the Meuse Region, from Liège to Lorraine. By the early seventeenth century major entrepreneurs, such as Jean Curtius and Louis de Geer, dominated this trade. Liège and Charleville stood out as major arms-manufacturing centres. Liège profited from the neutrality of the Prince-Bishopric to supply arms to both sides, while Charleville became the heart of French arms production from the late seventeenth century onwards. The Charleville musket, the standard infantry weapon of Napoleon's infantrymen, was developed here in the 1770s.¹³⁵

While the area around Liège, especially Herstal, retained its key role long after the 1850s, most forges in the principalities of Namur and Liège reached their heyday around the mid-seventeenth century, after which they suffered from increasing international competition, including the newly founded Charleville. The Dutch Republic, for instance, replaced its arms imports from the Prince-Bishopric of Liège through prefabricated iron parts during the late sixteenth and early seventeenth century, before shifting to iron imported from the Baltic. While this competition is often seen in economic or political terms, including the destruction of forges by armies, the ecological contribution can-

132 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 248r; inv. no. 218, fol. 31r (transcript Rien van den Brand); de Groot, *De stadsrekeningen*, 1384 fol. 16, 1385 fols. 7 and 42, 1387 fol. 7, 1388 fol. 6, 1390 fol. 29, 1391 fol. 5, 1398 fol. 12, 1399a fol. 9, 1403 fol. 10; Dinstühler, ed., *Die jülicher Landrentmeister-Rechnung*, 76–77; Drooghaag, “Visitation en Limbourg et Outre-Meuse,” 196, 203–4, 208, 215; Gaier, *L’Industrie*, 66–85, 98–104, 141–56. See also Bachrach, “Military Industrial Production.”

133 Kuppers, “De stadsrekeningen,” 23–24, 39.

134 Gaier, *L’Industrie*, 207; Le Bouvier, *Le livre*, 109.

135 Belhoste, “Une sidérurgie frontalière,” 12–15; de Jong, “*Staat van oorlog*,” 46–49, 87–90; Gillard, *L’Industrie de fer*, 47–49; Suttor, *La Meuse*, 441–52; Parrott, *The Business of War*, 196–202; 212–19; Yernaux, *La métallurgie liégeoise*, 33–61; Zunckel, *Rüstungsgeschäfte*, 61–77.

not be forgotten either.¹³⁶ Deforestation had already reached such an extent by the early sixteenth century that authorities in Liège, Bouillon, and Namur passed legislation to oblige forge owners to replace the trees they cut down or leave a certain percentage of woodlands standing. They also increased the penalties for illegal cutting down of wood. In the seventeenth century the production of four to five kilograms of iron required twenty kilograms of charcoal, or one hundred kilograms of oak wood.¹³⁷

In practice damage done to forests seems to have been limited more by environmental constraints than legal action. The Ferraris map (1777) clearly shows the deforestation along navigable rivers such as the Meuse, Sambre, and Ourthe. Trees were spared simply because the transportation costs became too high. It is no coincidence that in the Duchy of Luxemburg, with a very different hydrography, woodlands still occupied relatively large areas of land. In this context the testimony of a weapon-smith from Chiny who lived in Namur in 1648 becomes especially relevant: he stated before a notary that in Luxemburg it was common practice to use charcoal rather than coal for arms production, because the resulting iron was of better quality.¹³⁸ It is because of the constant need for fuel that the remaining woodlands in Namur and Liège were increasingly reduced to coppice wood, which in turn made the soil more vulnerable to erosion. It is worth noting that the seasonal floodings of the Meuse became more frequent during the early modern period.¹³⁹

Gunpowder weapons not only also worsened existing processes of deforestation by stimulating iron production, but also because they required large amounts of saltpeter (potassium nitrate). In the late fourteenth century gunpowder was still made with approximately equal amounts of sulphur, charcoal, and saltpeter, whereas by the late sixteenth century gunpowder makers mixed six parts of saltpeter for one each of charcoal and sulphur.¹⁴⁰ This growing importance of saltpeter presented a challenge, for in the Meuse Region it could only be found in small quantities. Rulers certainly attempted to obtain natural saltpeter: a charter from the County of Namur specifies that the lord of Han-sur-Lesse gave saltpeter makers permission in 1487 to gather it in rocks (caves) situated within his lordship. This saltpeter served the needs of the guns kept in the fortress of Namur. The high bailiff allowed them likewise to work in the cellars and stables of this fortress. Efforts to produce saltpeter from domestic sources were also made in Jülich, Bouillon, and Liège in the sixteenth century.¹⁴¹

136 de Jong, *"Staat van oorlog"*, 182–217, 230–32, 244–52; Harsin, "Etudes sur l'histoire économique," 73–80; Pirotte, "L'industrie métallurgique," 160–61, 182–83; Yernaux, *La métallurgie liégeoise*, 109–88.

137 Liège, Chambre des Comptes, Couvin 656: January 14, 1570 (transcript Généamag); Caffiaux, *Essai sur le régime économique*, 291–94; Douxchamps-Lefèvre, *Inventaire*, 1:317, 4:358; Gaier, *L'Industrie*, 206–8; Hoffmann, *An Environmental History*, 222–25; Jacob, *Bruyères*, 85; Suttor, "Les ressources forestières," 26–27, 34.

138 Brussels, KBR, Cartes et plans, MS IV 5.567: Carte de Ferraris; Bouvignes, Notaire Waulthier, Act January 16, 1648 (transcript Généamag); Charruadas and Deligne, "Cities Hiding the Forests."

139 Tomsin, "Frequence des crues de la Meuse," 297–302.

140 Gressy, *Saltpeter*, 11–12; Hall, *Weapons and Warfare*, 67–104.

141 Bouvignes, 1200, fol. 90: April 14, 1543; Namur, Haute cour de Namur, inv. no. 27, fol. 178

From an ecological perspective, the main issue is that these natural quantities were far too meagre to satisfy a rising demand for gunpowder. By the fifteenth century, saltpeter makers therefore attempted to extract saltpeter from earth rich in decaying organic matter, an environment that allows the bacteria responsible for the occurrence of nitrates to thrive. Such refinement processes inevitably required large volumes of firewood, even more than for the refinement of natural saltpeter.¹⁴² The need for large quantities of firewood provided the duchies of Bar-Lorraine with an opportunity to focus on the production and export of saltpeter from the seventeenth century onwards.¹⁴³

This domestic production experienced increasing rivalry from the English and Dutch East India Companies, which started to import large quantities of saltpeter from India, where it could be obtained more easily. Yet the importance of this salt was such that many saltpeter makers continued their practices, especially in the kingdom of France, because their government loathed dependence on their enemies' overseas imports. Strategic considerations thus encouraged the further depletion of woodlands.¹⁴⁴ In response to these pressures French saltpeter makers began to experiment with using plants containing high nitrate contents. In 1794, when the republic was in particularly desperate need of saltpeter, hundreds of citizens and soldiers were sent out to the woodlands near Verdun to pull out suitable plants.¹⁴⁵ Overexploitation of woodlands to satisfy military needs for arms and gunpowder, in peace as well as war, was clearly one of the armed forces' most long-lasting ecological impacts.

The final disturbance that needs to be examined here is shipbuilding. This means once again stressing the importance of wood and its overexploitation, but in a very different way. Iron or gunpowder production mainly consumes wood as fuel. Managing woodlands as coppice wood or pollards is in these instances a common way to limit ecological damage and ensure the continuous supply of firewood. The building of ships required large quantities of timber, mostly trees managed as high forest.¹⁴⁶ Different pressures, economic or otherwise, could thus potentially have a major influence on forest management. The question is how these contrasting pressures related to each other.

The link between ships and armies might seem ambiguous, given that sharp distinctions between naval and other types of ships only become discernible from the late seventeenth century onwards, but this confirms rather than questions their close association. Up to the mid-seventeenth century few ships were kept permanently in service

(transcript G  n  mag); Bodard, ed., *Receuil des ordonnances du Duch   de Bouillon*, 33–34; de Jong, “*Staat van oorlog*”, 234–35; Gaier, *L’Industrie*, 181–87; Lejeune, *La formation du capitalisme*, 190–95; Pauls, “*Wirtschaftsgeschichtliches aus dem Herzogthum J  lich*,” 325.

142 Cressy, *Saltpeter*, 15–25, 66–72; Hall, *Weapons and Warfare*, 74–79.

143 Laperche-Fournel, *L’Intendance de Lorraine et Barrois*, 184–85; Zunckel, *R  stungsgesch  fte*, 80–100.

144 Cressy, *Saltpeter*, 34, 133–35, 145–51; de Jong, “*Staat van oorlog*”, 206–8; Le Moigne, “*Le r  le   conomique*,” 211–12; Zunckel, *R  stungsgesch  fte*, 103–5.

145 Cornette, *M  moire sur la formation du salp  tre*, 7–9, 54–60; Pionnier, *Essai sur l’histoire*, 449–50.

146 Lake-Gigu  re, “*The Impacts of Warfare*.”

as warships, as most were used for trading or fishing and became part of a naval fleet when required. The main market for timber was Dordrecht, which procured a considerable part of its supply from the more forested areas of the Meuse Region, aside from the Rhine basin and the Baltic. Wood was after all one of the main commodities transported along the Meuse from the Early Middle Ages onwards. Customs registers from the fourteenth and fifteenth centuries demonstrate exactly how frequent the passage of ships loaded with planks or poles must have been. In some cases entire tree trunks were even bound together and floated down the Meuse from Sedan or Givet.¹⁴⁷

Remarkably enough, the importance of this transport of lumber decreased from the late sixteenth century onwards, precisely when Dutch naval industries experienced a major expansion. Timber for shipbuilding was now mainly imported from Norway and to a lesser extent the upper Rhine Region. The reason for this development lies in the aforementioned expansion of the iron and arms industries as well as regulations against deforestation. Shipbuilding requires a very different form of forest management and had to make way for these expanding industries.¹⁴⁸ In the mid-eighteenth century the construction of a man-of-war of seventy-four cannon, a common type of warship, required almost two thousand one hundred cubic metres of wood. The Meuse Region did however retain a limited role in shipbuilding, especially in France from the 1730s onwards, when it became increasingly difficult to find suitable wood closer to the coast.¹⁴⁹ Most timber originating from the Meuse Region was floated down the Marne towards Rouen. The wharfs of Toulon obtained only one percent of their timber from Champagne in 1755–1769.¹⁵⁰

The French takeover of the Southern Netherlands in 1795 could have served as a major turning point, because of the development of Antwerp as a major military port from 1810 onwards in combination with the massive expansion of state-owned forests. In absolute numbers the Rhine basin again supplied far more timber than the Meuse Region, but the remaining forests were still significantly affected. In June 1813, for instance, Napoleon ordered the extraction of no less than six to seven thousand cubic metres of wood from the woodlands near Namur and Dinant. In the long run this growing need for timber could have exerted a major influence on forest management throughout the Meuse Region, but given the abrupt ending of Antwerp's naval wharfs later that same year, it just seems to have contributed to the deterioration of the remaining high forests. The pressure on woodlands only ended in the 1860s, with the final demise of wooden warships.¹⁵¹ The supply of timber for shipbuilding contributed significantly to

147 de Jong, *“Staat van oorlog”*, 64–70; Fanchamps, “Transport et commerce”; Niermeijer, *Bronnen*; Sicking, *Zeemacht en onmacht*, 185–96; Suttor, “Un grand exportateur”; Suttor, *La Meuse*, 380–88.

148 Buis, *Historia forestis*, 2:505–13; Nusteling, “Strijd om de binnenvaart,” 155–59.

149 Belhoste, “Bois et fers pour la marine,” 99, 108; Boudriot, “Chêne et vaisseaux royaux.”

150 Buti, “Un arsenal méditerranéen,” 494–98.

151 Herbin de Halle, *Des bois propres au service des arsenaux*, 193–240; Tallier, “Politique forestière et construction navale”; Todorov, “La géographie des ressources forestières” http://www.rgh.univlorraine.fr/articles/view/52/La_geographie_des_ressources_forestieres_et_les_ambitions_navales_de_Napoleon_apres_Trafalgar_l_exemple_du_bois_de_chene.

the overexploitation of woodlands in the Meuse Region, but its long-term impact was relatively limited because arms and gunpowder production were considered to be more important.

Conclusion

The ecological damage that premodern armies could inflict was significant, even without the possibilities of industrial warfare, and with tools as simple as iron axes, spades, and torches. To what extent this damage is comparable to that inflicted by current military forces, in absolute or relative terms, certainly merits further analysis. Armies functioned like a natural disaster, but the “shocks” they brought about were in themselves rarely sufficient to bring about “shifts” in ecological systems. Outcomes might have been very different if not for the intervention of other actors, human or non-human. The strongest evidence for long-term effects comes in fact not from warfare as such, but its preparation and aftermath: arms production and destitution. Especially in these cases, making a distinction between armies and other, external or internal, influences is very problematic.

The key characteristic of military disturbances in the Meuse Region from 1250 to 1850, then, is that they put pressure on the substantial yet fragile control humans exerted over ecosystems. Survival strategies of the general population in wartime, especially rural dwellers, are quite meaningful from an ecological perspective because agriculture and livestock-raising dominated landscape use throughout the Meuse Region. Access to scarce natural resources, such as wood, fish, or game, was limited and carefully regulated. When armed forces challenged this control, wolves and other unwanted species could still take advantage of the resulting turmoil to reassert themselves. They no longer had such an opportunity during the World Wars, for wolves had been almost exterminated by 1914. The destruction these later conflicts brought about was in fact so extensive that it stimulated new forms of ecological conservation (such as the reforesting of the former battlefields of Verdun).

Chapter 4

POLICING

Protecting Natural Resources

The conservation of Africa's large mammals, especially elephants and rhinos, has become dominated in the last decades by heavily armed men wearing military uniforms, who patrol the savannah to hunt down poachers. This bellicose defence of animals that have a central role in today's notions of "nature" is a key element in current armies' allegedly modern behaviour towards ecological systems. The military has become a protector of nature. Although many environmentalists support this kind of nature conservation, it is not without its opponents. Critics argue that declaring war on poachers simply means fighting symptoms rather than real causes (a lack of other means of income, the general political turmoil in many border areas, and a growing demand for ivory). It is only relatively recently that authorities recognised the need to cooperate with local residents to combat poaching.¹

Such a situation has historical precedents. The U.S. army also had a major role in the creation and protection of the country's first national parks in the decades after the American Civil War (notably Yellowstone). The military was after all the government service best equipped to handle the difficulties connected to controlling such vast spaces. They had the necessary manpower and resources, and already had vital knowledge with frontier management (cf. cartography). These soldiers ran into regular conflict with both Native Americans and new settlers over poaching and illegal wood cutting, since the underlying assumption of national parks, then and now, is the idea that true "nature" is something that needs to be protected from human interference.²

The present chapter examines whether armed forces' safeguarding of specific types of animals and plants can be traced back to a far more distant past. It connects military conservation of biotic communities to an army's core function: organized violence. The examples just cited are all conflicts about entitlement or access to ecological systems. Military involvement goes further than preservation in the strict sense of the word, shielding biotic communities from disturbances. It is also about upholding a framework of law enforcement with the intention to control behaviour. For this reason the chapter specifically uses the term "policing."

The aim of this chapter, then, is to provide a new perspective on the history of state formation as well as contributing to a better understanding of past army-eco-system interactions. The role of armies in the controlling of biotic communities has to be studied in the context of the historical evolution of armed forces themselves. It is

1 Duffy, "Waging a War to Save Biodiversity"; Henk, "Biodiversity and the Military"; Lunstrum, "Green Militarization."

2 Jacoby, *Crimes against Nature*, 99–120; Meyerson, *Nature's Army*, 68–83, 106–17, 233–45.

well established that a state's monopoly on the legitimate use of armed force is a relatively recent phenomenon.³ As will be further referred to in subsequent sections, it is only in the (late) eighteenth century that states really appropriated the right to use organized violence against external enemies. It is at that point that "army" more or less became synonymous with "military." This evolution is closely related to another major development: increasing distinctions between external and internal organized violence, between organizations that are today called "the military" and "the police." A growing number of scholars consider soldiers as agents of repression in the early modern period, but so far no one has analyzed soldiers' involvement from an ecological perspective.⁴

In order to evaluate whether armies protected biotic communities in the past, a short overview has to be provided of the people who regulated access to natural resources in the medieval and early modern period. In the region in which we are concerned so-called high bailiffs, stewards, or castellans (*drossa(a)rd*, *hoogschout*, *Burggraf*, *chatellain*, *prévôt*), as well as ordinary bailiffs, were of central importance because these men represented a ruler or state in a given area. In this way they combined the duty of fighting internal or external threats to the maintenance of public order with the responsibility of enforcing environmental laws. High bailiffs often shared these latter duties with foresters and park keepers (*forestier*, *gruyer*, *Waldmeister*, *warandemeester*, *waldgraaf*, *houtvester*). Armed servants or wardens (*garde*, *sergent*, *bode*, *vorster*, *schutter*/*Schütze*) functioned as the main law enforcers at its lowest level and supported both bailiffs and foresters.⁵

Given that the military role of bailiffs is well known, it is useful to examine the connections between foresters and armies in more detail. In the Middle Ages foresters served in an army context simply because they were representatives of a potentate in a given area.⁶ A 1278 charter for example, of the kind typically written during peace talks, lists a number of complaints made against subjects of the bishop of Liège by representatives from the County of Namur. It includes one entry alleging that the bishop's forester of Havelange, woodlands located on the Liège–Namur frontier, conducted raids and stole horses in Jallet. This note should be read in light of the fact that in this case jurisdictional disputes provided the *casus belli*.⁷ A proclamation of the city council of Liège in 1486, on the other hand, called upon its citizens to identify the man who cut off two fingers of the forester of Visé at a muster of men-at-arms. The forester's exact role in this military review is unclear, given the absence of other administrative sources, but it is likely that he ran into a conflict with one of the soldiers.⁸

3 Muchembled, *A History of Violence*; Ruff, *Violence in Early Modern Europe*. Late medieval feuding practices are especially well studied. See for example Glaudemans, *Om die wrake wille*; Stercken, *Königtum und Territorialgewalten*.

4 Antonielli and Donati, eds., *Corpi armati*; Denys, *Police et sécurité*; Emsley, "The Military."

5 Bartlett, "The Impact," 87; Denys, "Les sergents de ville"; Jacobs, *Justitie en politie*, 20–30, 103–4; Smolar-Meynard, *La justice ducale*, 118–27, 426–39.

6 Delcourte Debarre, "Espaces forestiers," 298, 322; Deloffre, "Guerres et brigandages," 344; Gresser, *La gruerie*, 207–9; Thompson, "Chaucer's Warrior Bowman."

7 Poncet, "La guerre," 275–87, 322–24, 345.

8 Bormans, "Extraits des cris du péron," 168.

The accounts of the high bailiffs of 's-Hertogenbosch, of which an almost continuous series has been preserved from the mid-fourteenth century onwards, also indicate that during the Late Middle Ages high bailiffs first mobilized other officials, including foresters and wardens, when faced with an internal or external threat to the maintenance of public order. Medieval notions of service had a strong connotation of armed service, and in this sense the participation of these men in warfare can hardly be considered surprising.⁹ Perhaps most illuminating is a household inventory of Henrick van Boutershem, forester of the Nederrijksvald (wood- and heathlands located between the river Meuse and Nijmegen), in 1414. His possessions included a full set of armour (partially made of steel plates and partially of mail), three helmets (a steel one with a bevor, a hounskull, and a kettle hat), five crossbows (two with a cranequin, and three with a goat's foot lever), an "English bow," two quivers, and a mace. This might not even be a full overview of Henrick's weapon arsenal, for this list does not include a sword or dagger.¹⁰

The armed role of all the aforementioned officials decreased from the late sixteenth century onwards, in parallel with a shifting emphasis on mobilizing the general population for armed service, but never disappeared. The connections between foresters and armies transformed and adopted a different form (see further below). Mobilizing law keepers had in effect major drawbacks as their departure reinforced the breakdown of authority in war-affected areas. A particularly revealing example is the decision of the newly established Belgian government in 1831 to mobilize its foresters to fight off a potential invasion from Luxemburg. These men could have brought special skills, such as sharp shooting, to the military, and were familiar with the local terrain. The experiment was terminated after a few months because they simply served as garrison troops while locals plundered abandoned woodlands in their absence. It is significant that the French army picked up the idea of militarizing foresters again in the late nineteenth century, but took care to stress their role in woodland defence.¹¹

The role of armies in the protection of biotic communities was ordinarily aimed at supporting these officials, when confronted with a superior force, rather than the other way round. The participation of different kinds of armies, armed members of the general population versus soldiers, derived from the specific contexts in which these conflicts occurred. A court record from Roermond, from the late fifteenth century, concerned an incident which involved villagers from Echt, in the lordship of Montfort, taking up arms and rushing to nearby woodlands in order to chase away outsiders cutting wood. A nobleman who rode ahead was killed in the encounter.¹² A record of this homicide has been preserved because the local court found itself unable to judge the

⁹ Brussels, ARA, 137.01, inv. nos. 2779, 2784, 2785, 2788, 2789, 2793, 2795, 2800, 2803, 2657, 2818, 12991, 3015b (transcript Henk Beijers Archiefcollectie, <http://www.henkbeijers-archiefcollectie.nl>).

¹⁰ Thissen, "Städtischer Alltag."

¹¹ See Maastricht, RHCL, 01.187E Hoofdgerecht Thorn, inv. no. 1386 for a forest warden who claimed exemption from guard duty in 1793 because of his function. Breton, *Du rôle des forêts*; Leconte, "Le Corps des Guides Forestiers," 67–69.

¹² Janssen de Limpens, *Geldersche Wyssenissen*, 218–20.

case and had to ask the councillors of Roermond for their opinion. In such conflicts, fatalities were probably quite rare. Fiscal accounts from high bailiffs in the Duchy of Bar also indicate that they paid guards to protect falcon nests. These men had to make sure that no one stole the chicks, valuable for falconry. The accounts of the high bailiff of Etain from 1504 to 1505 mention, for example, that in a nearby high forest a nest of lanner falcons, a species that rarely breeds in the Meuse Region, received protection for six weeks, day and night.¹³

Soldiers acted in a very similar support role, but their interference served the interests of their paymaster. In this way they could operate against local populations. The accounts kept by the high bailiff of La Mothe, near Neufchâteau, specify that in 1658 the depredations of villagers reached such an extent that dragoons, mounted infantry that often served in policing operations, had to restore order in the forest of Ozières. In this case the intervention of soldiers was facilitated by the fact that the same nobleman fulfilled the duties of high bailiff, general receiver, and forester.¹⁴

Yet soldiers also acted in other, less confrontational capacities, as in 1478 when the general receiver of Hainaut received permission to keep twelve soldiers in the fortress of Locquignol to help protect the Forêt de Mormal against French incursions. Two hundred years later, in 1648, a notarial act lists several testimonies regarding pasturing rights of the villagers of Daussois in the neighbouring village of Yves, near Philippeville. One of these witnesses was a soldier, sixty years old, who claimed that he had guarded the sheep of Daussois for the last fifteen years.¹⁵ Eighteenth-century legal records confirm that soldiers patrolled agricultural fields or operated as gamekeepers at the behest of urban councils or major landowners.¹⁶

Hiring individual soldiers probably had its origin in changes within wartime safeguarding systems. From the late sixteenth century onwards it became not only common for military commanders to issue safeguards in writing, but also to station soldiers at the place requesting protection to guarantee that these safeguards were effectively respected. Once soldiers were stationed in a village they could perform related tasks at their hosts' request. In the early seventeenth century for example the villagers of Sprang, near 's-Hertogenbosch, asked the soldier staying there to arrest someone who had cut down newly planted oak trees.¹⁷ Court records demonstrate that several decades later, during the Nine Years War (1688–1697), so-called partisan companies secured entry to the woodlands near Brussels and Namur, both against other soldiers and local vil-

13 Bar-le-Duc, ADM, B 1281, fol. LXXVIR; Marchal, *Inventaire*, 145–46, 163–64, 200.

14 Marchal, *Inventaire*, 334, 372; Driessen, *Emundt van Oeteren*, 57.

15 Philippeville, Notary Degeldre 122: Act July 6, 1648 (transcript Généamag); Delcourte Debarre, "Espaces forestiers," 321. See also Namur, AEN, Conseil provincial, inv. no. 4266: Court records regarding the stealing of a flock of sheep and the horse of the soldier who guarded them (Bolline, 1654–1659) and Adriaenssen, *Staatsvormend geweld*, 166.

16 's-Hertogenbosch, BHIC, 9 Raad en Rentmeester-Generaal, inv. no. 454, fol. 114; Maastricht, RHCL, 20.085B: Indivies laaggerecht Maastricht, 4487.

17 Verschure, *Overleven*, 50–51, 220–21, 259.

lagers without travel permits ("passports").¹⁸ Armed forces continued to participate in the safeguarding of natural resources until well into the nineteenth century, but only in exceptional circumstances, when the policing officials ordinarily tasked with this responsibility needed support.¹⁹

While armed forces only intervened in the protection of fauna and flora in exceptional circumstances, they did contribute to the preservation of unique landscapes in the context of frontiers and fortifications. As argued in chapter two, fortifications provided safety in a general sense, often by controlling access to specific areas. Defensive structures have little value, and one could even consider them counterproductive, if no one guards them. Guarding fortifications is the second major element of defence systems, and also had a key role in the preservation of biotic communities on a daily basis. Preparing for a potential attack invariably involved enforcing or expanding watch duties as well as paying permanent guards (often members of shooting guilds).²⁰ The city council of Maastricht, for instance, responded to a possible threat in 1403 by stipulating that one guild should stand guard every night, and by assigning each strategic gate or tower a complement of three or four crossbowmen and a gunner.²¹

The obligation for adult males to stand guard on fortifications (city gates and walls, fortresses, or defensive lines) survived in different forms until the French Revolution, but was a very unpopular one that was bought off whenever possible. The accounts from Venlo specify that in 1406 the *waeckgelde*, the charge paid by individual citizens to buy themselves out of this duty, brought in more than two hundred and twelve *gulden* (a paid sentinel would earn five *gulden* a year).²² During actual threats, these mechanisms no longer applied and guard duty had to be performed in person; a clear indication that defence systems were only activated during armed conflicts. In fact, while some of the famous "watch and guard" (*guet and garde*) duties of rural populations can be traced back to the *corvées* of the Central Middle Ages, the majority only became established during periods of insecurity; either during the late Middle Ages, or the late sixteenth or early seventeenth centuries.²³

¹⁸ Cayron, *Jacques Pastur*, 33–46, 55, 73–84; Douxchamps-Lefèvre, *Inventaire*, 4:406; Philippart, "Conséquences socio-économiques," 274.

¹⁹ Van der Wal, *Of geweld zal worden gebruikt*, 46, 333–36.

²⁰ Grave, SLC, Archief Gemeente Grave, inv. no. 218, fols. 172r, 183v, 184r, 193r, 225v, 260v, 275v, 294r, 299v, 304r, 316r (transcript Rien van den Brand, <http://www.scriptoriumempeje.nl>); Bormans, "Extraits des cris du péron," 173, 199; Bormans, "Table des registres," 11:268 and 11:270; Devillers, "Documents relatifs," 92, 98; Koreman, *De stadsrekening*, 136–38; Kraus, *Die Aachener Stadtrechnungen*, 187, 191, 417, 421, 431–32, 435, 437, 448, 452, 455; Laurent, *Aachener Stadtrechnungen*, 104, 107, 147, 166, 176, 182, 187–88, 249; Piérard, *Les plus anciens comptes*, 1:185, 1:199, 1:285, 1:622–23.

²¹ van der Eerden-Vonk, *Raadsverdragen*, 162–63.

²² de Groot, *Stadsrekeningen*, 1386 fol. 2, 1404 fol. 27, 1405 fol. 2, 1406 fol. 2.

²³ Borgnet, *Cartulaire*, 78–79; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 4:344–48; Coulson, *Castles in Medieval Society*, 285–90; Douxchamps-Lefèvre, *Inventaire*, 3:77, 3:173, 3:174, 4:154; Fruin, *De oudste rechten*, 1:20–21, 1:181–89, 1:302, 1:321–22; Girardot, *Le droit et la terre*,

The most direct danger to most fortifications, especially before the establishment of several layers of earthen walls in the late sixteenth and seventeenth century, did indeed not come from a major army with specialized siege equipment, but from relatively small groups of armed men who simply scaled the walls or broke down the gates at an opportune moment, generally at night.²⁴ An inventory of the fortress of Rode (in Herzogenrath) from 1408 accordingly lists twenty-eight crowbars and twelve assault ladders among the items stored. In 1404–1405 the high bailiff of Bassigny called upon a certain Naldenat, who “made ladders to assault fortresses and knows how to place them.” Another option was to bribe or overpower the gatekeeper and simply storm through the gates. Johan van den Vogelsanck, member of the town council of Venlo, stood by the gates around 1486 to prevent such surprise attacks. When the sentinel made known that horsemen were approaching, he tried to close the gates, but the gatekeeper prevented him and his son gave them a sign. Johan was badly wounded as a result and later brought the pair of them to trial.²⁵

Such examples are mostly neglected in studies about (medieval) siege warfare, a fact that is emblematic for the assumption that a certain scale is a prerequisite for using the terms “army” or “warfare.”²⁶ These techniques were still of major use in the Eighty Years War, the fortress of Huy being taken in 1595, for instance, by Dutch soldiers who climbed through a window on Saturday night and took its occupants prisoner at Sunday mass.²⁷ A particularly remarkable testimony is a notarial act written in Mariembourg that very same year in which a soldier declared that his brother-in-law, also a soldier, fell out of a castle window and died during such an assault.²⁸ It is because of the threat these tactics posed that special officials, often men of some standing such as aldermen or noblemen, had to ensure that guard duty was carried out properly.²⁹

Sudden assaults on fortifications (“coups de main”) remained a viable alternative to formal sieges because the number of occupants tasked with defending them on a day to day basis was surprisingly small. Until far into the sixteenth century few fortresses or

2:476–78; Habets, “Costumen,” 169–70; Hoeckx et al., eds., *Kroniek van Molijs*, 250–53; Thewissen, *De gezworen schutterijen*, 107–60; Villa-Séblin, *La sénéchaussée*, 190–92.

24 “Attaque de Dinant”; Cleves, *Instruction*, 111–19; de Stavelot, *Chronique*, 362–63; Koreman, *De stadsrekening*, 131; Kuppens, “De stadsrekeningen,” 72, 77; Laurent, *Aachener Stadtrechnungen*, 181–82; Raynaud, *A la Hache!*, 346–49; Toureille, *Robert de Sarrebrück*, 107, 118; Waale, *De Arkelse oorlog*, 123.

25 Janssen de Limpens, *Geldersche Wyssenissen*, 356–57; Servais, *Annales historiques du Barrois*, 1:63; 2:378; Uitterhoeve, *Burg Rode*, 23, 41, 43.

26 One of the few studies dedicated to this type of tactics is Harari, *Special Operations*. See also Rogers, *Soldiers’ Lives*, 248–50.

27 Frésón, “Prise du château de Huy.” See also Bourguignon, “La surprise d’Arlon”; Caldecott-Baird, *The Expedition in Holland*, 145–50; de Graaf, *Oorlog*, 404–7; Duyck, *Journal*, 1:298, 1:350, 1:358, 1:526–27; Parker, *The Army of Flanders*, 7–8; Richer, *Abrégé chronologique*, 201, 203.

28 Mariembourg, Notary Lecomte, 11: Act November 6, 1595 (transcript Généamag).

29 Bormans, “Table des registres,” 12:34–35; de Groot, *Stadsrekeningen*, 1388 fol. 8; Meisen, “Brabant, Limburg und die Übermaaslände,” 180; Servais, *Annales historiques du Barrois*, 1:43; van de Venne, *Het beleg*, 16.

cities housed a “garrison” of more than ten men (gatekeepers, sentinels, watchmen or sergeants or soldiers, a crossbow maker, or a gunner), as stipulated in their accounts.³⁰ When the *prévôt* of Longwy mobilized the duke of Bar’s fiefholders to pursue raiders who invaded his jurisdiction in 1346–1349, he paid three horsemen (*sergents à cheval*) to stay in the fortress so it was not undefended in his absence. They resided there for five weeks, and presumably served alongside the fortress’s normal household. The *prévôt*’s next account, covering the years 1349–1352, specifies that he called upon six local noblemen or four *sergents à cheval* to guard the fortress for a few days whenever a threat presented itself.³¹

The term garrison is used here for want of a better word since these men were urban officials or members of noble households. Actual garrisons only appeared during major conflicts with the activation of defence systems. The 1435 accounts from the fortress of Hambach (Jülich) make a very clear distinction between its five permanent guards and a temporary garrison of more than fifty horsemen who only stayed for a few weeks.³² Such reinforcements could also include local citizens or nearby villagers; in the Central Middle Ages some charters of liberties were granted for precisely this purpose.³³

In the same way as fortifications provided safety in a general sense, guard duty had multiple functions that went beyond discouraging violence. Paid watchmen or citizens on guard duty had a central role in fire prevention in medieval and early modern cities for instance. This role also applied to sentinels positioned on strategic locations (towers). Appointments of a permanent guard for one of the watchtowers of Aachen’s *Landwehr* in 1458 and 1497, specifically read that he had to make sure that no foreign livestock entered the territory of the city.³⁴ Officials in charge of guarding fortifications, such as shooting guilds in fifteenth-century Dordrecht or the newly appointed castellan of Geldern in 1497, were entitled to the income provided by a certain part of the fortifications (fishing and pasture rights) as an incentive to ensure that they did their duty.³⁵

30 The medieval terminology regarding sentinels (*eskerwaite*, *torenwachter*) and watchmen (*waite*, *wachter*) is somewhat confusing. Sentinels had to stand on the lookout, typically on a tower, while the armed men who patrolled the fortifications, especially at night, were denoted as watchmen. Guard duty of rural populations generally encompassed both functions (the duty of *guet et garde*). Balon, “L’organisation militaire,” 12–16, 30, 46–48; Bodard, *Receuil des ordonnances*, 6, 44, 85; Bormans, “Table des registres,” 11:263; Burgers and Dijkhof, eds., *De oudste stadsrekeningen*, 10, 42; Den Dooven, “Les émoluments,” 98–99; Kraus, *Die Aachener Stadtrechnungen*, 441, 465–66; Meisen, “Brabant, Limburg und die Übermaasländer,” 160, 162, 166–67, 180, 208–9, 247–48; Mougeot, “De la périphérie à la frontière?,” 160–62; Salamagne, “Les garnisons,” 707–11.

31 The word *sergent* derives from Latin *serviens* and could refer to any armed man who did not have a knight’s title. In some contexts it specifically denoted a low ranking official (such as a forest warden). Bar-le-Duc, ADM, B 1853, fol. 10; B 1854, fols. 16v–29v.

32 Dinstühler, ed., *Die Jülicher Landrentmeister-Rechnung*, 76–78, 81, 90.

33 See, for instance, Lejeune, “La charte.”

34 Pick, “Verpflichtungsurkunden,” 224–25, 246–47.

35 Fruin, *De oudste rechten*, 1:264; Jacobs, *Justitie en politie*, 161; Laurent, *Aachener Stadtrechnungen*, 242, 379; Salamagne, “Les garnisons,” 720; Thewissen, *De gezworen schutterijen*, 108–9.

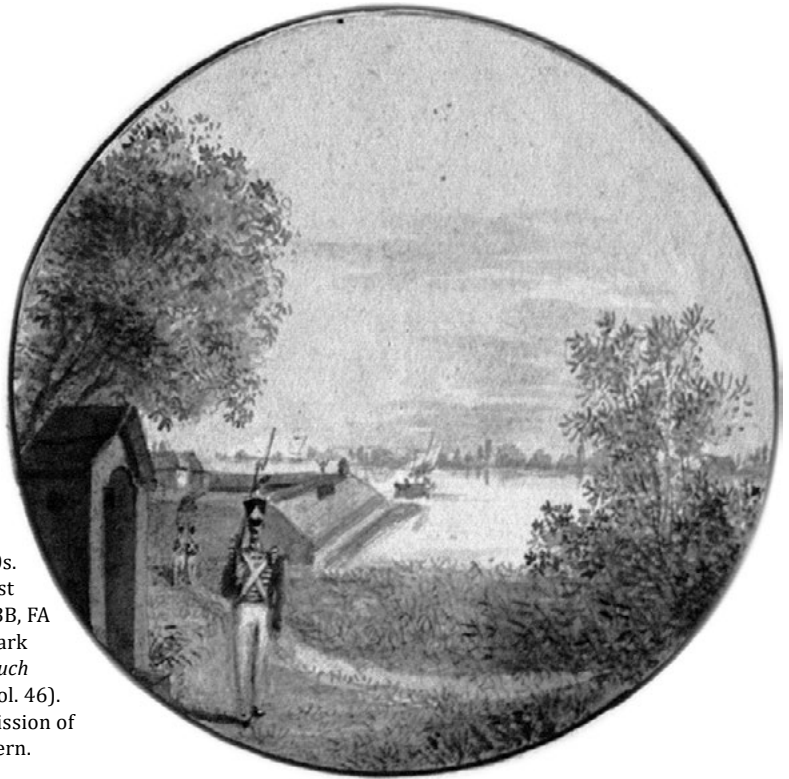


Figure 24. Guard post on the fortifications of 's-Hertogenbosch, 1820s. Sketch by captain August von Bonstetten (Bern, BB, FA von Bonstetten-shelfmark EK 2008/400: *Skizzenbuch August von Bonstetten*, fol. 46). Reproduced with permission of the Burgerbibliothek Bern.

Medieval guards had multiple functions, in the same way as the fortifications they had to protect, and were relatively well integrated into general society.

These observations apply to a much lesser extent to military guard systems, referring to the military as an organization, which became established from the late sixteenth and seventeenth centuries onwards. These were far more extensive than their predecessors and can be studied through a more detailed corpus of sources: garrison orders and regulations. There is in fact a significant upsurge in legislation from the last decades of the seventeenth century onwards regarding the maintenance and policing of fortifications. It is unclear whether this reflects changes in effective management, implying that guard duty was laxer earlier, or simply demonstrating increased state involvement. Military control over fortifications was hardly unchallenged, as we have argued above, which means that guard duty should be seen as a key method by which the military tried to safeguard its interests (the conservation of what they perceived as desirable biotic communities and landscapes).

The number of soldiers on guard duty in permanent garrisons was vast. The garrison orders of Namur, which are very specific in this regard, indicate that at the end of May 1759, four hundred and eighty-eight soldiers on guard duty were spread throughout the city at any given time, of which a hundred and twenty-one actually stood guard by day and a hundred and fourteen at night. A remarkable notebook, kept by the eighteenth-century private soldier Michael Andrist, who served in the Swiss regiment Stürler from

1779 to 1784, demonstrates that such forces were quite typical. It lists the guard posts for Maastricht and 's-Hertogenbosch for respectively 1780 and 1783. In Maastricht five hundred and fifty-five soldiers were on guard duty, and in 's-Hertogenbosch two hundred and thirty-seven.³⁶ Soldiers who were not standing guard or on patrol had to remain within guardhouses from where they could quickly come to their comrades' aid. Such an organization is without equal in the history of premodern policing,³⁷ as most early modern governments had to depend on a handful of police officials, shooting guilds, and the general population to arrest offenders.³⁸ Guard duty was not without its risks, however: records of the French Invalides reveal that one wrong step or a strong current could entail a fall of several metres down into the moat leading to crippling injuries or even death.³⁹

This display of force was meant to ensure that surprise attacks of the kind described above became impossible, but also fulfilled a major role in the maintenance of public order, by ensuring that curfew was respected. Anyone walking the streets at night without a legitimate reason was liable to get arrested. These sentries moreover had to prevent members of the garrison from deserting and regulated entrance to the fortifications.⁴⁰ According to eighteenth-century garrison regulations, citizens were only allowed to walk on the main wall by day and children were forbidden to play there. They needed written permission, a permit ("passport"), from the governor in order to access the outworks (the fortifications lying beyond the main wall). At night no one was allowed in the fortifications, except the guards, the patrols, the garrison's staff, and the engineers.⁴¹

A sketch made by the Swiss officer August von Bonstetten in the 1820s, when he served in the garrison of 's-Hertogenbosch, provides a rare glimpse how fortifications might have looked like when military forces still managed them (see figure 24). It depicts the outworks as large green spaces, guarded by sentries. Because uninhabited lands in an urban context were relatively rare, military defences became the locale for a series of conflicts: bird catchers had to be chased off the glacis and counterscarp, no hunting was allowed in these same areas, and no one was to fish in the moats, cut grass or reed, and pasture livestock in the outworks without written permission.⁴² If domestic animals

36 The Hague, NA, Raad van State, inv. no. 2087; Soesterberg, NMM, inv. no. 00216132: Notebook of soldier Michael Andrist, fols. 63r, 64r. See also G. Vallée, "Le journal du marquis de Langeron," 161.

37 With the possible exception of the eighteenth-century Garde de Paris, but this is very much a military unit in everything but name. Chagniot, *Paris et l'armée*, 117–57.

38 Denys, *Police et sécurité*, 51–64, 156–62, 398–401.

39 Vincennes, SHD, GR, 2Xy09: Pierre de la Vergne; 2Xy14: Alexis Loir, Simon Remy; 2Xy18: François d'Armagnac; 2Xy20: Pierre Beaumont, Remy Ronseme; 2Xy23: Jean Gillot; 2Xy24: Jean Baptiste Reuter; 2Xy26: Johannés Scherumpf; 2Xy45: François Camus (transcript www.hoteldesinvalides.org). See also The Hague, NA, Raad van State, inv. no. 2088: order November 27, 1771; Teunisse, *Onderdaan in Oranje's oorlog*, 40–41.

40 Augoyat, *Aperçu sur les fortifications*, 82–83; Isambert, Decrusy and Taillandier, eds., *Recueil Général des anciennes lois françaises*, 20 (1830) 611–14; Berkvens, *Plakkatenlijst Overkwartier*, 1:234.

41 *Ordonnance du roi (June 25, 1750)*; *Reglement en orders Maastricht (1786)*; *Reglement en ordres 's-Hertogenbosch (1770)*.

42 The glacis refers to the open fields lying around the outer fortifications, within cannon shot

were found within the fortifications without permission they were, theoretically, confiscated (horses, cows, sheep) or simply shot (dogs, poultry). The trees and hedges could not be damaged in any way either. Such a range of restrictions can perhaps best be summarized by a nineteenth-century saying from the French Meuse department: "whatever falls into the moat, belongs to the soldier."⁴³ Given that a garrison's staff was entitled to the fishing and pasture/hay benefits in the fortifications, in a similar way to their medieval predecessors, they must have had a direct socio-economic interest in ensuring that these regulations were carried out.⁴⁴

The garrison orders of Namur, which regulated everyday life in this fortress, indicate that the garrison's own members were quite often the very people against which sentries had to intervene. Officers and their attendants were repeatedly singled out for breaching the hunting regulations. Disregard of fishing rights in the fortifications, the Meuse, Sambre, and local ponds, seems to have been commonplace, as was the taking of wood from nearby forests by soldiers as well as their families. The same applied to digging loam in the fortifications. In 1762 non-commissioned officers were tasked with inspecting the barracks for illegally procured wood, the normal policing mechanism, the guards at the gates, apparently being insufficient to prevent its smuggling into the city.⁴⁵

In practice, enforcement might very well have been less strict than the regulations indicate. Personnel records of the eighteenth-century Dutch army reveal that running away from one's guard post was a popular way of deserting (representing nineteen percent of the deserters for whom the manner of desertion is provided).⁴⁶ A garrison order, dating to June 20, 1772, also forbade soldiers standing guard to cut young trees on the walls with their sabres.⁴⁷ Implementing garrison regulations must have been difficult if the sentries themselves were not always reliable. In the County of Namur peasants still conducted armed patrols in the countryside, and were encouraged to arrest desert-

range. The counterscarp is the outer side of a moat. The Hague, NA, Raad van State, inv. no. 2079: Order March 23, 1714; *Ordonnance du roi* (June 25, 1750) articles DCLXV–DCLXX; *Reglement en ordres Maastricht* (1786); *Reglement en ordres 's-Hertogenbosch* (1770).

43 *ç que cheu do l'foussé c' ost pou l'souldat*. Labourasse, *Glossaire abrégé*, 288.

44 Petitot-Bellavène, "Verdun," 91; Roebroek, *Het land van Montfort*, 114; Rorive, *La guerre de siège*, 211.

45 The Hague, NA, Raad van State, inv. nos. 2079, 2081, 2087, 2088: Garrison Orders of Namur. Prohibitions against hunting by members of the garrison: February 1, March 15, July 31, October 15, 1714; January 27, April 13, June 11, September 31, November 1, November 20, 1716; March 17, May 1, 1717; May 21, 1739; June 15, August 16, 1759; July 28, 1761. Against fishing: January 26, February 21, July 21, 1714; May 27, August 2, 1715; May 28, August 13, and September 13, 1716; February 15, April 22, May 25, 1717; February 5, 1739; June 18, July 6, 1740; July 15, 1742; June 8, 1759. Against bringing wood into the city: November 28, 1714; July 4, October 15, 1715; September 8, 1716; November 13, 1738; November 7, 1741; June 2, 1760; October 10, 1762. Against digging loam: April 19, 1717; November 14, 1738; January 31, 1741. See also Philippart, "La pêche," 92.

46 Based on a database of 199 deserters, originating from the Dutch speaking part of the Prince-Bishopric of Liège who served in the Dutch army between 1770 and 1795. Govaerts, "Fire-Eaters."

47 The Hague, NA, Raad van State, inv. no. 2088: June 20, 1772.

ers and soldiers on leave who damaged their fields or hunting traps.⁴⁸ The commander of 's-Hertogenbosch released several proclamations in 1835–1837 about the ban on livestock in the fortifications, before he lost his patience. He subsequently issued live rounds to a non-commissioned officer, ordered him to take one soldier on guard duty with him every week and shoot any poultry still found wandering about.⁴⁹

Despite these problems, it does seem that such guard systems were overall quite successful in enforcing garrison regulations.⁵⁰ In 1803, for instance, the leaseholder of the fisheries in the moats of the fortress of Heusden petitioned the Batavian government for an extension of his contract. He had been unable to make good his initial investment as a result of overfishing. Because of the absence of a garrison everyone tried to fish at night.⁵¹ Non-military forces in fact passed similar legislation to safeguard the maintenance of fortifications. Rules introduced in Campine/Kempen villages with regard to their refuge forts (*schansen*) in the seventeenth century, as well as orders given to Liège patriot troops in 1790, both include prohibitions regarding the damaging of the fortifications, fishing in the moats, discharging guns, and cutting wood or stealing crops.⁵² Some garrisons, such as those of Liège in the eighteenth and Grave in the nineteenth century, went a step further, and used their guard system for disaster response. Soldiers fired cannons to warn citizens respectively of a fire and of flooding from the Meuse.⁵³ Guard duty was key to military forces' control over garrison towns, but ironically enough the main threat came from their own colleagues.

Controlling Migration

The role of armies in the protection of biotic communities was clearly quite complex, because they acted simultaneously as agents of order and disorder. We will now examine how rulers or states responded to this issue, and to what extent they made efforts to control the movement and behaviour of the people and animals (horses) who served in their armies, or could potentially be incorporated into them. The protection of natural resources in the strict sense of the word is thus contextualized within larger policing issues. The symbolism of the garden (see chap. 1) in effect came to imply that the movements of every living being in this garden became subject to state control. Given that these processes are relatively well studied for conscription armies in the late eighteenth and nineteenth century, this analysis emphasizes their working in systems of voluntary recruitment and their medieval origin.

Passports as documents that specifically regulate movement originate in the Central Middle Ages. They evolved out of letters of safe conduct, and initially served to safe-

⁴⁸ The Hague, NA, Raad van State, inv. no. 2079: August 30, 1714; inv. no. 2081: July 17, 1739; inv. no. 2088: May 30, 1773; Denys, *Police et sécurité*, 141–56.

⁴⁹ Bruggeman, *Bestedingen dienst der Fortificatiën*.

⁵⁰ Denys, *Police et sécurité*, 265–66; Tixon, "Une garnison en ville: facteur d'ordre ou de désordres?"

⁵¹ *Besluiten van het staats-bewind der Bataafsche Republiek*, December 9, 1803, no. 28.

⁵² Hansay, "Documents inédits," 162–64, 192–93; Molemans, "De Luikse Revolutie," 79.

⁵³ Lhoist-Colmon and Gabriel, "La colline," 73–74; van Hoof and Roozenbeek, *Grave*, 63.

guard the passage of a group of travellers or the transportation of goods. The mobility of the person(s) conveying these commodities was much less of a problem and to a large extent implied.⁵⁴ The accounts of the high bailiff of 's-Hertogenbosch from 1486–1487 specify, for example, that he fined five men because they demanded to see the passport of a soldier who passed through Vught with three horses. They claimed his passport was false and confiscated the horses.⁵⁵ The increasing use of such documents for people derived from several factors: prevention of epidemics, supervision of vagrants and beggars, but also a growing interest in the criminal activities of soldiers. Charles the Bold made sustained efforts to control the movements of his men, and instituted passports by 1473 at the latest.⁵⁶ In the late fifteenth century passports for soldiers must still have been quite exceptional, however, for at an unspecified date in 1459–1487 the councilors of Roermond had to judge a case in which three men from Lobberich claimed that the bailiff had given them oral permission to leave the army, a statement he denied.⁵⁷

The lasting association of passports with soldiers, who were, for whatever reason, separated from their unit, came about in the first half of the sixteenth century. At that point there was a growing unease about the actions of soldiers who begged, extorted, and stole from the settlements they passed through, generally to overcome the period between their discharge and enlistment with another paymaster. Dutch and German sources use the word *ga(e)rden* or *garten* for this kind of behaviour. The word appears as early as 1494–1495 in the accounts of the high bailiffs of 's-Hertogenbosch.⁵⁸ Pensioned or discharged soldiers were common protagonists in early modern folk tales and were also increasingly linked to other mobile people associated with criminality, such as vagrants, beggars, and Roma. Repression of all these groups was stepped up during the same period.⁵⁹

The study of passports is complicated because these were personal documents of a temporary nature, which means that those that have been preserved are often kept in family archives and personal collections. It is useful to have a look at one specific example, the passport of Gerard Vilansin, trumpeter in the French cavalry regiment Melac, garrisoning Maastricht in 1677 (see figure 25). It is one piece of paper containing a discharge from his captain and an actual passport from the governor. It was given to him because he left for the recently established Hôtel des Invalides. The passport is a simple text in which the governor states his destination and reason for travelling, while simultaneously asking anyone concerned to let him pass through. Eighteenth-century

54 van Doorninck and Molhuysen, eds., *Briefwisseling*, 36–37.

55 Brussels, ARA, 137.01, inv. no. 12995 (transcript Henk Beijers Archiefcollectie).

56 Cauchies, "La désertion," 140; Groebner, *Der Schein der Person*, 117–19, 124–27; Scholz, *Borders*, 37–48, 134–45; Servais, *Annales historiques du Barrois*, 2:461; Verreycken, *Pour nous servir en l'armée*, 156–70.

57 Janssen de Limpens, *Geldersche Wyssenenissen*, 140–41.

58 Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. no. 12995; Behr, "Garden und Vergardung"; Burschel, *Söldner*, 88–96, 278–86, 311–17.

59 Bois, *Les anciens soldats*, 307–16; van Kappen, *Geschiedenis*, 121, 129, 139, 152–53, 155, 158–59, 161.

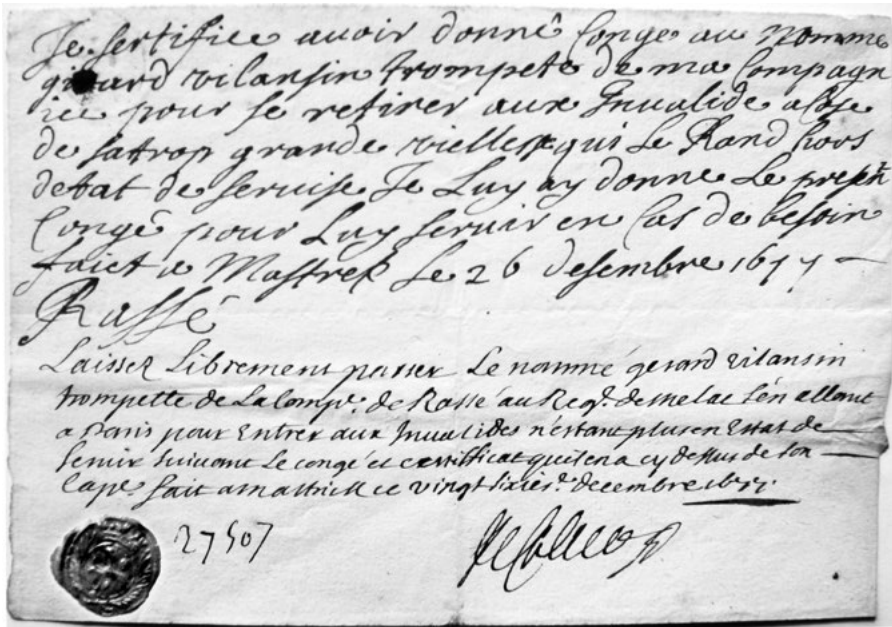


Figure 25. Discharge and passport for Gerard Vilansin (Maastricht, Private Collection).

passports became more elaborate with a pre-printed text in which features of the man's appearance were often included as well. The garrison orders of Namur from January 31, 1717 explicitly mention that soldiers could only go outside the gates with a printed passport signed by general du Portal.⁶⁰

The practical enforcement of these regulations, or the repression of unwanted migration, remained the responsibility of (high) bailiffs and their counterparts until the suspension of all these officials at the end of the Ancien Régime. It is one of the specific contexts in which the general population was not only allowed to act in an army context, but even obliged to do so.⁶¹ Soldiers assisted occasionally in hunting down deserters or as an exceptional government clampdown. During the eighteenth century, however, the patrols made by members of the general population were increasingly supported and taken over by uniformed police officials, of which the military police was a relatively small part.⁶² The only soldiers for whom migration control became a core duty served in the small eighteenth-century army, one infantry regiment, of the bishops of Liège. This

⁶⁰ The Hague, NA, Raad van State, inv. no. 2079: Orders January 31, 1717.

⁶¹ Tongeren, SAT, inv. no. 1, fols. 296v, 297r, 305r, 319r, 321; Berkvens, *Plakkatenlijst Overkwartier*, 1:167; Bodard, *Receuil des ordonnances du Duché de Bouillon*, 222, 304, 315–16, 342–43; Boonen, "Repression van vaandelvluchtige soldaten"; Bormans, "Table des registres," 12:14; Reiche, *Vom bewaffneten Hausmann zum Polizisten*, 20–46.

⁶² Berkvens, *Plakkatenlijst Overkwartier*, 2:110, 2:174; Desbrière, *Chronique critique*, 232–33; Piraux and Dorban, eds., *Douane, commerce et fraude*, 126–27; Verschure, *Overleven*, 50, 70–74,



Figure 26. Fifteenth-century army on the march (Brussels, KBR, MS 9242: *Chroniques du Hainaut*, fol. 184r). Reproduced with permission of the Bibliothèque Royale de Belgique / Koninklijke Bibliotheek van België.

unit already started to provide villages in the Campine/Kempen with individual soldiers to chase away vagrants in the 1720s. This slowly changed into a deliberate government policy by the 1740s with major operations involving up to one hundred soldiers. The archives of the estates reveal that a special military tribunal was instituted in Liège to judge captured beggars and vagabonds.⁶³

Authorities typically forced arrested vagrants or deserters into specific kinds of work because of their supposed idleness, including service as galley rowers or main-

221–22; van Kappen, *Geschiedenis*, 190–91, 197–98, 414, 440, 446, 451; Winter, “‘Vagrancy’ as an Adaptive Strategy,” 256.

⁶³ Liège, AEL, Etats, inv. nos. 268, 2974; Jamar, “Prinsesoldaten.”



taining fortifications. In this way the policing of biotic communities contributed to the maintenance of militarized landscapes and defence systems.⁶⁴ According to the accounts of the high bailiff of 's-Hertogenbosch these practices date back to at least 1463–1464, when twenty-five vagrants were arrested and sent to the galleys in Sluis (Flanders) at the request of Charles the Bold, Duke of Burgundy. Galleys, being of Mediterranean origin, are not well adapted to weather conditions in the North Sea, but they remained valuable for river defence. The presence of punished soldiers on a galley is still attested in Rotterdam as late as 1634.⁶⁵

⁶⁴ Dorreboom, "Gelijk hij gecondemneert word mits deezen," 204–8; Petitot-Bellavène, "Verdun," 36; Roosens, "De invloed van de vestingbouw," 93–97; Thewes, *Stände, Staat und Militär*, 130; Vandewal, "De kroniek," 246–47.

⁶⁵ Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. no. 12993 (transcript

Soldiers figured prominently among premodern migrants. The introduction of passports should therefore also be seen in the context of attempts to secure the supply of manpower for the armed forces. As argued in the introduction, an army could contain large numbers of people who were not expected to fight, or more precisely did not have a recognized combat role and the wages associated with it. This distinction is significant since it makes counting and identifying these people problematic, but also because efforts to secure army recruitment were primarily directed towards soldiers. During the Middle Ages combatants typically brought their own wagons with them, and ecclesiastical institutions could also be expected to provide transportation (see figure 26). From the 1500s onwards armed forces increasingly had to rely on the communities they passed through, as well as contractors.⁶⁶

Noteworthy in this regard is a charter from the village of Genoelselderen, near Tongres/Tongeren, written down in 1431, in the aftermath of a major attack on the County of Namur. It reads that in case of a military campaign (*heervaert*) the villagers and their lord each had to bear half the expenses made for the construction of an army wagon (*heerwagen*) pulled by three horses. The villagers were also allowed to put their travel bags and equipment on this wagon and could ride on it if they felt weak. A French military map from the Austrian War of Succession (1740–1748) by contrast depicts the Duchy of Limburg and the lands of Outre Meuse, and is accompanied by a list of these lands' resources (the acreage devoted to agricultural lands, grasslands, and woodlands, the number of adult males, horses and wagons/carts).⁶⁷

As for soldiers, during the Central Middle Ages the concept of "foreign military service" did not even exist. One could fight for anyone or any cause, and accept wages, provided only that it was a "just" war. Noblemen for instance could, theoretically, not fight someone to whom they owed fealty. As long as military service was closely tied to land ownership, either in the context of feudal obligations or urban and rural militias (see the 1301 charter from Couvin in chap. 1) there was little need to control combatants' movements. This changed with the growing importance of a monetary economy from the twelfth and thirteenth centuries onwards. If rulers, noblemen, or urban councils could reward combatants by giving them fief rents or wages they could increase their military potential by enlisting the aid of people living beyond the boundaries of their own lands.⁶⁸

This development fits into a more general tendency to put less emphasis on obligatory military service, and only recruit people who were willing and able to wage warfare. Surviving fiscal accounts from the fourteenth and fifteenth centuries demonstrate that commanders first called upon "those who came voluntary," generally family members, friends or retainers. If this was insufficient, men "living nobly," fiefholders who

Henk Beijers Archiefcollectie); Rotterdam, SAR, ONA, inv. no. 93, no. 286: May 29, 1634; Sicking, *Zeemacht en onmacht*, 189–90, 200.

66 Borgnet, *Cartulaire*, 10; Darquenne, *La conscription*, 48–49; Gaier, *Art et organisation*, 96–101; Gorissen, "De karweien"; Gutmann, *War and Rural Life*, 39–41; Kroener, *Les routes*, 82–83; Petitot-Bellavène, "Verdun," 44.

67 Lemoine-Isabeau and Helin, *Cartes inédites*, 47–63; Nijssen, "Een akkoord."

68 Govaerts, "From Knight Errants to Disloyal Soldiers."

served on horseback, were mobilized. The same applied to members of shooting guilds, if these were available. The general adult male population was only called upon to serve if the former methods were inadequate.⁶⁹ When war broke out between Holland and Brabant in 1334, Daniel van der Merwede, bailiff of Zuid-Holland, consequently send a messenger to everyone living in his district that he thought was a fiefholder of the count. According to his fiscal account citizens of Heusden stole the warhorses of several of these noblemen when they made sure no supplies entered the Duchy of Brabant. This suggests that they patrolled the Meuse on a boat (possibly a cog).⁷⁰

The increased emphasis on monetary rewards had one major drawback, however: it made these same men less dependent on one lord or employer. This was especially so in the politically fragmented Meuse Region. On June 24, 1297, for instance, Guy de Dampierre, Count of Flanders and Margrave of Namur, hired Warnier de Dave, a knight from the County of Namur, to serve in his campaign against the King of France with three other knights and twenty-one squires. The contract specified that Warnier would receive one thousand pounds in wages and did not have to enter the lands of one of his other lords (the bishop of Liège, the duke of Brabant, the count of Hainaut, and the lord of Valkenburg). This restriction did not apply to any of his men who were not fiefholders of those lords.⁷¹ In order to gain more control over their soldiers, both rulers and urban councils thus started to develop new ways to link military service to land during the Late Middle Ages: living or being born in a certain area increasingly came to imply the existence of a personal bond between subject and potentate. So, the gradual development of a new concept, "foreign military service," can also be seen as a territorial practice, a practical way to maintain control over the relatively limited pool of men willing and able to engage in warfare.⁷²

The accounts of the high bailiff of 's-Hertogenbosch, who controlled more or less the area encompassed by the current Dutch province of Noord-Brabant, provide an excellent starting point because they reveal to what extent military service for another potentate was a punishable offence on the Brabant-Guelders frontier. The only reference to an explicit prohibition comes from 1402. In that year the high bailiff sent messengers to proclaim in churches that it was forbidden to join either side in the war between the count of Holland and the lord of Arkel. He only prosecuted two men, however, because they pursued the war in his jurisdiction. The first had stolen horses from subjects of the count of Holland and brought them into Brabant, the second, Floris van der Aa, was one of the noblemen who took the lord of Arkel prisoner when he passed through the duchy in 1415.⁷³ We know that Duchess Johanna of Brabant (1355–1406) had earlier forbidden her subjects to join the Frisian expedition of the count of Holland in 1396, but the

69 Brussels, ARA, 137.01, inv. nos. 2779, 2781, 2784, 2785, 2786, 2787, 2789, 2790, 2800, 2803, 2805, 12991; Kupperts, "De stadsrekeningen," 23–24, 39, 62, 101, 128, 148, 160–61, 207, 328; Liégeois, "Compte de la recette de Chiny," 140–42, 151–54, 158–63; Villa-Séblin, *La sénéchaussée*, 32–46.

70 Smit, ed., *De rekeningen*, 54–56.

71 de Saint-Genois, *Chartes*, 266–67.

72 Govaerts, "From Knight Errants to Disloyal Soldiers."

73 Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. nos. 2818, 44.1.2.3; 12991,

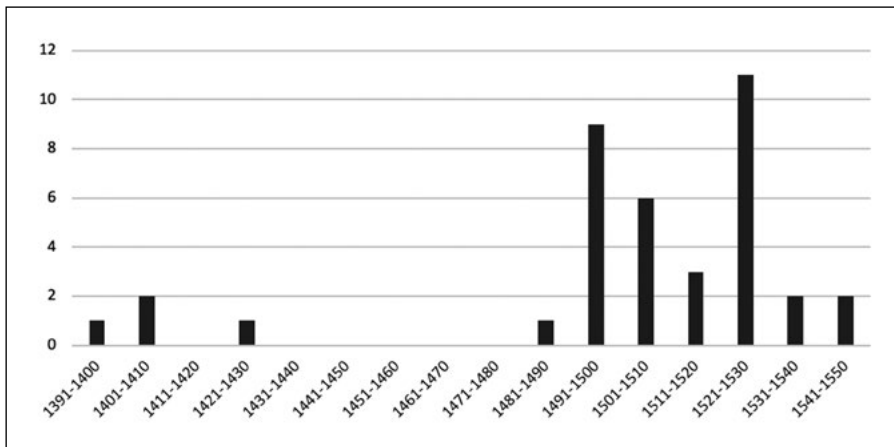


Figure 27. Overview of people prosecuted for foreign military service in the Meijerij of 's-Hertogenbosch, 1393–1550 (Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. nos. 2797, 12990, 12991, 12995, 12996).

Armorial Beyeren, which depicts the armorials of noblemen taking part, indicates that at least eleven attended.⁷⁴

From 1393 until 1550, that is before the outbreak of the Eighty Years War, the accounts of the high bailiff of 's-Hertogenbosch include thirty-nine cases of “foreign” service (see figure 27). It is noteworthy that only a minority got punished, with a fine, for enlisting with a lord or ruler other than the dukes of Brabant, and even here there was a strong connotation of enemy service.⁷⁵ The others were prosecuted for treason (serving “against their natural prince”), frequently in combination with other offences, such as desertion from the imperial forces. In these cases execution was the most common form of punishment. The high bailiff pursued both men born and living in his jurisdiction and anyone who committed a crime there. According to his account from 1506–1508 he executed a soldier who was born in “the Indies.” His name, “Christoffelen Myn,” suggests that he might have been a native converted to Christianity. He was sentenced for deserting from the imperial army, serving the duke of Guelders, and pressing locals for food and drink after returning to the imperial forces.⁷⁶

74.2.3.10; 75.4.3.10 (transcript Henk Beijers Archiefcollectie). For Floris van der Aa see Damen, *Prelaten, edelen en steden*, 100.

74 The Hague, KB, Medieval Manuscripts, Wapenboek Beyeren, part 3: Roll of arms of the battle of Kuinre, 1396; Janse, *Grenzen aan de macht*, 263.

75 Two men who fought in Frisia against the duke of Saxony, an ally of the Habsburgs, in 1497, and 1502–1503 respectively. A servant (*jongen*) was fined in 1491–1492 for participating in the feud against a certain Willem Trant.

76 Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. nos. 2797, 12990, 12991, 12995, 12996. See also Bormans, “Extraits des cris du péron,” 180, 195; de Lusy, *Le journal*, 348, 351–53, 370; Desbrière, *Chronique critique*, 49; Marchal, *Inventaire*, 296, 325; Richer, *Abrégé chronologique*, 147; Grauwels, ed., *Dagboek*, 62, 169; Sangers and Simons, *Geschiedenis*, 67.

A particularly remarkable case is a twelve- or thirteen-year-old boy from Someren who was sent by his mother to the imperial forces near Mézières, presumably during the siege of 1521, to look for his sister, who served there with her partner. When the boy learned that this soldier had shortly before deserted to the French side with some comrades, he followed them there as well. He stayed in the French army for two months because he could not come back, and was fined along with two soldiers. Still, his sister, who probably acted in the same way, does not appear in the accounts. Given that this boy would have served as a soldier's servant, this case demonstrates that the ban on foreign service applied to any male serving in an army context, soldier or not, but not to women. There is another case of a *jongen* (servant) who was sentenced for joining the French. The fact that he did not receive any wages is explicitly stated.⁷⁷

The emphasis on enemy service is important because serving in foreign armies as such did not really become an issue for at least another century, except in very specific circumstances, such as when governments raised or expanded their own armies and manpower became scarce. Former soldiers were actually encouraged to enlist with another potentate because it resolved the social problem of discharged veterans and released their paymasters from distributing their arrears in wages.⁷⁸ Notarial acts from Rotterdam dating to the first decades of the seventeenth century indicate that the armed forces of Venice, France, Denmark, Portugal, and Muscovy all sent recruiters to Rotterdam.⁷⁹ Even if officials wanted to enforce the law, evidence might have been difficult to come by. A miller from Roly, near Philippeville, declared before a notary in 1692 that he had not enlisted with the king's enemies in Charleroi (the Spanish army), and claimed that these allegations were based on village gossip.⁸⁰

In the long run, the establishment of large standing (permanent) armies at the end of the seventeenth and the beginning of the eighteenth centuries turned out to be a key turning point. Now governments and commanders had a vested interest in keeping large numbers of soldiers with the colours. The kingdom of France also reorganized the military obligations of its subjects around this time and in effect introduced conscription, albeit only for militia regiments.⁸¹ The resulting change in attitudes is well studied for the Austrian Netherlands, where the government adopted a much harsher attitude towards foreign service after the reorganization of their forces in 1725. Nevertheless, in

⁷⁷ Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. nos. 12996, 080.1.2.3.6; 080.13.5.4.

⁷⁸ Berkvens, *Plakkatenlijst Overkwartier*, 2:129; Bormans, "Table des registres," 11:269, 12:63, 12:70–72, and 12:74; Brouwers, "Recrutements"; Douchamps-Lefèvre, *Inventaire*, 3:28, 5:52; Helfferich, "A Levy in Liège," 481, 485, 490, 493–95; Kroener, "Der Krieg hat ein Loch," 619–25; Leclercq et al., eds., *Liste chronologique*, 181–84, 188–90; Parrott, *The Business of War*, 95–100, 156–73; Sangers and Simons, *Geschiedenis*, 250; Sicking, *Zeemacht en onmacht*, 200.

⁷⁹ Rotterdam, SAR, ONA, inv. no. 86, no. 344: February 11, 1645; 91, no. 97: November 13, 1619, 96, no. 147: March 27, 1648; 108, no. 217: November 15, 1631; 248, no. 93: July 24, 1641; 407, no. 206–207: March 18, 1658; 465, no. 191: May 7, 1645; 466, no. 14: February 8, 1646; 495, no. 218: November 27, 1646; 632, no. 80: May 27, 1658.

⁸⁰ Roly, 6786: Act March 16, 1692 (transcript Généamag).

⁸¹ Lynn, *Giant of the Grand Siècle*, 380–96.

practice enforcing regulations for soldiers serving below commissioned rank remained very difficult. Foreign recruiters were arrested when discovered and subjects joining other armies had to enlist in an imperial regiment in exchange for amnesty, but every year hundreds of men, often deserters, simply crossed the border and joined another army.⁸² The Prince-Bishopric of Liège and a multitude of imperial immediacies in its close neighbourhood did assume a major recruiting role at a European level during the following decades precisely because they allowed foreign recruitment, sometimes openly, sometimes more clandestinely. A considerable part of the recruits gathered here had deserted from the Imperial, Dutch, and French armies, as proven by a systematic comparison of military personnel records. The bishops did sign cartels for the exchange of deserters, but enforcing these treaties was not in their interest.⁸³

In historical studies, the introduction of conscription is often presented as a “solution” to these recruitment problems, a perception based to no small extent on the writings of Enlightenment thinkers, but such a view does not take the ecological framework and perceptions of other contemporaries into full focus.⁸⁴ This can be clarified by taking the Bouillon regiment, raised in 1757 by the duke of Bouillon for the French army, as an example. Because every settlement had to provide able-bodied men for the militia, it is possible to get an idea of the principality’s recruiting potential. The militia totalled 741 men in 1776. Furthermore, a small number of documents relating to the organization of the colonel’s company have been preserved. This is a very senior company, theoretically commanded by the duke as colonel proprietor of the regiment, organized by taking soldiers from all the other companies. In this way, it gives a unique insight into the composition of the regiment. Of sixty-one men, only two came from the duchy itself. Even if one takes into account the age structure of the population, the exclusion of married men, and the physical standards required from soldiers at this time (see chap. 5), this percentage is surprisingly low.⁸⁵

The duke could surely have filled a larger proportion of his regiment, or at least his own company, by recruiting his own subjects, but this was not in his or his unit’s interests. His explicit instructions, namely that one half of the soldiers provided had to be “known and native,” with the other half being “foreigners and deserters,” reflects a practical problem of recruiting soldiers who met certain physical standards without destabilizing the demographic framework on which one’s own government rested.⁸⁶ Only in

82 Berkvens, *Plakkatenlijst Overkwartier*, 2:238; Lorgnier, *La maréchaussée*, 2:86–91; Sonkajärvi, “Aperçu sur l’économie de la désertion”; Ruwet, *Soldats*, 24–26, 254–70.

83 Brouwers, “Soldatenwerving”; Govaerts, “Fire-Eaters”; Hélin, “Les Liégeois.”

84 Kunisch, *Fürst—Gesellschaft—Krieg*, 161–202; Léonard, *L’Armée*, 215–37, 259–80; Theeuwen, *Pieter ’t Hoen*, 226–31, 276–77, 291–93, 299, 643; Wilson, “Foreign Military Labour.”

85 Maastricht, Private Collection, documents relating to the establishment of the colonel’s company of the regiment Bouillon, 1757: Contrôles July 16, 1757.

86 It is unclear what “known and native” in this context means, given that the Duchy of Bouillon was originally part of the Prince-Bishopric of Liège, and forcibly ceded to the French noble family de la Tour d’Auvergne in 1676. In 1757 the regiment recruited most of its personnel in the northeastern part of the Kingdom of France (the Alsace), the Prince-Bishopric of Liège, and the Austrian Netherlands.

1759 did the duke make an effort to recruit his own subjects, primarily to replace war-time losses. From 1763 to 1776 eighteen men from Bouillon served in the ranks of the colonel's company, of whom seven died during the unit's tour of duty in the Caribbean (Martinique). In 1788 the regiment still counted only twenty-seven soldiers from the duchy among more than one thousand men.⁸⁷ Even the widespread adoption of conscription in the first decades of the nineteenth century did not fully eliminate foreign recruitment, which continued to be the norm for colonial units, such as the Dutch Indies Army, and the navy. It is only from the 1850s onwards that the enlistment of foreigners truly disappeared, with the notable exception of the French Foreign Legion.⁸⁸ Governments had prohibited their subjects from joining foreign armies from at least the fourteenth century, but despite steadily increasing migration control they never fully succeeded in suppressing it.

Armed forces did not just depend on people, however, but also included a sizeable animal component. How armies obtained the horses, on which so many of their functions depended, is a fundamental question, but also one that is often taken for granted.⁸⁹ In a similar way to human recruitment, a distinction has to be made between riding horses and draught horses. There is much more information available about the first type because these are the animals used by an army's combat element. Draught horses were before the nineteenth century exacted from the general population as part of a larger spectrum of services, or provided by contractors.⁹⁰ A list of fifty-eight horses requisitioned in the lordship of Grevenbroek, in the far north of the Prince-Bishopric of Liège, for the siege of Huy in 1695, provides an exceptional insight into this matter. This document is very detailed, provides a physical description of each animal, and makes clear that sixteen of the horses were old and worn out. The villagers likely selected their least useful animals for army service, though the state of these specimens might also simply reflect the general impoverishment of the Campine/Kempen at this time.⁹¹

Of special interest here is thus whether there existed a type of horse that was specifically raised for warfare, a "warhorse." Administrative sources classified horses according to many different types during the Central and Late Middle Ages, but only one of these referred indisputably to a warhorse, the *destrier*. This is the so-called "great horse" on which a fully armoured knight charged in battle. Because rulers were expected to recompense their combatants for horses lost in their service up to the late fourteenth century, it is possible to get some idea about the horses used by medieval armies. In

87 Maastricht, Private Collection, Arrangements pour la formation de la compagnie colonelle du régiment de Bouillon, 1757; Vincennes, SHD, GR 1Yc158: Contrôles of the Bouillon regiment, 1763–1776; Deschard, *L'Armée*, 113; Polain, *Ordonnances*, 193–95.

88 Bossenbroek, *Volk voor Indië*; Lucassen, "The International Maritime Labour Market."

89 See however Bachrach, "Animals"; Davis, *The Medieval Warhorse*; Moore-Colyer, "Horse Supply"; Robinson, "Horse Supply"; Stradling, "Spain's Military Failure."

90 De Bruijn, *De hoeve en het hart*, 223–33; Douxchamps-Lefèvre, *Inventaire*, 4:148; Gaier, *Art et organisation*, 96–102; Girard d'Albissin, *Genèse de la frontière*, 333; von Below, "Die Leistungen," 10–18.

91 Driessen, "De paarden."

some ways these sources are even more informative than those of subsequent centuries, given that individual animals figure prominently among them.⁹²

A comparison of two receipts for horse loss, both from horsemen serving the duke of Brabant, will be taken as an example because they show the diversity of horses used by medieval armies as well as the difficulty of establishing whether the horses used in war were effectively “warhorses.” The first receipt concerns a reimbursement to Dietrich von Heinsberg and his men for seventy-six horses lost during the 1339 campaign of Edward III (1327–1377). Of these twelve are described as *destriers*, nineteen as *cavalli*, and forty-five as *equi*. *Cavallus* and *equus* both mean “horse” in general, but the term *cavallus* has a strong connotation of a horse used in warfare, especially in medieval Latin. It is likely therefore that in this document the word *cavallus* referred to a warhorse of lower value than a true *destrier* (possibly a “courser”).⁹³ The second receipt sums up forty-three horses lost by horsemen from Namur who served Robert of Namur, marshal of Brabant, during the siege of Chaligny in 1363. Here three horses are described as coursers, high value riding horses used for warfare or hunting, seven as horses, thirty as rounceys, riding horses of low value, and three as draught horses.⁹⁴

The sharp distinctions between these two groups may reflect the socio-economic status of their riders to some extent, but mainly derive from the environmental conditions in which these campaigns took place. Duke Jan III of Brabant (1312–1355) contracted Dietrich von Heinsberg (Count of Loon, 1336–1361) to serve with three hundred armoured horsemen, which entailed a force of at least six hundred horses, in the royal army of Edward III that raided through the fertile Scheldt and Sambre valleys. The horsemen of Namur served on a much smaller campaign led by the marshal of Brabant, directed against demobilized soldiers and required navigating the inhospitable Woëvre, in Lorraine. Bringing their best horses meant relatively little gain in terms of prestige at a much higher risk of loss.⁹⁵ It is noteworthy that late medieval fiscal accounts frequently note that horses had been “ridden to death.”⁹⁶

Medieval fiscal accounts also indicate that it was quite common for mounted combatants to lend or buy horses at the beginning of a campaign. This does not necessarily mean that someone did not own a horse or “warhorse,” only that he did not have a horse fit for

⁹² Ayton, *Knights and Warhorses*, 39–51; Bennett, “The Medieval Warhorse Reconsidered”; Contamine, *Guerre, état et société*, 17–20, 103–6; Davis, *The Medieval Warhorse*.

⁹³ The Wardrobe Book of William de Norwell (1338–1340) includes a compensation claim made by Dirk van Valkenburg (Thierry de Fauquemont), who also served in the English royal army in 1339. This list makes a distinction between *destriers* (*dextrarii*), coursers (*cursorii*), and horses (*equi*). Lyon, Lyon, and Lucas, *The Wardrobe Book*, 324–25; Verkooren, *Chartres*, 2: no. 667.

⁹⁴ de Raadt, “Liste des hommes.”

⁹⁵ Comparable distinctions can be observed for English warhorses serving in France or Scotland. Ayton, *Knights and Warhorses*, 194–224.

⁹⁶ Brussels, ARA, 137.01, inv. nos. 2805, 12991 (transcript Henk Beijers Archiefcollectie); Laurent, *Aachener Stadtrechnungen*, 371–72; Renes and Wessels, “Loen ende Werck,” 127–28; van Doorninck, ed., *De tocht van Jan van Blois 1371–1372*, 121.

the task at hand.⁹⁷ The accounts of lord Frank van Borselen, a close supporter of the Burgundian dynasty in Holland–Zeeland, demonstrate for instance that he bred horses on his estates, both for his own use and as gifts, but he still had to send a subordinate to buy one or multiple horses every time his bastard son went off to war in the 1460s.⁹⁸

While commanders did have a role in the supply of horses, the main responsibility lay by the combatants themselves. This was possible because in the late Middle Ages service as an armoured horseman was one of the signs of noble status.⁹⁹ In the seventeenth century mounted military service still carried such prestige that bringing a horse could be a prerequisite for being accepted into a cavalry regiment. Lambrecht Claes, a soldier in Maastricht and native from Oostham in the principality of Liège, thus sold his share of his parents' inheritance in exchange for a horse, bridle, coat, shoulder belt, and spurs in 1638.¹⁰⁰ By 1666, such practices seem to have become more exceptional, for lieutenant John Grove specified before a Rotterdam notary the conditions under which Edward Feeck, an English nobleman living in 's-Hertogenbosch, enlisted in his cavalry company. He had to supply a good horse himself, but would receive double pay and could buy his own food.¹⁰¹ Rulers also continued to call upon their fiefholders to serve in emergencies, until the last decade of the seventeenth century in France and Liège, but at that point the institution had visibly outlived its military usefulness.¹⁰²

Nevertheless, delegating most of the responsibility to the combatants themselves, or increasingly to their commanders (captains and colonels), solved only part of the horse supply problem. Horses still had to be available for purchase at an acceptable price. Differences in agrosystems—the availability of grasslands (pasture)—became a key concern. The northern part of the Meuse Region, Brabant, Holland, and Guelders, exported horses and had access to major horse raising areas in Utrecht, Frisia, and Holstein. The kingdom of France, on the other hand, was a major importer of horses from at least the fourteenth century onwards, with the Southern Netherlands and Lorraine as facilitators. In the eighteenth and nineteenth century horse breeds from the north

97 Brussels, ARA, 137.01., inv. no. 12990; Bolsée, ed., *La grande enquête*, 26–28, 31, 55, 85, 92–93, 108, 116, 128, 185, 191–93, 245, 252, 305, 307, 312, 327, 332; Herborn and Mattheier, *Die älteste Rechnung*, 45, 64; Kuppers, “De stadsrekeningen,” 128, 130, 328; Laurent, *Aachener Stadtrechnungen*, 360; Marchal, *Inventaire*, 276; Martens van Sevenhoven, “Een betalingsordonnantieboek”; Servais, *Annales historiques du Barrois*, 2:315; van Doorninck, ed., *De tocht van Jan van Blois 1371–1372*, 110–11; van Doorninck, ed., *De tocht van Jan van Blois 1362*, 122–27, 133, 172; van der Eerden-Vonk, *Raadsverdragen*, 218; Verkooren, *Inventaire*, 1: no. 467.

98 Arkenbout, Frank van Borselen, 74–75, 77–78, 195–201.

99 Girardot, *Le droit et la terre*, 2:624–26, 2:719–22; Govaerts, “Mannen van wapenen,” 307–13, 321–23; Janse, *Ridderschap*, 79–80; Paravicini, “Adelskultur Europas.”

100 Stevens, *Het land van Ham*, 3:22. See also Rotterdam, SAR, ONA, inv. no. 92, no. 272: May 23, 1628; Couvin, 1895: Act October 17, 1633; Namur, Haute Cour de Namur 392, fol. 54: Act July 28, 1614; Philippeville, 6433: Act January 28, 1659 (transcript Génémag).

101 Rotterdam, SAR, ONA, inv. no. 397, no. 340: December 1, 1666, no. 341: December 3, 1666.

102 Liège, AEL, Etats, inv. no. 2966: Reglement pour la paye generale des troupes de Son Altesse Evêque Prince de Liège, 1690; Lynn, *Giant of the Grand Siècle*, 369–71; Parrott, *Richelieu's Army*, 62–65.

were also on average larger than those of the south because the latter were raised in a more extensive way.¹⁰³

The Meuse Region's importance as a transit zone for the warhorse trade can be made clear by a document from 1389, which lists the rights of the duke of Limburg, the lord of Dalhem, and the lands of Outremeuse/Overmaas. It was written down in the context of the purchase by Philip the Bold (Duke of Burgundy, 1363–1404) of these lands from the heavily indebted Johanna of Brabant. According to this survey the duke of Limburg held the high justice on the main roads from Liège to Cologne, including the rivers Meuse and Rhine as far as he could ride a white warhorse (*blanc destrier*) into the water and still reach the bottom with his lance. Because of this obligation to safeguard the roads the duke was entitled to tax certain merchandise moving between the Meuse and Rhine, including warhorses (*destriers*).¹⁰⁴

Because of the aforementioned environmental characteristics horse smuggling became a major problem in the sixteenth century with Dutch and to a lesser extent Spanish soldiers making sustained efforts to prevent horse exports from reaching their adversaries.¹⁰⁵ Marguerite and Catherine, wives of Jean and Martin le Rosseau, even had to appeal in 1580 to the councillors of Couvin to attest to the good fame of their husbands. The brothers had bought four horses at Tongres/Tongeren, an intermediary in the long-distance horse trade between Holland and France, but were taken prisoner at Bouvignes by members of the garrison who thought that they were soldiers of a foreign potentate. Few soldiers wore uniforms at this time so there was little to distinguish them from any other armed man.¹⁰⁶

In 1691 Allied forces, which included the Dutch Republic, the Habsburg Netherlands, and the Prince-Bishopric of Liège, went a step further and devised extensive legislation to prevent horse imports from reaching the French army. Horses could only be sold in controlled circumstances, they could not be moved without a passport, and all fences and hedges had to be repaired so no horse dealer could divert from the main road.¹⁰⁷ These efforts intended to worsen their opponent's desperation for suitable mounts: earlier that year the French government had lowered the minimum height for cavalry horses from 1.50 m to 1.37 m (that is, almost 15 hands down to 13½ hands). Dragoons could take horses as small as 1.32 m (13 hands). Even though the legislation was renewed during the Spanish War of Succession (1701–1714), merchants from Brussels and Dinant

103 Bautier, "L'élevage du cheval," 68–69; Geisweit van der Netten, *Antwoord op de vraag*, 41–42; Laperche-Fournel, *L'intendance de Lorraine et Barrois*, 190; Mulliez, *Les chevaux*, 15–25, 71–82; van Leeuwen, *Geschiedenis*, 39, 48, 63, 64–65, 83; van Oebchelwitz, *De Nederlandsche stalmeester*, 50–53.

104 Quicke, "Une enquête," 359, 376.

105 Rotterdam, SAR, ONA, inv. no. 46, no. 20: October 19, 1605; inv. no. 142, no. 145: April 8, 1637; inv. no. 204, no. 201: April 24, 1643; inv. no. 390, no. 256: November 30, 1639; Borgnet, *Cartulaire*, 74–75; Douchamps-Lefèvre, *Inventaire*, 3:86, 3:221; Stradling, "Spain's Military Failure," 212–14; Verschure, *Overleven*, 66–70.

106 Wearing uniforms only became standard practice among soldiers in the second half of the seventeenth century. Couvin, 1969: Act May 31, 1580 (transcript Génomag).

107 Berkvens, *Plakkatenlijst Overkwartier*, 2:196, 2:238–39; Dibbetz, *Het Groot Militair Woordenboek*, 493–96.



Figure 28. Two Ardennes horses in the service of the French horse artillery, drawing by Hippolyte Lalaisse, 1850 (Gayot, *Atlas statistique*).

still managed to supply the French army with thousands of Dutch and German horses.¹⁰⁸ Jean-Baptiste de Colbert and his successors had sought to avoid this reliance on imports by the distribution of stallions brought in from abroad, efforts that evolved in 1717 in the creation of the *haras*, a series of depots spread throughout the countryside housing stallions for breeding. This demonstrates the government's assumption that it was the task of farmers to supply the military with low-priced horses of good quality.¹⁰⁹

The *haras* was very unpopular, appearing regularly in the 1789 *cahiers de doléances*, lists of complaints addressed in the Assemblée Nationale, because farmers felt they had to pay for the breeding of animals they did not need. The Revolutionary government consequently abolished them, only to be recreated in a reduced form by Napoleon's regime (including two in the Meuse Region: in the Ardennes and Roer departments). In the end, the problem of horse supply remained unresolved. France continued to be a major importer of horses throughout the nineteenth century. Napoleon's army managed to make good its immense losses of horses by a combination of requisitioning, purchase, and simply taking the horses of defeated enemies. Neither of these practices fundamentally changed France's structural lack of inexpensive and good cavalry mounts. The only development of note was the increased emphasis on so-called light cavalry in the late eighteenth and early nineteenth century, which led to a reappraisal of smaller indigenous horde breeds; especially from the Ardennes and Lorraine (see figure 28).¹¹⁰

108 Bogros, "Les chevaux de la cavalerie française"; de Bruijn, *De hoeve en het hart*, 237–45; de Peuter, "Paarden, geldhandel en haute finance," 351–62.

109 Mulliez, *Les chevaux*, 82–91, 106–9, 149–62, 167; van Leeuwen, *Geschiedenis*, 75–76.

110 The huge draught horses which are today closely associated with the Ardennes are the

Throughout the premodern period armed forces continued to rely on agriculture to supply them with suitable mounts, which gave major horse raising regions a significant advantage over their counterparts.

Notions of Military Professionalism

The aspiration to limit access to certain biotic communities, as well as the need to ensure a continuous supply of those living beings that constitute an army, involved very basic problems. A constant tension existed between different human actors, different kinds of combatants, especially because of the varying ability to employ organized violence, so the capacity to raise armies remained diffuse into the late eighteenth and early nineteenth centuries. Soldiers brought both order and disorder and were therefore not completely reliable as policing agents. Let us turn now to how increased distinctions between armies and society at large, conceptions of military professionalism as a code of conduct and a practical social reality, evolved as result of these issues. The establishment of the military as an institution and a principal state actor came about because of these developments.

The first element in the changing distinctions between armies and the general population, the making of “civilians,” was disarmament. In the Middle Ages every able-bodied adult male had, at least theoretically, to serve in a military context when required to do so. For that reason, they all had to own weapons and armour according to their means.¹¹¹ The accounts of Grave show, for example, that in 1438 members of the town council went from house to house to ensure that everyone owned appropriate weapons and equipment. This widespread ownership of weapons and armour created obvious concerns in terms of the maintenance of public order, but they also had an important ecological impact.¹¹²

Most missile weaponry, such as (cross)bows and guns, could be employed for both hunting and warfare. In this context the widespread adoption of gunpowder weapons from the latter Middle Ages onwards became a major issue. Medieval handguns, while not as accurate as early modern rifles, were used for hunting by the last decade of the fifteenth century at the latest.¹¹³ The close relation between ownership of guns and hunting is confirmed by a list of armed men from the district of Dinant in 1570. Numerous documents of this kind have been preserved from the sixteenth century. They originate in governments’ efforts to (re)enforce military obligations among the general popula-

descendants of horses introduced during the second half of the nineteenth century in the context of new breeding programs. Brun, “Le cheval”; Illaire et al., eds., *Les cahiers de doléances*; Le Bouvier, *Le livre*, 110; Mulliez, *Les chevaux*, 317–20; van Leeuwen, *Geschiedenis*, 99–130.

111 Registers van de Hollandse Grafelijkheid, WI 562 (online at www.ressources.huygens.knaw.nl); Tongeren, SAT, inv. no. 1, fol. 5v, fol. 42; Bormans, “Extraits des cris du péron,” 199; Gaier, “Pauvreté et armement individuel,” 153–64.

112 Grave, SLC, Archief Gemeente Grave, inv. no. 217, fol. 195v (transcript Rien van den Brand); Glaudemans, *Om die wrake wille*, 112–14, 341–42.

113 Hall, *Weapons and Warfare*, 97–99.

tion. What is noteworthy about this list is that differences in the arms carried by the men of these villages (the relative number of guns versus staff weapons) can be explained by the local availability of game. Communities with the largest area of woodlands are also those with the largest number of guns.¹¹⁴

For authorities the most obvious concern was indeed that men took advantage of their military obligations to poach or otherwise be a threat to public order. The regulations regarding the organization of the militia in the Prince-Bishopric of Liège in 1632 explicitly mention that the militiamen were under no circumstances permitted to shoot partridges, pigeons, hares, rabbits, or other game. In the district of La Mothe the weapons used by the *élus*, the men elected to provide military service, were kept in the castellan's fortress in the late sixteenth century in order to avoid misuse.¹¹⁵

Even though the military obligations of the general population were significantly reduced over time processes of disarmament were far from straightforward. One has to distinguish between the general population's contribution to rulers' or states' forces, which had by the late sixteenth century become reduced to sending manual labourers ("pioneers") and wagoners, and their continuous role in local defence. The latter included repression of unwanted migration and wolf hunting. Military obligations in a militia structure were in fact expanded during the late sixteenth and early seventeenth centuries, to deal with the problem of marauding soldiers. In the Germanic part of the Meuse Region such militias were generally denoted as "shooters" (*schutters*, *Schützen*), which suggests a link with medieval shooting guilds. These older associations continued to exist, but became submerged in larger militia structures, and more or less took over their policing role.¹¹⁶

The major turning point lay around the last decades of the seventeenth and early eighteenth centuries. At that time efforts to curtail assaults by soldiers on locals coincided with an increased emphasis on buying protection. It is useful to take the mobilization of the rural population by the French government as an example. Since 1644, attempts had been made to establish defensive lines along the Sambre and/or Meuse Rivers, mainly against raiding parties (see chap. 1). These had to be manned by villagers drawn from the area between the Meuse and Aisne Rivers. An inventory of guns owned by these men, dating to the 1740s, a list that also indicates whether someone had military experience, shows that the percentage of guns owned by former soldiers, 137 guns for 494 men, was lower than those owned by the population at large (1928 guns for 6122 men). This can be explained by the fact that gun ownership was a mark of status, being a reflection of the right to hunt. Noblemen included in this list often owned several guns. It is likely that most of the men on this list with military experience had served in

114 Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 4:109–11.

115 Hansay, "Documents inédits," 213; Polain and Bormans, *Recueil des ordonnances de la principauté de Liège*, 3:107–8; Richer, *Abrégé chronologique*, 206; Villa-Séblin Nicole, *La sénéschaussée*, 191, 230–31.

116 *La vie quotidienne dans les Ardennes*, 32–33; Borgnet, *Cartulaire*, 89–90, 221–23; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 6:238–39; Denys, *Police et sécurité*, 93–97, 118–23; Jacobs, *Justitie en politie*, 160; Verschure, *Overleven*, 222–27.

militia regiments, recruited through conscription and generally associated with a low socio-economic status.¹¹⁷

In this way, the list represents a changed relationship between armies and society. Military obligations were not abolished, they were expanded, but the emphasis was gradually moved towards service in the military, which allowed much more control from the government's viewpoint. Attempts to re-arm and mobilize all able-bodied adult males in the traditional way were certainly made during the revolutionary years and major invasions (in 1784–1787, 1790–1794, 1809, 1813, and 1830) but they all produced very mixed results, and quickly gave way to either disbandment or incorporation in military structures.¹¹⁸ Widespread ownership of arms remained both a military necessity and a threat to government control over natural resources until well into the eighteenth century. This ambiguity could not be durably solved until increasing distinctions between “military” and “civilians” made the latter's armament redundant.

Militias continued to function, despite their obvious threat to public order, in order to prevent the governments' own soldiers from pillaging the countryside. One of the reasons why these combatants proved so difficult to manage was their special status in contemporary justice systems. This gave them, or at least created a perception, of impunity. The high bailiff of 's-Hertogenbosch, for instance, declared in his account from 1423–1424 that he did not punish two malefactors to the full extent of the law because they had served the duke regularly, and lived “on the borders of the realm” (*de palen van de lande*).¹¹⁹ The pressing need for men willing to serve in an armed capacity thus has direct repercussions on the maintenance of law and order.

Military justice in the proper sense of the word developed from the late fifteenth century onwards and had a direct impact on the capability of authorities to arrest soldiers. The High Bailiff of 's-Hertogenbosch explicitly stated in 1508–1509 that he was only able to fine a culprit because he was a soldier.¹²⁰ It also had a major influence on environmental crimes. A court record of Breust, dating to 1684, includes several witness statements regarding a certain Jan Lindekens and his son. The latter had been arrested for cutting wood illegally in the lordship of Rijkholt. After his release he became a soldier in Maastricht and used this status as a pretext for walking around armed and shooting the forester's pigeons. Given that no statements of the offender(s) themselves are included, it is conceivable that the son's military status shielded him from arrest. Authorities for their part were not completely powerless to pursue military offenders. In 1702 for instance the lord of Rekem started a lawsuit against Renier Schrammen because he had

117 Corvisier, *L'Armée française*, 1:197–251; Desbrière, *Chronique critique*, 30–31, 224–25, 230, 267–70.

118 Maastricht, RHCL, 04.01, inv. no. 18; Leconte, *La Révolution brabançonne dans le duché de Limbourg*; Rosendaal, *Tot nut van Nederland*, 41–53, 164–76, 197–208; Sabron, *De oorlog*, 2:12–14; Terlinden, *Les souvenirs historiques*, 81–105; Wanty, *Le Milieu militaire belge*, 10–16.

119 Brussels, ARA, 137.01, inv. no. 12990, fol. 179 (transcript Henk Beijers Archiefcollectie).

120 Brussels, ARA, 137.01, inv. no. 12996. See also Boonen, “Repressie van vaandelvluchtige soldaten,” 30, 36, 41, 43, 46; Storrs, “Military Justice”; Verreycken, *Pour nous servir en l'armée*, 110–14, 188–99; Wilson, “Early Modern German Military Justice.”

cut wood on the village's lands and attempted to have his belongings confiscated. The latter, who served as a soldier in Maastricht, claimed that only a military court could judge him.¹²¹ The impression that soldiers could transgress environmental laws with relative impunity is confirmed by the repeated assertions in the Habsburg Netherlands that military privileges did not apply when it concerned hunting offences.¹²²

Another issue, of no less importance, is to what extent such environmental crimes were perceived as important within a military context. The high bailiffs of 's-Hertogenbosch fined a mere three combatants for environmental crimes over the course of more than one hundred and fifty years. One man was fined fifty *gulden* in 1495–1496 for multiple offences: fighting, threats, cutting down shrubs and a young nut tree, draining a pond and stealing the fish while serving with soldiers in the County of Loon. A soldier received a fine of six *gulden* in 1512–1513 for shooting an arrow in a beer barrel and cutting some willow branches for firewood, and one of his colleagues had to pay twenty *gulden* in 1514–1515 for *garden* (or *gaerden*, *garten*, that is, pillaging or begging in a violent manner) and cutting some oaks managed as coppice wood.¹²³

Military officers, who were fond of hunting themselves, probably considered these offences above all as a form of insubordination. The garrison orders of Namur regularly mention that it was forbidden to fish in specific locations and that offenders were liable to lose their fishing equipment as well as risking some sort of undefined punishment. Nevertheless, they provide very few explicit references to the enforcement of these orders: one soldier had to ride the “wooden horse” for an hour in 1716 and two soldiers had to run the gauntlet seven times up and down in 1742.¹²⁴ Given that the latter punishment was carried out a month after one of the governor's prohibitions, they were probably being made an example of. A 1704 court record from the Dutch army similarly concerns a trooper, Willem Moens from Tongres/Tongereren, who had intercourse with a mare. The sentence leaves no doubt about the heinous character of the crime and the need to punish it accordingly, by executing and burning both man and horse, but it is still striking how it emphasizes that this soldier had transgressed the regulations on military discipline in particular (it was his captain's horse).¹²⁵

The military court of Namur, which processed 2805 cases between 1815 and 1851, only considered two explicitly environmental crimes: two soldiers cutting wood in a royal forest in 1818, and a soldier who cut down trees and damaged fences in 1839.

121 Hasselt, RAH, Schepenbank Rekem, inv. no. 938; Maastricht, RHCL, 01.176 Schepenbank Breust, inv. no. 1491. See also Bouvignes, 1340: Act August 25, 1649 (transcript Généamag).

122 Berkvens, *Plakkatenlijst Overkwartier*, 2:223; Lelièvre, “De la juridiction militaire,” 133–34.

123 There are also a few entries about stealing horses or other livestock. Brussels, ARA, 1107 Rekeningen Hoogschout 's-Hertogenbosch, inv. nos. 12995, 12996.

124 The wooden horse is a punishment device in the shape of a horse with a sharp back on which the offender has to sit. It is typically located near the main guardhouse on the parading grounds. It might be a common punishment for this kind of offence since the main character of the semi-fictional *Simplicius Simplicissimus* (in the mid-seventeenth century) was also punished in this way. The Hague, NA, Raad van State, inv. no. 2081, August 12, 1716, July 15, 1742, August 16, 1742; von Grimmshausen, *Der Abentheurliche Simplicissimus Teutsch*, bk. 4, chap. 9.

125 The Hague, NA, Hoge Krijgsraad, inv. no. 262: Trial Willem Moens.

Military authorities could also hardly claim to have played a proactive role: forest guards arrested the former offenders, and the *gendarmerie* the latter.¹²⁶ Military regulations from at least the fifteenth century onwards encompassed a wide range of environmental crimes: cutting down woody plants, damaging gardens or fields, and shooting pigeons or rabbits, but if these were dealt with at all it would likely have been in a way that does not find reflection in military court records. One solution to this problem could be to examine monthly reports, which have been preserved for some eighteenth-century regiments and note minor punishments, but these too do not indicate a concern for environmental crimes.¹²⁷

Archives of nineteenth-century military courts have the advantage that they included excerpts of a soldier's *livre de punition*, a list of earlier offences including those that did not involve a court martial. Louis Eeckhout, for example, deserted from the Belgian army in 1844 and joined the French Foreign Legion, but came back after his five-year enlistment. This was a fairly common practice at that time.¹²⁸ His records indicate that he received twenty-seven minor punishments in little more than five years before deserting. These included eight days' confinement for throwing stones at a citizen's apple tree, and another fifteen for breaking out of prison (the *cachot*) and stealing fruit from an enclosed garden.¹²⁹

In this context the military court of Namur seems to have been surprisingly lenient towards the two German soldiers who cut down trees in 1818, claiming in effect that the minutes only provided sufficient evidence for the soldiers hacking down one tree with their sabres, not the other twelve firs the forest guards found felled. The defendants were consequently condemned to eight days in prison and the costs of the trial. The soldier arrested by the *gendarmerie* by contrast was punished more severely (one month's detention), but he had also been drunk and had caused a public outcry.¹³⁰ Military justice in general was therefore not particularly concerned with repressing environmental offenders.

Soldiers were not solely perpetrators. They were both enforcers and lawbreakers. Growing distinctions between armies and general society in 1250–1850 originated in the difficulty of enforcing military obligations as well as concerns about the maintenance of public order. Men who derived their main income from military service there-

126 Namur, AEN, Conseil de Guerre Provincial, inv. nos. 227, 1424.

127 Liège, AEL, Conseil Privé, 2634: Report from the regiment Royal Liégeois (French service) regarding punishments given in December 1788. *Militair Wetboek*, articles 175–182; *Reglements et ordonnances du roy pour les gens de guerre*, 9:228 (August 28, 1695); Berkvens, *Plakkatenlijst Overkwartier*, 2:249; Bikar, "Aperçus de l'état militaire," 239–44; de Laurière et al., eds., *Ordonnances des rois de France*, 13:307–8; Rase, Maréchal and Bodart, *Inventaire*, 23–84; Rorive, *Les misères de la guerre*, 344; Teunisse, *Onderdaan in Oranje's oorlog*, 29.

128 Bastin, *La justice militaire*, 186–88.

129 Eeckhout might have come into conflict with the Belgian military justice system again, for he became a French citizen in 1862, when serving as a grenadier corporal in the French Foreign Legion. Namur, AEN, Conseil de Guerre Provincial, inv. no. 2678; *Bulletin des lois de l'empire français*, *XIe série*, 20:267.

130 Namur, AEN, Conseil de Guerre Provincial, inv. nos. 227, 1424.

fore gradually came to dominate an army's combat element from the Late Middle Ages onwards. The fifteenth century saw the creation of the first permanent military units in the Meuse Region: the famous *bandes d'ordonnance*. These were mostly mounted troops of noble origin. The transformation of these first units into the large standing forces of modern states is a core theme in the history of early modern Europe. This book specifically analyzes to what extent changes in the organization of military service influenced biotic communities.¹³¹

The growing emphasis on permanent armies came to a certain degree at the cost of the combatants themselves, as demonstrated by the detailed accounts of the castle of Blitterswijk near Venlo in 1584–1591. The local steward paid nine soldiers in 1584 to serve as guards, a number gradually reduced to two. As argued earlier, these men did not constitute a garrison, but fulfilled analogous roles to medieval sentinels and watchmen, officials that are notably absent from the accounts.¹³² The towns of Dordrecht and Sedan also retained soldiers in their pay and they patrolled the city and enforced the council's police regulations during the sixteenth century. These men received different wages: either three or four *brabantse gulden* a month. It is a well-known feature of sixteenth-century armies that private soldiers could receive different pay rates depending on their equipment and/or experience.¹³³

By 1586 only three soldiers were left, including one earning higher pay. He had to accept a uniform pay rate, but got two pair of shoes in return. More importantly is that this man performed all kinds of chores to complement his income: as a hunter, builder, miller, and field warden.¹³⁴ This is not an isolated incidence, but a reflection of processes occurring all over the Meuse Region. A considerable part of the ecological impacts of soldiers included in this study—working on fortifications, gathering or selling wood, and fishing—originate in these processes of standardization which lowered their social status.¹³⁵ A watchman certainly performed comparable chores in Venlo as early as 1386–1387, namely making fences and repairing roads, but the status of these officials was much lower than that of medieval soldiers. In fourteenth-century Aachen, *Soldeneren*, who invariably served mounted, earned ten to twenty-five times the wages of a watchman.¹³⁶

Soldiers who performed their service well could conversely be rewarded in a way that was of direct significance to the policing of biotic communities. In 1418 Jan IV, Duke of Brabant (1415–1427), allowed Carselis de Eupen, who occupied the post of forer in the duchy of Limburg since 1411, to retain his function until the duke repaid his debts. These arrears had a military origin: de Eupen already appeared briefly in the previous chapter when his men garrisoned the fortress of Argenteau in 1411, and his

131 Contamine, *Guerre, état et société*, 278–90; Guillaume, *Histoire des bandes d'ordonnance*.

132 Dreiskämper, "Thonis Ongewassen en Johan Copper," 184, 190.

133 *Informacie up de staet faculteyt ende gelegentheyt*, 515; Philippoteaux, "Gages des soldats."

134 Dreiskämper, "Thonis Ongewassen en Johan Copper," 184, 190.

135 Bas van Bavel, *The Invisible Hand*, 177–206; Burschel, *Söldner*, 38–44; Swart, "From Landsknecht to 'Soldier'"; von Grimmelshausen, *Der Abentheurliche Simplicissimus Teutsch*, bk. 4, chap. 9.

136 de Groot, *Stadsrekeningen*, 1386 fol. 7, 1387 fol. 20; Laurent, *Aachener Stadtrechnungen*, 9, 218–19, 249, 256–57, 260, 314.

father had been taken prisoner at the battle of Baesweiler (1371). Apparently, the family had, after more than forty years, still not received full compensation for losses suffered at this famous debacle.¹³⁷

These medieval notions of service were expanded from the sixteenth century onwards in response to changing social realities. On January 10, 1559, for example, the governor of Chimay appointed a certain Yzaye Fauquesseau as forest warden. This man served as “archer” (heavy cavalryman) in the company of the prince of Chimay, part of the *bandes d’ordonnances*, but he also owned land in the area (Baileux). The prince thus rewarded a subject for his loyal military service by assigning him to a different kind of service, by making him a functionary with a central role in the management of his natural resources. Given the special status of these units, most soldiers did not have to remain with their company in peacetime, he did not even have to give up his military role, and he was still denoted as archer in 1563.¹³⁸

During the early modern period former soldiers were gradually perceived as particularly appropriate candidates for serving in other government functions, particularly if these involved arms. The bailiff of Kempenland, for instance, declared in 1651 that all his field wardens were former cavalrymen of the Dutch army, apparently because he could not find suitable candidates among the local villagers. This can be explained by the recent takeover of the mostly Catholic northern part of the Duchy of Brabant by the Dutch Republic, which required all state officials to be Protestant. At the same time it is emblematic for the position of soldiers as one of the oldest and most prominent servants of the state, which made them a model for other branches of government.¹³⁹

By the eighteenth century military service had clearly become a desirable experience for police officials, for it gets explicitly stated in candidates’ records. Former soldiers also constituted a significant minority among customs officials at that time. In 1825 the Netherlands government established an official list of government functions preferably given to former members of the military, including prison guard, servant of the provost (*stokkenknecht*), engineer with the department of water management, lock keeper, porter, provost, exciseman, mailman, and gamekeeper. The nineteenth-century French government also employed officials called *gardes forestiers de la marine* who had nothing to do with forest protection as such, but whose work involved selecting trees suitable for shipbuilding. They were recruited among members of the militarized craftsmen who built warships.¹⁴⁰

137 Govaerts, “Mannen van wapenen,” 302–6, 318–19; Yans, *Histoire économique*, 89–91.

138 Carnets du Major Lebrun 1507–Baileux 39 rouge 3m, p. 2: Act April 19, 1563; 24 rouge 2 X Pairie de Chimay, p. 91: Act January 10, 1559 (transcript Génémag); Guillaume, *Histoire des bandes d’ordonnance*, 104, 199. See also Bois, *Les anciens soldats*, 299–300; Burschel, *Söldner*, 276; Gresser, *La gruerie*, 144–51; Manning, *Hunters and Poachers*, 28.

139 ’s-Hertogenbosch, BHIC, 178 Resoluties Raad van State, inv. no. 187, fol. 822v; Hagen, *Van “Crouwaetz gewelt” tot “Fransche brandt”*, 18–20.

140 Bosch, *De nationale waterstaatsdienst*, 131–36; Denys, *Police et sécurité*, 82–85; Hardenberg, *Overzicht der voornaamste bepalingen*, 2:253–54; Piraux and Dorban, eds., *Douane, commerce et fraude*, 132–33; Tellès d’Acosta, *Instruction sur les bois de marine et autres*, 221–22.



Figure 29. Arrest of a poacher (1813–1839), lithograph based on a painting by Horace Vernet. Note that the forest guard has only one arm (Art Institute of Chicago, 1927.5653).

The general idea behind these practices was to solve three problems at once: reward soldiers for their service, reduce violence while they are vagrant by helping discharged veterans find employment, and gain loyal subordinates (see figure 29). In practice, the situation was far more complex, partially because soldiers were not necessarily motivated to serve in these capacities and partially because they were not paid very well. The town of Maaseik, for example, appointed a new field warden on April 2, 1782. His nomination explicitly mentions that he was a former soldier to the point of naming his regiment, an Imperial unit. Three months later the town had to find a replacement because the man had enlisted again, this time in the Spanish army.¹⁴¹ The recruitment of reliable field guards, the nineteenth-century successors to these wardens, also proved particularly difficult because of their low pay.¹⁴² Still, a list of former soldiers resident in Maaseik, dating to 1815, reveals that three police officials (a field guard, *agent de police*, and guard of the fisheries) all had military experience.¹⁴³

141 Maaseik, Stadsarchief, Oud archief, Magistrale Rol, fol. 91: Stadsrekening 1782–1783; Boonen, *Misdaad en straf*, 21–22.

142 Maastricht, RHCL, 04.01., inv. no. 30: letter of the mayor of Rutten (Tongres/Tongeren), March 22, 1814; *Receuil général des lois et ordonnances*, 11 (1841), 462; Kort, *Bromsnor in Zeeland*, 39–43, 50–56, 115–21; Parmentier, *Pays de Charleroi*, 268–69.

143 Maastricht, RHCL, 04.01., inv. no. 124.

The uncertainty whether these men really were the models of discipline and loyalty that their military service supposedly guaranteed was an even more serious issue from the government's viewpoint. Cutting down wood in the forest of Rekem, meant to prepare Maastricht for an imminent Allied siege in December 1813 (see chap. 3), was considerably delayed because Lambert-Henri-François Frantzen, head of the forestry department and nominally in charge of the operation, was absent for several days. It is possible that his specific background, rising to officer's rank in the revolutionary years without prior military experience, did not qualify him as the prototype of a disciplined soldier. His second-in-command, who took charge of the operation, had served Napoleon as a non-commissioned officer and initially asked the prefect for a position as a court clerk.¹⁴⁴ Yet it is significant that an 1804 attempt to establish a French veteran camp near Jülich, based on Roman examples, also had to drop its military aspects because the veterans wanted to become ordinary farmers.¹⁴⁵

Armies evidently had an important function in the policing of biotic communities during the premodern period. Still, incessant conflicts continued between the military as an organization that gradually came to represent the state and the ongoing ability of the general population to provide armed service, often in order to repress soldiers' own disorderly behaviour. This paradox eventually contributed to the rise of organizations that controlled both members of the military and civilians, still built on ideas about rewarding military service and cultivating a specific image about military professionalism. The best known of these organizations is the French *gendarmerie*, created in 1791 through a reorganization of the *maréchaussée*.

The *maréchaussée* was a medieval institution, founded in the fourteenth-century kingdom of France to deal with marauding soldiers within a changing context of military justice. Their creation was directly connected to the function of provost, the official specifically tasked with maintaining order among army members. This rather quickly evolved into a general obligation to provide safety on the road and the organization lost its specific association with warfare by the seventeenth century.¹⁴⁶ A major reform in 1720, not coincidentally the same period that saw the consolidation of France's permanent armed forces, militarized the organization. It adopted uniforms, a strict hierarchy, and serving in the military became a prerequisite for obtaining an officer's commission. The French government expanded its military aspects during subsequent reforms, with the requirement of prior military service being extended to all ranks.¹⁴⁷

144 Maastricht, RHCL, Frans Archief, inv. no. 613: letter July 17, 1811; inv. no. 1177: letter December 21, 1813; 04.01, inv. no. 30: Lists of former soldiers receiving pensions; Terlinden, *Les souvenirs historiques*, 123.

145 Woloch, *The French Veteran*, 232–46. See also Meyrac, *Traditions*, 324.

146 For the role of the *prévôt des maréchaux*, see Bouvignes, 1197: Act May 21, 1495 (transcript Génomag). Brouillet, "La maréchaussée des origines à 1720"; Smolar-Meynard, *La justice ducale*, 356–61.

147 Emsley, *Gendarmes*; lung, "La maréchaussée de Lorraine et Barrois"; Lorgnier, *Maréchaussée*, 1:89–102.

It is easily overlooked, because of its later success, that the *maréchaussée* was just one of several examples during the eighteenth century. In the Habsburg Netherlands the armed followings of the *prévôt général*, the high bailiffs, and the forester of Brabant, were militarized as well at the turn of the seventeenth and the eighteenth century. In late eighteenth-century Jülich and briefly also Liège cavalymen patrolled the countryside. These resembled the French *maréchaussée* in many ways, but prior military service was not a precondition for entry.¹⁴⁸ One can consider these horsemen as a sort of intermediary for they also adopted the green uniforms typical of police officials in other parts of the Holy Roman Empire. The use of the colour green reflects the hunter origin of today's German police forces. In the Thirty Years War the Swedish government had drafted its gamekeepers and forest wardens into special units that acted as military police, a practice that then quickly spread to nearby German territories, notably Hessen and Prussia (the military *Jäger*).¹⁴⁹

A major issue proved to be the need to maintain a balance between the cultivation of military ideals and these units' role in policing. Looking specifically at one unit, the *flanqueurs-chasseurs* of Napoleon's Guard, illustrates this dilemma. The regiment was formed in 1812 and recruited hunters and/or woodsmen. Relatives of forest guards were especially encouraged to volunteer by promising them a position in the forestry department. The unit's personnel records show that a hundred and twenty-nine soldiers from the Meuse Region, and more specifically the *départements* with large areas of woodlands (the Ardennes, Meuse, and Roer) enlisted. The relative precision of military records from the Napoleonic period is of note here, because the professions of these men rarely point to a direct relationship with forests. It is the professions of their fathers, rarely included in earlier records, which makes all the difference (forty-four soldiers were indeed sons of forest guards). After the disastrous Russian campaign only nine of the original hundred and twenty-nine remained. They were consequently replaced with conscripts, which effectively put an end to the unit's special status. Napoleon did not draft any serving forest guards, so the forestry department continued to function, but the loss of so many potential successors and family members likely affected it in other ways.¹⁵⁰

It is significant that the *maréchaussée/gendarmerie*, which eventually became the formula adopted throughout the Meuse Region, emphasized difference from regular military units. In terms of activities, they were in many ways remarkably similar to their medieval and early modern predecessors. A series of reports from the company *maréchaussee*¹⁵¹ stationed in the province of Liège (1816–1830) suggest an emphasis on arresting deserters, vagabonds, thieves, and so forth, with references to poachers or

148 Balace, "La maréchaussée"; Emsley, *Gendarmes*, 13–36, 149–54; Goblet d'Alviella, *Histoire des bois et forêts*, 2:30–31; Reiche, *Vom bewaffneten Hausmann zum Polizisten*; van Belle, *Le premier projet de police*, 15–23, 191–202.

149 Murk, "Rekrutierung und Ausbildung," 109–10; Nyrén, "Riksjägmästarambetet."

150 Vincennes, SHD, GR 20Yc99: Contrôles Régiment de flanqueurs chasseurs. For the insistence that the *Landdragoner* in the duchy of Jülich would not come under control of the military, see Reiche, *Vom bewaffneten Hausmann zum Polizisten*, 67–68, 76–78.

151 The newly founded kingdom of the Netherlands (1815–1830) adopted the name *marechaussee*

woodcutters being quite rare (thirteen arrests in fifteen years). Environmental crimes only appear when members of the company intervened on behalf of forest or field guards or during exceptionally cold winter months, when large numbers of people were desperate for firewood. This is very much in line with the official policy of serving as support and supervisors of forest and fields guards.¹⁵²

One of the oldest reports, from April 1816, is exceptional because it states that multiple nightly patrols conducted by the company put an end to the frequent thefts of wood in royal forests. It also specified that citizens refused to do their guard duty and that public officials set a bad example. In other words, the *maréchaussee* interfered because normal protection mechanisms were ineffective. This should be seen in the context of two regime changes in less than two years. The archives of the forestry department in fact include a complaint about the inhabitants of Malmédy taking advantage of the presence of Prussian soldiers in 1814 to plunder state forests. In this way the interference of this specific kind of armed force had to resolve the disarray brought about by disturbances caused by other armies.¹⁵³ This demonstrates the military police's core function as a controlling mechanism for both the military and the general population.

Conclusion

Protecting fauna and flora is hardly a prerogative of modern armies or of today's conceptions of nature, since the role of armed forces in the safeguarding of biotic communities is well attested from the Middle Ages onwards. Their contribution derives from the inherent connection between armies and organized violence. The precise ways in which armies intervened transformed markedly over the course of six centuries and demonstrate, more explicitly than any other chapter, how changing conceptions of what an army is or should be influenced the interactions between these groups and ecological systems. Distinctions between different kinds of organized violence (military versus police) or armed forces and society at large (military versus civilians), which are considered normal today, originated in these developments.

The essential characteristic of the Meuse Region from the thirteenth to the nineteenth centuries was one where soldiers gradually became the dominant type of combatant, but other forms of military service were not entirely abolished. This stimulated the formation of a group of people who depended on military wages as a primary source of income. They became both key actors in ongoing processes of state formation, and a constant source of problems, a paradox that was, from the governments' point of view, not satisfactory resolved until the nineteenth century.

instead of *gendarmerie* because of the latter's association with the French Revolution and Napoleon's regime.

152 Liège, AEL, Fonds Hollandais, inv. no. 800; Delguste-Van Der Kaa, *Histoire des loups*, 89–92; Emsley, *Gendarmes*, 53–62, 91–92, 96, 109–10, 112; lung, "La maréchaussée de Lorraine et Barrois," 355–79.

153 Liège, AEL, Fonds Hollandais, inv. nos. 396, 800.

Part Three

PATHOGENS

Chapter 5

ARMY HEALTH

Armies as a Hazard to Public Health

On July 5, 1847 the French *Chambre des députés* became the scene of an important parliamentary debate, concerning peacetime mortality in the French armed forces. Representative Desjobert started the discussion by arguing that the death-rate in the military in peacetime significantly exceeded that of comparable age-groups in the general population. The Minister of War and another general denied the claim. The debate eventually ended inconclusively but serves as a powerful symbol that contemporaries were well aware that armed forces lost far more men to environmental factors, mainly diseases, than to enemy action.¹

A consensus exists among historians that warfare not only caused important health issues, including the spread of epidemics, but also stimulated significant changes in medical practices, from wound treatment to inoculation. Because of this perceived dialectic relationship, the narrative of progress, the slow ascendancy of “modernity,” is particularly strong in studies about the history of military medicine.² It notably builds on the assumption that medieval armies did not take basic measures of disease prevention and lacked well-educated medical practitioners.³ The Parisian anecdote above reveals that nineteenth-century armies still had to cope with serious health issues.

The study of military health has a long history since it is rooted in the writings of army doctors themselves, who examined as early as the eighteenth and nineteenth century past occurrences of epidemics. By the First World War the connection between warfare and epidemics had become firmly established.⁴ Exchanges between medical and environmental history, however, are a far more recent phenomenon. Historians have traditionally placed their main emphasis on European troops in tropical contexts, environments to which they proved particularly vulnerable, and ship crews on long sea voyages. Hospitals and wounds have also benefited from far more attention than mechanisms of disease prevention.⁵ The findings of battlefield excavations have in fact become increasingly important for the study of military medicine in historical contexts during the last decades.⁶

1 *Discours prononcés par M. Desjobert.*

2 Gabriel and Metz, *A History*; Garrison, *Notes*; Hargreaves, “The Long Road”; Smallman-Raynor and Cliff, *War Epidemics*, 32–40.

3 Gabriel and Metz, *A History*, 1:205–10, 2:143–54; Garrison, *Notes*, 85–97; Vollmuth, *Die sanitätsdienstliche Versorgung*, 117–18. For a different view, see Geltner, “In the Camp and on the March.”

4 Heizmann, “Military Sanitation”; Hirsch, *Geographical and Historical Pathology*; Prinzing, *Epidemics*.

5 Lenihan, *Fluxes, Fevers, and Fighting Men*; McNeill, *Mosquito Empires*; Mitchell, *Medicine*; Mounier-Kuhn, *Chirurgie de guerre*; van Meerbeeck, “Service sanitaire”; Wagner, *Die Seuchen*.

6 See for instance Meller, ed., *Schlachtfeldarchäologie*.

The current chapter questions this idea of progress by considering the changes in the ways members of an army sought to preserve their health within a larger spectrum of ecological interactions. The term “pathogens,” disease-producing microorganisms or materials, refers to the lowest level in ecological systems, that between species and individual organisms. Rather than assume that medieval armies remained apathetic towards epidemics and that soldiers became increasingly aware of the importance of prophylactic or preventative healthcare during the Renaissance or subsequent centuries, it considers whether changes in the organization of armies themselves made them more vulnerable to ecological pressures. Significant medical developments eventually occurred, but these changes might have been more evolutionary than revolutionary and could furthermore have been brought about by a steady deterioration of military health over time.

The main theoretical framework underpinning military health practices throughout the 1250–1850 period remained in effect that of Hippocrates and Galen. The Greek physician Hippocrates (who lived in the fifth to fourth centuries BCE) is traditionally credited with formulating the idea that pestilential or corrupt air (miasmas) produced disease for the first time in a European context. The Roman doctor Galen (from the second century CE) considerably expanded this theory and connected susceptibility to “bad air” to the balance of humours in the body. The four humours are black bile, yellow bile, phlegm, and blood. According to humoral theory any imbalance in these four substances can cause disease. In order to remain healthy, one had to maintain equilibrium between the six non-naturals (air, motion and exercise, sleeping and waking, food and drink, excretion, and passions/emotions) for these influenced the four humours.⁷

Furthermore, there remained a strong continuity in the functions attributed to various kinds of medical practitioners. From the Central Middle Ages until the early nineteenth century strict divisions existed between physicians on the one hand and surgeons on the other. Physicians were mainly concerned with disease, or their patients’ interior health, and followed a university education. Surgeons by contrast set bones and dressed wounds, a trade most of them learned as apprentices. Aside from physicians and surgeons, there were also barbers or barber-surgeons, skilled in shaving and bloodletting. This provided them with a basic knowledge of the treatment of wounds. Attaching medical practitioners, invariably surgeons or barber-surgeons, to specific military units only became general practice during the sixteenth century. We know that physicians, university-educated surgeons, and pharmacists, all served as members of a ruler’s or commander’s household (an army’s “general staff”) during the Middle Ages. They continued to do so during the early modern period but were from the sixteenth century onwards also attached to military hospitals. The majority of medical practitioners actually present with armed forces in the field were therefore surgeons and barber-surgeons.⁸

The maintenance of army health on the most basic level did not involve either medical practitioners or miasmas, but simply resolved around defence against environmen-

⁷ Jouanna, *Greek Medicine*, 119–36.

⁸ Howard, *Napoleon’s Doctors*, 5–18; Kerkhoff, “Over de geneeskundige verzorging,” 49–59; Vollmuth, *Die sanitätsdienstliche Versorgung*.

tal pressures. Reading the “ego documents” left by army members, particularly those written by private soldiers, provides a stringent reminder of the omnipresence of inclement weather and climate. These ecological impacts had a major, but in historical studies somewhat neglected, effect on military health. Hendrik Conscience, a seventeen-year-old volunteer with the Belgian army in 1831, still vividly remembered in 1858 how he spent his first night in the open field and that he immediately fell sick.⁹ While earlier centuries might lack the prevalence of such personal testimonies, they are by no means absent. As early as the fourteenth century, the poet Eustache Deschamps, who participated in the French invasion of Guelders (1388), recorded his experiences (see chap. 1). An anonymous gunner from Utrecht who fought with the imperial army during the 1554 campaign in the Meuse valley mentioned in his journal that on the night of October 26 three soldiers froze to death when standing guard. The French engineer de Vauban included a note in his account of the 1692 siege of Namur that the trenches were constantly full of water because of the incessant rain.¹⁰

Chronicles and fiscal accounts can be very informative as well and provide a more detached perspective. Melis Stoke's chronicle, dating to the early fourteenth century, records for instance that Haarlem lost its warship in the Meuse estuary during a storm. The prior of St.-Jakob's hospital in Tongres/Tongeren, on the other hand, corroborated the observations of the aforementioned gunner when he noted that imperial troops passed by in 1552 “with running noses and with chattering teeth, and many were very sick and died like dogs.”¹¹ In November 1585 the town of Weert had to accommodate twenty-six Spanish soldiers arriving from the Bommelerwaard with frozen feet. For several of these men help came too late.¹²

While armed forces certainly took seasonal fluctuations, and general weather circumstances, seriously (there being examples of medieval mounted raids being cancelled because of heavy rain), one should not go so far as to assume that they never campaigned before late spring and always stopped fighting in late fall.¹³ In some cases continuing military action, despite such environmental constraints, could bring a commander significant advantages. In 1386 the presence of a strong west wind encouraged the urban militia of Brussels to lead an assault on Grave. One chronicle claims that they thought incendiary missiles would be more effective, another asserts that dust clouds

⁹ Conscience, *De omwenteling*, 54–57.

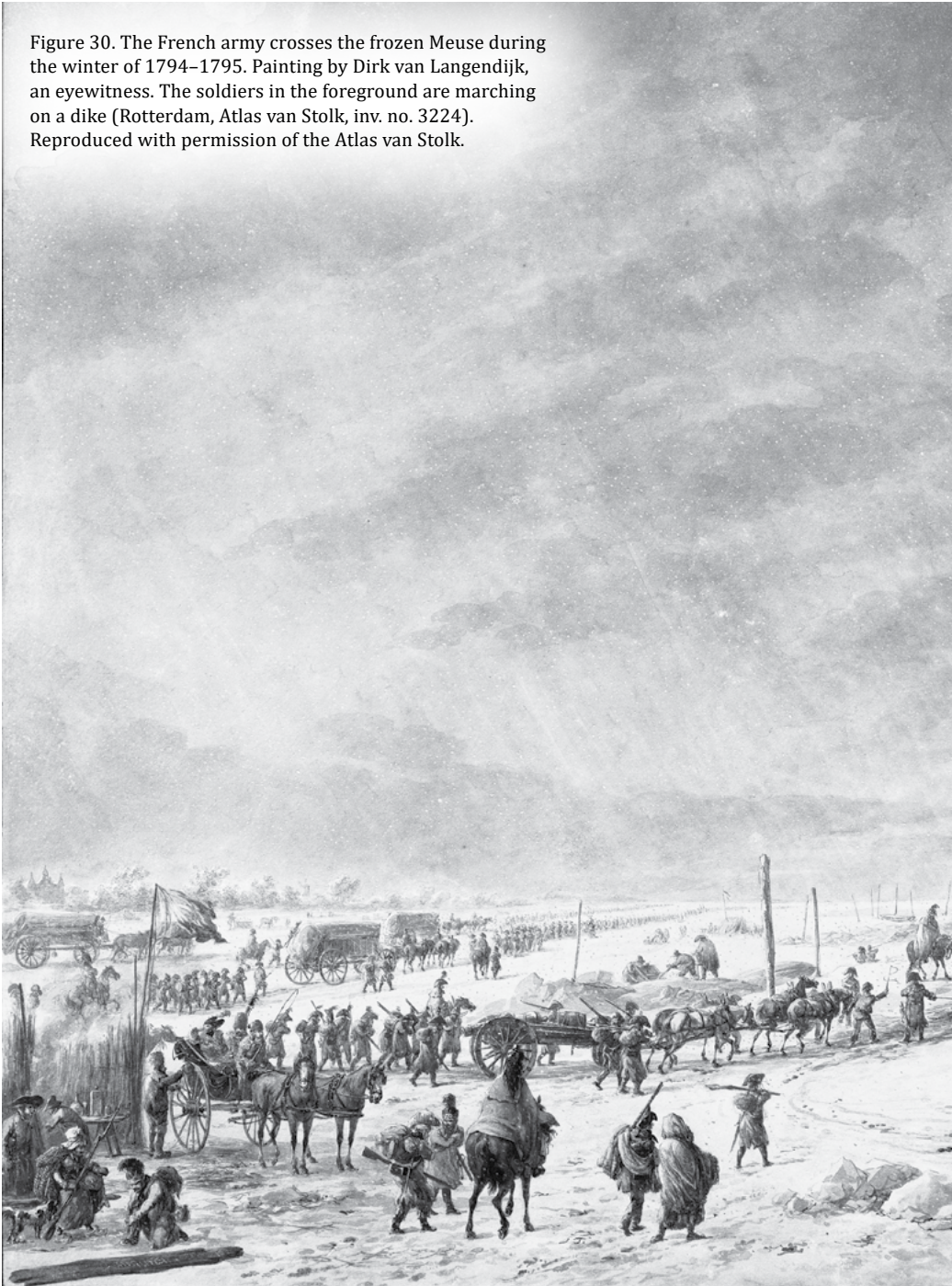
¹⁰ Deschamps, *Oeuvres*, 1:123–24, 3:24–26, 5:121–22; de Vauban, *Journal*, 139, 153; Macaré, ed., “Dagverhaal,” 284, 303–4. See also de Rabutin, *Commentaires*, 1:164; d'Haynin, *Mémoires*, 1:131, 1:145, 1:158, 1:217, 1:221, and 2:85; Duyck, *Journal*; Hexham, *A Journal*; Jacquet-Ladrier, “Les mésaventures,” 85; Laukhard, *Leben und Schicksale*, 3:106, 3:110, 3:122, 3:123, 3:130, 3:140, 3:141; Vallée and Pariset, eds., *Carnet*, 7, 57; Peters, ed., *Peter Hagendorf*, 62; von Adlersfels-Ballestrem, ed., *Memoiren*, 12.

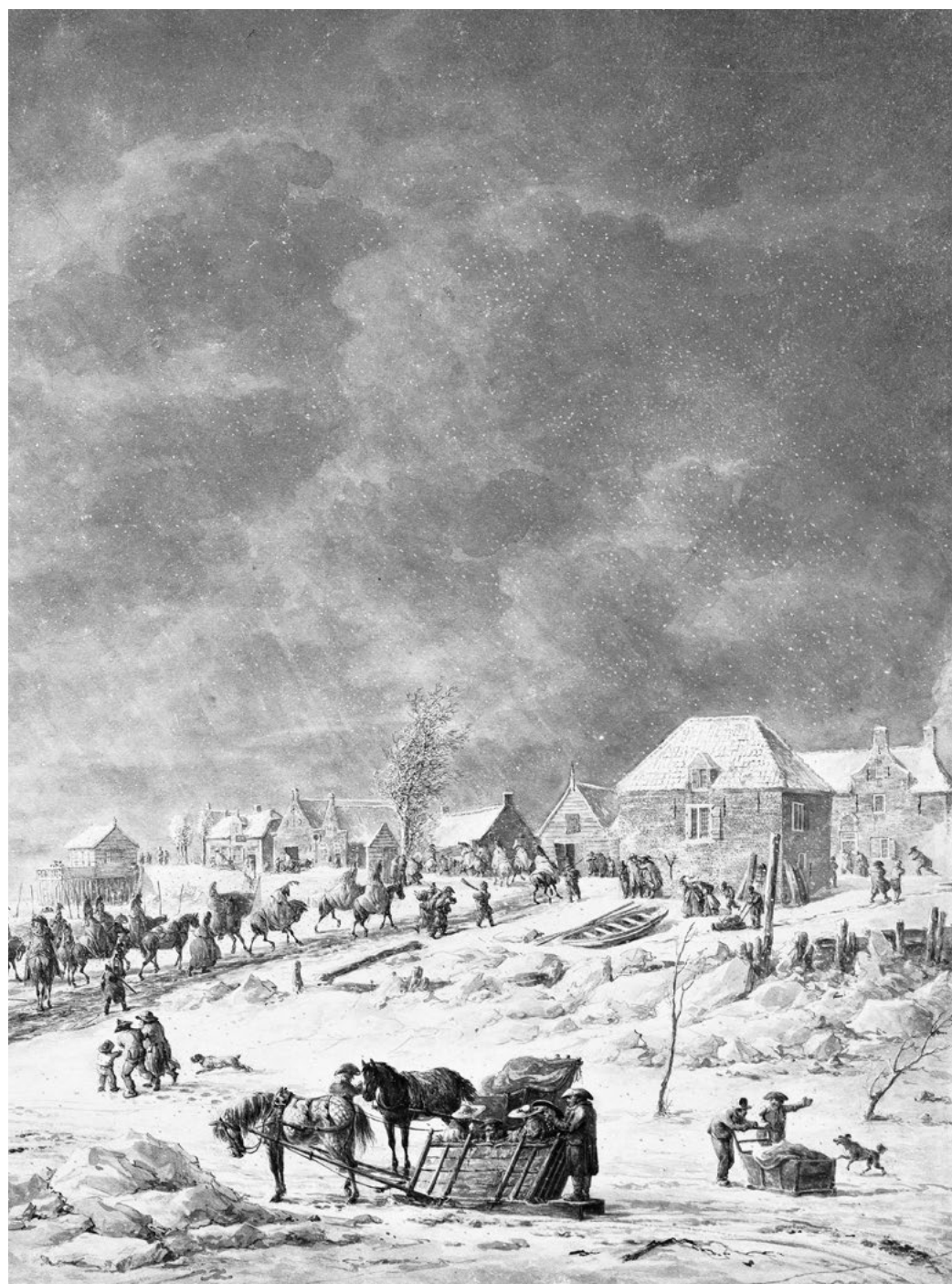
¹¹ Stoke, *Rijmkroniek*, vv. 590–608 (<http://resources.huygens.knaw.nl/rijmkroniek>); Vandewal, “De kroniek,” 235, 241. See also de Stavelot, *Chronique*, 112; Kraus, *Regesten*, vol. 6, no. 827.

¹² This would have shortly before Dutch troops breached the dikes and isolated the Spanish infantry on an island in the Meuse (see fig. 22 above). Klaversma, *Weert tussen 1062 en 1602*, 217.

¹³ van Boendale, *Brabantsche yeesten*, 2:348 (bk. 6, vv. 10110–10114 and 10125–10128); Buisman, *Duizend jaar wind, weer en water 1300–1450*, 577.

Figure 30. The French army crosses the frozen Meuse during the winter of 1794–1795. Painting by Dirk van Langendijk, an eyewitness. The soldiers in the foreground are marching on a dike (Rotterdam, Atlas van Stolk, inv. no. 3224). Reproduced with permission of the Atlas van Stolk.





would blind the defenders (possibly referring to the river dunes and drift sands near the city). Whatever the advantages the gale might have brought, their attack ultimately failed.¹⁴ The French *Armée du Nord* was more fortunate during the winter of 1794–1795. The freezing of the Meuse and other major rivers nullified the defensive value of the Hollandic Water Line and allowed the French army to invade the republic's heartland (see figure 30). It is noteworthy that H. A. Sabron, captain in the Dutch general staff, published tables with mean temperatures as early as 1893 to demonstrate that extremely cold temperatures hampered the republic's defensive efforts.¹⁵

The rapid collapse of the Dutch defence in 1795 confirms Dagomar Degroot's conclusion that climate changes were "a catalyst for, but rarely a cause of, military victories and defeats."¹⁶ It is the combination of environmental pressures and a society's range of adaptive strategies, which are based on earlier experiences and existing developments, that really matters (see also chap. 3). We know that the Dutch army suffered from a range of structural problems in the late eighteenth century, which prevented it from responding adequately to its French enemies. The Dutch traditionally relied on large numbers of foreign soldiers, for example, which worked well during the Eighty Years War but caused significant difficulties during the eighteenth century, because they gradually lost access to their traditional recruiting grounds.¹⁷ The renewed interest in weather and climate does have the merit, however, of placing armies' well-known vulnerability to disease in perspective. It shows that military health concerns cannot be limited to hygiene awareness.

The ways that armies sought to protect themselves from the elements might seem rudimentary, but they fulfilled a key role in health preservation. The construction of huts, made from straw and wood, sometimes with linen and possibly added with moss, remained common on campaign up to the nineteenth century. Such huts appear on late medieval miniatures, seventeenth-century sketches or paintings, and photographs of the camp of Beverlo.¹⁸ Tents were of course preferable but were also quite expensive. During the Middle Ages they were consequently mainly restricted to noble retinues and urban militias. According to the accounts of Dordrecht from 1283–1287 the tents of the urban militia were washed and then stored in a church after they returned from a military campaign.¹⁹ It is only towards the end of the seventeenth century that using tents became the norm for all armed forces. The Prussian marshal von Natzmer, who served in the Dutch army in the

14 de Dynter, *Chronique*, 3:113–14; van Boendale, *Brabantsche yeeften*, 2:280–83 (bk. 6, vv. 8127–8215).

15 Sabron, *De oorlog*, 2; the tables are published on pages 32–33 of the attachments (*bijlagen*).

16 Degroot, *The Frigid Golden Age*, 195. See also more generally chap. 3 on disturbances.

17 *Essai sur l'armée hollandaise*, van Nimwegen, *De Republiek*.

18 Desbrière, *Chronique critique*, 50; de Solemne, *La Charge du Mareschal des Logis*, 21; Martin and Russon, *Vivre sous la tente*, 196–200; Richer, *Abrégé chronologique*, 212; Spaans, "Legerkampen," 171–73; Weuts, *Honderdvijftig jaar kamp van Beverlo*, 18–20.

19 Bolsée, ed., *La grande enquête*, 87–88, 279; Burgers and Dijkhof, eds., *De oudste stadsrekeningen*, 10, 23, 24, 44–46, 55, 57, 63, 72; Martin and Russon, *Vivre sous la tente*, 184–96.

1670s, recalled in his memoirs that he still had to construct such huts and that they needed to be of uniform appearance, even though they were broken down again the very next day.²⁰

The issuing and repairing of clothing and shoes should be seen in a similar light. The accounts of Aachen specify that it paid a shoemaker to repair the footwear of citizens taking part in military expeditions during the fourteenth century.²¹ More than four centuries later (1788) a list of recruits of the Royal Liégeois regiment, assembled in Liège before their march to their new garrison in Givet, reveals that several of these men not only received a money bounty but also a new pair of shoes.²² The most common measure taken to preserve the wellbeing of horses was likewise the repairing or reshodding of horseshoes. In 1378 the prévôt of Chiny rewarded a village farrier for shoeing the horses of his followers, mobilized fiefholders. This force, sufficiently large since this task took eight days, apparently did not include a farrier. From the sixteenth century onwards farriers appear regularly on muster rolls, which suggests that their enlistment became standard practice around this time.²³

Guards and sentries were even more vulnerable to the elements, as suggested by the accounts of the high bailiff of Montfort from 1397–1398. These mention that the fortress's sentries received wool or fur trimmed cloaks. Urban accounts likewise include references to the construction or repairing of guardhouses, later made famous in the paintings of the Dutch Golden Age.²⁴ The accounts from the town of Geldern (1387/88) mention the making of arrow slits in one of these. They must have been common in fortresses as well, for the chronicler Petrus Treckpoel claimed that a gunner shot down the guardhouse from the main tower during the siege of the fortress of Reydt near Mönchengladbach (1464), so that the feathers of the sentinel's bed "flew around as if it has snowed."²⁵ Eighteenth-century garrison regulations were more specific and ruled that a soldier only had to stand guard for two hours at a time, or one hour during the winter months.²⁶

20 Dibbetz, *Het Groot Militair Woordenboek*, 300, 613; Melder, *Korte en klare instructie*, 72–73; von Adlersfels-Ballestrem, ed., *Memoiren*, 12.

21 Laurent, *Aachener Stadtrechnungen*, 278, 279, 281.

22 Brussels, CDMRA, Ancien Régime, inv. no. II/20.

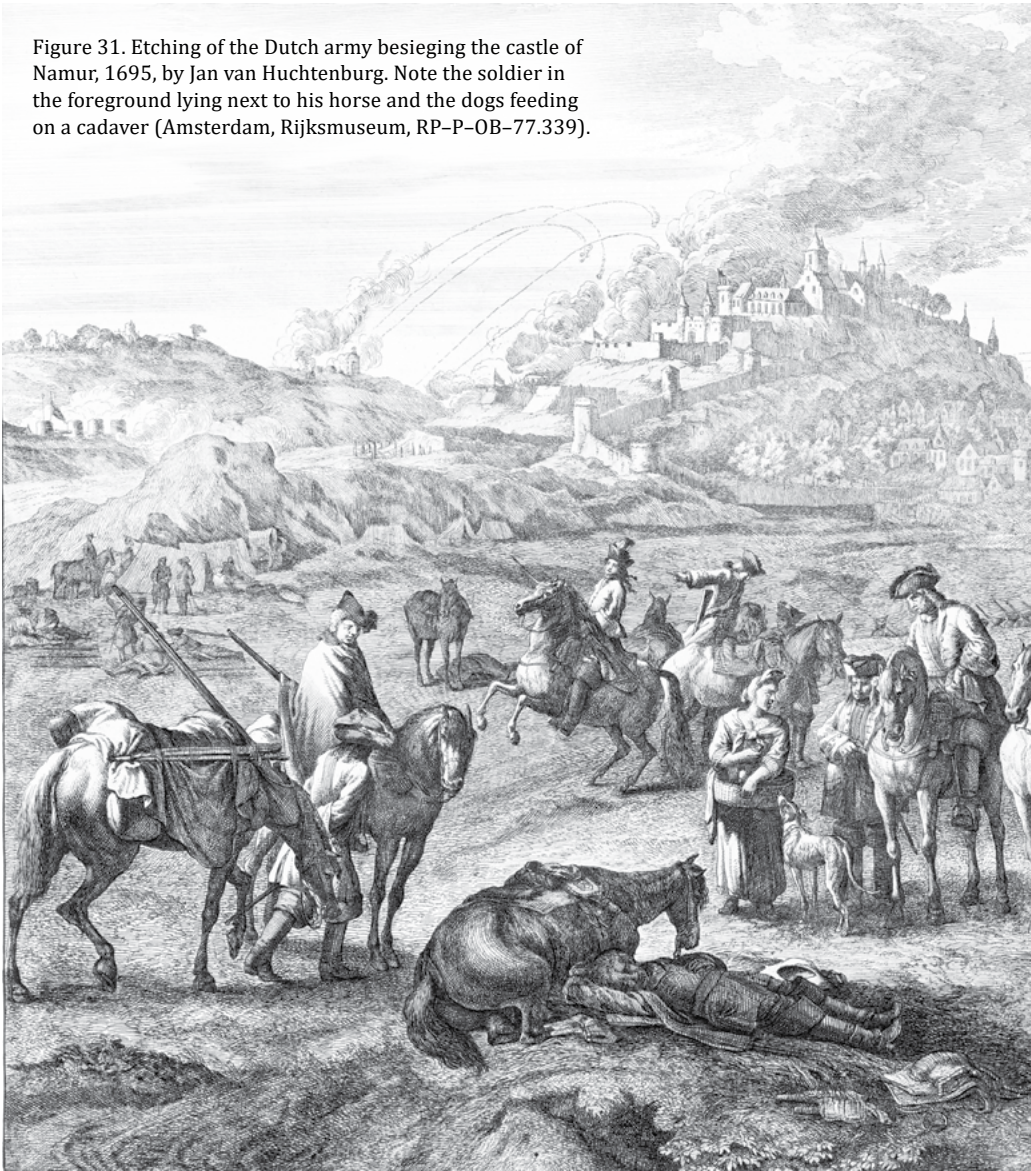
23 Liège, AEL, Etats, inv. no. 2965: Muster roll of two hundred horsemen led by captain de Cortenbach, 1552; Liégeois, "Compte de la recette de Chiny," 158, 162. See also Boffa, *Warfare*, 164; de Keralio, Lacuée, and Servan, *Encyclopédie méthodique. Art militaire*, 1:589–97; Laurent, *Aachener Stadtrechnungen*, 292.

24 Archiv Haus Welbergen, inv. no. 754: Accounts city of Goch, 1626–1677, fol. 63; Grave, SLC, Archief Gemeente Grave, inv. no. 217, fols. 7v, 46r, 122r, 133r, 193v, 227r, and inv. no. 218, fols. 15v, 52r, 72v–73v (transcripts Rien van den Brand); Gentenaar and Hupperetz, "Personeel en werkzaamheden," 202; Renes and Wessels, "Loen ende Werck," 113; Rosen, *Soldiers at Leisure*.

25 Koppers, ed., "De stadsrekeningen," 9, 11, 14, 22, 28; Paquay, "Kroniek der Luiksche Oorlogen," 207.

26 The Hague, NA, Raad van State, inv. no. 2079: Orders November 31, 1715, December 22, 1716; inv. no. 2081: January 8, 1739; Vincennes, SHD, GR, 2Xy09: Germain Vincent dit Parisien; *Reglement en orders Maastricht (1786)*, art. 36; Bovy, *Promenades*, 1:76–77.

Figure 31. Etching of the Dutch army besieging the castle of Namur, 1695, by Jan van Huchtenburg. Note the soldier in the foreground lying next to his horse and the dogs feeding on a cadaver (Amsterdam, Rijksmuseum, RP-P-OB-77.339).



The emphasis on environmental pressures is imperative because it provides an ecological context for the spread of actual epidemics. Given the traditional image of medieval armies as being too ill-equipped to enforce basic hygiene standards, one would expect references to the latter to be bountiful. In practice relatively few sources explicitly comment on epidemics, or fear thereof, in a military context before the late fifteenth or sixteenth centuries. Emond de Dynter's description of Duke Antoine of Brabant's failed attempt to besiege Dordrecht in 1418 does not remark on anyone falling ill, but he



did admit, nonetheless, that citizens from Dordrecht took members of the ducal household prisoner when they returned by boat because of sickness.²⁷ A claim for compensation made by Engelbert of Nassau, lord of Breda, regarding losses suffered in ducal service, reveals that the Brabant army had to conduct a desperate fighting retreat on foot towards Geertruidenberg, and that fifteen of his own followers, of a contingent total-

27 De Dynter, *Chronique*, 3:806–8.

ling about fifty-five horsemen, were taken prisoner. The account also notes that most of them were captured when the ship carrying his retinue's equipment was overwhelmed. It is unclear, however, whether all of these men were also sick, for at least three of them were not combatants (a cook, clerk, and surgeon).²⁸

Medieval fiscal accounts, which give evidence about all kinds of expenses made during military campaigns, only mention the purchase of medicine for individual horses and provide no indication that massive numbers of men or animals were struck down by disease.²⁹ A major inquest from 1389 lists seventy-five cases of individuals or groups of men fined by officials of Duchess Johanna of Brabant, because they left the army prematurely during one of the sieges of Grave (in 1386 and 1388). Thirteen of these provided an excuse: seven claimed poverty or lack of pay, two were wounded, and four were sick. Of the latter only one gave a detailed statement: he was a man-at-arms who fell ill in 1386 when he reached Bladel near Eindhoven, that is before he had even left the duchy, and sent his bastard brother to serve in his place in 1388, because he had still not recovered. His illness might therefore have had nothing to do with camp life. Several other people also claimed exemption from military service because of sickness.³⁰

Historical research regarding medieval military medicine has neglected to point out that unambiguous references to epidemics or epizootics come from very specific circumstances, unrepresentative for warfare in general: sieges and extended campaigns in different environmental contexts (such as the crusades or the imperial campaigns in Italy).³¹ The poet Jan van Heelen, for instance, did not comment on the presence of disease during Jan I of Brabant's campaigns between the Meuse and Rhine in the 1280s, but devoted several lines to nine prominent knights killed by an epidemic during the Aragonese Crusade (1284–1285); apparently even the duke himself had to fear for his life.³² This inclusion of the Aragon campaign is significant because Jean de Meun's famous criticism that the armies of Latin Christendom lacked the basic hygiene of their Byzantine, Muslim, and Mongolian counterparts in his 1284 translation of Vegetius, also originates in such experiences.³³

Many historians of medicine thus assume that since armies in recent centuries suffered from epidemics, these must have been at least as commonplace in medieval times. Such a belief does not take changes in armies or warfare into account, or the fact that some diseases may have evolved significantly over time. This issue is further complicated by the difficult identification of specific illnesses in a historical context. Sixteenth- and seventeenth-century chronicles or ego documents that comment on epidemics in

²⁸ Juten, "Engelbrecht I van Nassau," 27–33.

²⁹ Brussels, ARA, 137.01, inv. no. 12991; van Doorninck, ed., *De tocht van Jan van Blois 1371–1372*, 32, 62, 63, 76–77, 87.

³⁰ Bolsée, ed., *La grande enquête*, 26, 95, 220, 324.

³¹ Bradbury, *The Medieval Siege*, 83; Decourt, "Paludisme"; Martin and Russon, *Vivre sous la tente*, 226–28; Mitchell, Stern, and Tepper, "Dysentery"; Prinzing, *Epidemics*, 12–15; Wagner, *Die Seuchen*.

³² Boffa, "Les soutiens militaires," 17–18; van Helen, *Rymkronyk*, 102–4.

³³ Richardot, *Végèce et la culture militaire*, 167–68.

a military context often refer to any epidemic disease as “plague.”³⁴ Sick soldiers do appear regularly in prints and paintings, but these images rarely allow an identification of specific diseases (see figure 31). A detailed breakdown of mortality causes for 4232 soldiers from the Jemappes department (in the Belgian Hainaut) in 1798–1814, based on billets for hospital admittance, shows that 64.4 percent died from “fevers,” without further specification.³⁵ These are just afflictions that caused someone’s death.

The association between venereal disease and soldiers became well established during the major outbreak of syphilis in the 1490s. It reached the Meuse Region by 1497–1498 at the latest. Up to the nineteenth century exact distinctions between syphilis and other venereal diseases remain vague, however.³⁶ According to overviews of hospital admittance for Napoleonic soldiers in the “Belgian” departments more than one in five patients was admitted because of a venereal disease. Statistics of “syphilis” published around the middle of the nineteenth century indicate that it affected more than ten percent of the French, Dutch, and Belgian armies. In the Dutch navy approximately a quarter of the personnel suffered from such ailments.³⁷

What the sources do show is that the vulnerability of army members to diseases was not a simple reflection of their awareness of hygiene, or a lack thereof. Insects have a very important role in disease transmission within military contexts: lice spread typhus, mosquitos malaria, and house flies dysentery, trachoma, and typhoid. The house fly prefers horse manure for breeding, an environment that could be found in large quantities near armed forces and it causes disease by transferring bacteria from its breeding place to human food. It is also worth noting that the insects themselves are not responsible for epidemic outbreaks, they simply act as vectors for the bacteria that actually produce disease in humans or animals. This means that epidemics or epizootics mainly occur in very specific environmental circumstances: when the presence of both pathogens and vectors is combined with human and animal bodies that have been weakened by stress, lack of proper food, and insufficient shelter.

The fear of marshes and “marsh fevers,” for example, is expressed as early as the fifth century CE in Vegetius’s famous treatise on military matters, which served as the main military handbook throughout the Middle Ages.³⁸ These “marsh fevers” might refer to one or several diseases, but it is likely that they included malaria, spread by mosquitos of the *Anopheles* genus. The parasites of the *Plasmodium* genus, which cause malaria, are not native to the North Sea area, but became established there in Antiquity or the Early Middle Ages. It is possible that Roman or Frankish armies played a role in their trans-

34 Burschel, *Söldner*, 258–68; de Graaf, *Oorlog*, 498–500; Leboutte, “D’Austerlitz à Liège,” 442–45; Mitchell, *Medicine*, 209–19; Mitchell, “Retrospective Diagnosis.”

35 Darquenne, *La conscription*, 244–68.

36 Burschel, *Söldner*, 260; Garrison, *Notes*, 108–9; Schmitz-Cliever, “Pest und pestilenzialische Krankheiten,” 135.

37 Darquenne, *La conscription*, 244–46; Haneveld and van Royen, *Vrij van zichtbare gebreken*, 184–85; Hirsch, *Geographical and Historical Pathology*, 2:70.

38 Vegetius, *De re militari*, bk. 3; Allmand, *The De Re Militari of Vegetius*.

mission.³⁹ Pliny the Elder, who might have been involved in the construction of a canal between the Meuse and Rhine while serving as an officer on the Roman Rhine frontier in the first century CE, records that a spring in the lands of the Tungri, possibly near Tongres/Tongerren, cured tertian fevers. Malaria remained endemic in the northern part of the Meuse Region, the Meuse–Rhine estuary and the Campine/Kempen, until the late nineteenth or even twentieth century.⁴⁰

Local inhabitants would have been to some degree immune to the disease, given its prevalence, but this did not apply to soldiers originating from elsewhere. The death of massive numbers of British soldiers who campaigned in the Campine/Kempen during the Austrian War of Succession (1740–1748) led to two major publications on army health by John Pringle and Jacob Grainger. Both connected epidemics of intermittent fevers among British soldiers to the marshes or inundations near Heusden and 's-Hertogenbosch.⁴¹ These floodings were just a temporary phenomenon, but since military defence in the shape of individual fortifications and the Hollandic Water Line necessitated that large stretches of land remained waterlogged they also preserved an ideal habitat for mosquitos over a long-term period. The government of Charleroi did in fact note in 1795 the difficulty of removing stagnant water from the fields inundated by the garrison.⁴² Fifty years later the infamous “fevers of Beverlo” kept medical circles in Belgium occupied. The publications of these doctors connected the “miasmas” coming from marshes near the camp with summer heat, in other words circumstances that allowed members of the *Anopheles* genus to thrive. In this case assembling soldiers from all over the country to train in a wilderness had unintended results.⁴³

The relative scarcity of information on epidemics in a medieval military context is therefore not just related to the nature of the sources, but also to army members' growing vulnerability to disease. Armies grew in size (with forces of tens of thousands of people becoming more common), which caused major logistical difficulties, their members were drawn from a larger area than before, and they were more likely to move into different disease environments. It is hardly a coincidence that references to epidemics spread by armed forces increase from the late fifteenth century onwards. Because soldiers regularly switched garrisons they kept getting exposed to different pathogens. Imperial troops coming back from the Hungarian front in 1566–1567 brought the “Hungarian Disease” or typhus to Western Europe. The Danube region served as a reservoir for spreading typhus during subsequent centuries as well.⁴⁴

39 Hoffmann, *An Environmental History*, 299–302; Newfield, “Malaria.”

40 Pliny the Elder, *Naturalis Historia*, bk. 31, chap. 8; Devos, “Malaria,” 205–8; Haneveld and van Royen, *Vrij van zichtbare gebreken*, 107, 218–20; Kort and Raczynski-Henk, “The Fossa Corbulonis”; van Nispen, *Willemstad*, 67.

41 Grainger, *Historia febris anomala Batavae*, 20; Hirsch, *Geographical and Historical Pathology*, 1:218; Kerkhoff, “Over de geneeskundige verzorging,” 67; Pringle, *Observations*, 53, 62–67, 101, 170–77; Wittmann, “Verhandeling,” 105–10.

42 Parmentier, *Pays de Charleroi*, 92; van Mastrigt, *Willemstad Prinsheerlijk*, 197.

43 Delameillieure, “Het kamp van Beverlo,” 92–93; Devos, “Malaria,” 210–14, 218.

44 Agoston, “Rivers, Forests and Forts,” 77–78; Garrison, *Notes*, 130–31; Prinzing, *Epidemics*,

Another illuminating example of this internationalization is the spread of ophthalmia or trachoma in the early nineteenth century. Blindness was not unknown in military contexts, but chronicles rarely specify why a certain individual became blind. Jacques de Hemricourt, for example, mentioned the participation of two blind noblemen at the battle of Donmartin (1325), one of whom was even knighted before the battle.⁴⁵ In 1799–1801, however, trachoma, a disease endemic in many parts of Egypt, infected invading French soldiers on a massive scale. This bacterial infection was highly contagious and is traditionally seen as the main cause for ophthalmic epidemics that affected European armies in subsequent decades, but it became especially virulent in the Netherlands and Belgian military. In 1826 almost ten percent of the soldiers in the Netherlands army suffered from this ailment.⁴⁶ We may infer that morbidity rates in medieval armed forces might have been far lower than traditionally assumed, while a relative growth in army size made their early modern counterparts more vulnerable to disease.

The chronological changes observed within armies themselves were mirrored in their relations with society at large. From the late sixteenth century onwards, chronicles and parish records increasingly referred to a general perception that armies spread disease. In 1553 the mayor of Bouvignes wrote to his counterpart in Namur: “Where the Spanish infantry has stayed, people die quickly.” The parish records from Burtscheid near Aachen likewise specified in 1629 that someone died from the “Hungarian or military disease” (typhus).⁴⁷ The expressions “camp fever” and “army fever” are also significant in themselves.⁴⁸ The medieval evidence by contrast is far more ambiguous, the lasting connection between syphilis and soldiers being the major exception.⁴⁹

In order to evaluate the perceived association between armies and the spread of disease, a distinction has to be made between the direct and indirect impact of armed forces. The former will be studied first. The people and animals that composed an army could simply spread disease by transporting pathogens in their bodies over hundreds or even thousands of kilometres: from one theatre of war to the next. A councillor’s act

22–24; Schmitz-Cliever, “Pest und pestilenzialische Krankheiten,” 132–35, 139–40; Zinsser, *Rats, Lice and History*, 266–77.

⁴⁵ Bellwald, “Das Augenleiden”; Masson, “La guerre,” 435, 437.

⁴⁶ Haneveld and van Royen, *Vrij van zichtbare gebreken*, 212–14; Howard, *Napoleon’s Doctors*, 209–10; Vandendriessche, “Ophthalmia,” 49, 54–55; Vleminckx and van Mons, *Essai sur l’ophtalmie*, 7–8, 15.

⁴⁷ Jacquet-Ladrier, “Les épidémies de peste,” 125; Schmitz-Cliever, “Pest und pestilenzialische Krankheiten,” 150–51.

⁴⁸ *La vie quotidienne dans les Ardennes*, 30; Corvisier, *L’Armée française*, 2:670–71; Gutmann, *War and Rural Life*, 164–66; Jacob, *Bruyères*, 53–56; Martin, *Une guerre de trente ans*, 211–15; Miart, “La population,” 130, 137–38; Richer, *Abrégé chronologique*, 150, 195–96; Verschure, *Overleven*, 232–33, 286.

⁴⁹ The infamous Black Death certainly made assembling armies and waging warfare more difficult, for example by the relative impoverishment of families living nobly, but armies did not have a significant role in its spread through the Meuse Region. Hans Ditrich has in fact recently suggested that the role of the siege of Caffa (1346) in the spread of *Yersinia pestis* to Europe, is overstated. Ditrich, “The Transmission.” See also Newfield, “Early Medieval Epizootics,” 98–100.

from Couvin, dating to 1598, indicates that the citizens prepared to resist with force of arms the entrance of troops suspected of bringing disease. The town of Tilburg similarly paid a soldier suspected of carrying “the plague” in 1603 so he would move on to a neighbouring village.⁵⁰ Troops led by Ernst von Mansfeld (a bastard son of the count mentioned in chap. 3) and Johann von Werth brought respectively typhus and the plague to the Meuse Region in 1622 and 1636.⁵¹

Especially devastating were those instances where epidemics and epizootics struck more or less simultaneously. Winand Mengels, a farmer living near Maastricht, wrote in his chronicle that the French army started to suffer from a disease with symptoms that resemble those of dysentery in 1747–1748. The villagers attributed the unknown disease to eating unripe fruit, but then they started to suffer from it too.⁵² To make matters worse, the invaders also brought a cattle disease with them. The French army was more reliant on oxen and mules as draught animals than its opponents because horses were more difficult to procure (see chap. 4). A similar epizootic struck the Prince-Bishopric of Liège in 1711–1714, and it is quite possible that in this case too warfare was the crucial factor. The parish priest of Sibret, in the Duchy of Luxemburg, likewise declared in 1656 that an epizootic struck flocks of sheep in 1636, the very year that Imperial troops invaded the area, so that almost no sheep were left.⁵³

The relative growth in the size of armed forces facilitated this spread of epidemics and epizootics. In the Middle Ages soldiers often lodged in inns or taverns, as shown by fourteenth-century accounts. The *Roman of Heinric and Margriete van Limborch*, from the same period, tells us that one of the protagonists had difficulty finding a room because the town where he was staying was filled with soldiers.⁵⁴ From the sixteenth century onwards individual soldiers had to be billeted in private houses due to lack of space. Seventeenth-century court records from Namur reveal that some inhabitants even kept a room for exactly this purpose.⁵⁵ Massive building programmes during the eighteenth and nineteenth centuries eventually ensured that soldiers lived in barracks and received care in military hospitals, but this only applied to garrison towns. In 1779 imperial soldiers returning to the Austrian Netherlands from the Bohemian front during the Bavarian War of Succession (1778–1779) spread dysentery along the routes of their marches. The aforementioned ophthalmia quickly spread to Belgium’s civilian popula-

50 Couvin, 1976 (transcript Généamag); Verschure, *Overleven*, 286.

51 Adriaenssen, *Staatsvormend geweld*, 274–75; Engelen, “Stokkem,” 45–46, 84–85; Gutmann, *War and Rural Life*, 152–56; Kayser, “Le phénomène épidémique,” 76–77; Klinkenberg, “Dye quade siecte,” 274–75; Mertens, “Oorlog, epidemie en emigratie,” 129–32; Miart, “La population,” 144, 146–53; Schmitz-Cliever, “Pest und pestilenzialische Krankheiten,” 141–44.

52 De Harzé, “Manuscrit,” 275; Mengels, *Chronyk*, 46–47, 55–62.

53 Boonen, *Ziekten en genezers*, 89; Daenen, “Bijgelovig volk en ziek vee”; de Saxe, *Mes Rêveries*, 153–54; Jakob, *Bruyères*, 117; Rouché, “Journal de l’entrée,” note 24.

54 Gaier, “L’approvisionnement,” 565; van Aken, *Roman van Heinric en Margriete van Limborch*, (bk. 5, vv. 967–968).

55 de Graaf, *Oorlog*, 364; Douxchamps-Lefèvre, *Inventaire*, 4:86; Gutmann, *War and Rural Life*, 37–38; van Ryckenroy, *Kroniek*, 197.

tion in the 1830s because military doctors sent infected soldiers home, expecting they would recover faster that way.⁵⁶

The caring for sick or wounded soldiers remained in fact to a large degree the responsibility of the general population, especially those of large urban environments, which had the infrastructure to organize hospitals or could provide access to existing ones.⁵⁷ Huy obtained permission in 1690 and 1691 to assemble sick soldiers in a hospital located far way from the town centre. Apparently, some citizens had already died as a result of contamination, and the soldiers' waste increased the chance that epidemics would spread. During the siege of 1695 the Carmelites of Namur likewise cared for wounded soldiers and buried the deceased in their garden (a practice attested archaeologically at Tongres/Tongerren).⁵⁸

The indirect role of armies in spreading disease was more ambiguous but at least as significant. In ecological terms an army of several thousand people functioned as a town on the move, a town that proved to be particularly demanding in terms of food and shelter and infringed on other people's entitlements. The spread of epidemics would at the very least have been stimulated by the destruction or confiscation of crops and general impoverishment.⁵⁹ On September 28, 1794, for instance, the governor of Grave instructed its citizens to procure provisions for two months or leave the city, in preparation for the coming siege. By December 12 many citizens had ran out of food and asked the governor to distribute some from the military depots. The governor argued that the two-month limit only applied to the actual investment of the city, which had started on October 20, and refused to accede to their demands. The freezing of the water in the moats finally forced him to surrender on December 30.⁶⁰

Fear in itself further deteriorated the health of those unfortunate enough to be living in warfare-affected areas (see chap. 3). The accounts from 1636 of the *prévôt* of La Marche, in the Duchy of Bar, speak of villagers dying in the woods where they had sought refuge. In that same invasion year, the high bailiff of Stokkem gathered testimonies from villagers and the parish priest from Opoeteren who had hidden for weeks in ditches, hedges, woods, marshes, stables, and barns after the taking of their *schans* (fort). The city council of 's-Hertogenbosch had to warn its citizens in 1794 not to stay in their cellars for days on end, for fear of bombardments, because of the resulting stench.⁶¹ Quen-

56 Bruneel, "L'épidémie," 208–13; Vandendriessche, "Ophthalmia," 49.

57 de Cauwer, *Tranen van bloed*, 183–84; Engelen, "Stokkem," 228–29; Kerkhoff, "Over de geneeskundige verzorging."

58 Creemers and Vanderhoeven, "Archeologische Kroniek," 317; Jacquet-Ladrier, "Vivre à Namur en temps de guerre," 176, 187; Rorive, *Les misères de la guerre*, 117–22.

59 Adriaenssen, *Staatsvormend geweld*, 274–75; Colombier, *Préceptes*, 368–80; de Cauwer, *Tranen van bloed*, 234–35; Felsenhart, "L'invasion," 349; Gutmann, *War and Rural Life*, 36–39, 166–68; Outram, "The Socio-Economic Relations," 164–74; Patist, *Het beleg van de stad Grave*, 39, 82; van der Heijden and Sanders, eds., *De levensloop*, 226; van Ryckenroy, *Kroniek*, 137, 148, 155–57, 159, 164–65, 172–73.

60 Sabron, *De oorlog*, 2:61, 2:67, 2:74.

61 Cuppens, "Opoeteren," 85–96; Jakob, *Bruyères*, 105; Marchal, *Inventaire*, 348; Mommers, "De

tin Outram has in fact argued that the worst wartime crises in mortality happened when relations between armies and societies at large deteriorated into violence with flows of distress migration resulting.⁶²

The perceived relationship between armies and epidemics was, however, not clear-cut. Armies did not inevitably bring disease and epidemics occurred in peace- as well as wartime. Historical studies have repeatedly emphasized the role of weather and climate as significant factors in explaining patterns of disease. The aforementioned Imperial forces led by von Mansfeld and von Werth did not come from just anywhere, but respectively Bohemia and the Palatinate, areas especially heavily affected during the Thirty Years War.⁶³ The Prussian invasion of France in 1792 serves as a reminder of how a combination of adverse weather (incessant rainfall) and terrain (the Argonne) could break even an army famous for its *Reinlichkeit* ("cleanliness"), with dysentery outbreaks and lice–flea infections as a result. We are fortunate to have access to two eyewitness accounts written by common soldiers, one by the Prussian infantryman Laukhard, the other by the French dragoon Marquant. Both provide vivid descriptions of the disorderly Prussian retreat after the battle of Valmy, which left a trail of abandoned cannons, wagons, and horse cadavers behind.⁶⁴

Up till this point we have assessed the vulnerability of armies to the weather, epidemics, and their involuntary spread of pathogens. Still, armies could also deliberately seek to affect their opponent's health without the use of arms. Biological warfare is defined here as the use of pathogens or toxins of biological origin to affect human, animal, or plant health during conflicts. The study of biological warfare in a historical context is far from unproblematic because it has a strong connotation of being an unethical, or at least unconventional, way to fight. It presents a methodological problem insofar as the very success of these tactics often depends on secrecy. Most of the sources examined here therefore indicate a fear of biological warfare, rather than unambiguous evidence of intention.⁶⁵

One of the most common examples presented in historical studies of biological warfare is the throwing of human or animal corpses into a besieged fortress. This was a gruesome, but probably relatively rare, alternative to a far more common tactic: throwing excrement. The chronicles of de Dynter and Froissart both mention that a besieging force led by the duke of Brabant threw cadavers into Grave during the siege of 1388.⁶⁶ Urban militias from Liège besieging Argenteau in 1347 by contrast threw stones, earthen pots with melted iron, and burning metal into the fortress and when this did

gezondheidstoestand," 74; Ritter, "Verhandeling," 15; Schoetter, "Etat du Duché de Luxembourg," 341–42.

62 Outram, "The Socio-Economic Relations," 180–84.

63 Gutmann, *War and Rural Life*, 156–63; Jakob, *Bruyères*, 119; Outram, "The Socio-Economic Relations," 162–64.

64 Laukhard, *Leben und Schicksale*, vol. 3; Vallée and Pariset, eds., *Carnet*, 147, 150, 162, 168–70, 174–77.

65 Frischknecht, "The History"; Mayor, *Biological and Chemical Warfare*, 28–29.

66 de Dynter, *Chronique*, 3:124, 3:625–26; Froissart, *Chroniques*, 13:160–61.

not have the desired effect, brought the contents of cesspits from Liège to pollute the defenders' water. The chronicle of Jean de Stavelot also remarks that when troops from Liège besieged Bouillon between December 1406 and January 1407 they defecated into barrels in order to throw these into the fortress and soil its cisterns and water supply.⁶⁷ Fortifications located on a hill were very vulnerable to such tactics because they rarely had direct access to a stream.⁶⁸

A chronicler from 's-Hertogenbosch on the other hand wrote that many citizens believed that the defenders of Tiel had fired poisoned projectiles during the storming of that city in 1528 because many of their injured died.⁶⁹ The militiamen had brought the wounded to religious houses and hospitals where numerous women helped to take care of them. Whether the defenders really used poison is unclear, but this remark does reveal something about the quality of healthcare at that time and the chances of recovery. Poisoned projectiles were certainly used in medieval Europe, but the available evidence mainly concerns hunting rather than warfare. Many sixteenth-century surgeons also believed that gunpowder wounds were poisonous, but this chronicle does not say so explicitly.⁷⁰

Sudden and apparently inexplicable deaths could easily be attributed to poison. Reginald Möhner, for instance, a chaplain of an imperial regiment serving in support of the Spanish crown in 1651, left an account of his experiences, marching from Austria to the Spanish Netherlands, before invading the kingdom of France and eventually turning back. According to his testimony the regiment entered a village near the Sambre, where one soldier found milk in an abandoned house, drank it, and immediately fell dead. His wife and comrades discovered, or assumed, that the milk was poisoned and the commander gave the order to burn all abandoned houses from then on.⁷¹ In 1831 Dutch soldiers were likewise anxious that their Belgian opponents had poisoned the food and water supplies. Poisoned herbs were effectively used in wolf hunting, and it must have been relatively easy to apply such knowledge to warfare as well.⁷² In May 1714 the commander of Namur even received complaints that officers and soldiers threw drugs or poison in the Meuse to kill the fish.⁷³

Meanwhile, gunpowder continued to be associated with poison well into the seventeenth century. Many artillery manuals gave practical information to their readers on how to make "poisonous" or "stink" bombs, but it is unclear to what extent gunners actually applied this advice.⁷⁴ During the siege of 's-Hertogenbosch in 1629 a soldier of

67 *Ly myreur des histors in Chronique de Jean des Preis dit d'Outremeuse*, ed. Borgnet and Bormans, 6:179; de Hocsem, *La chronique*, 358–59; de Stavelot, *Chronique*, 101–2, 254.

68 Bragard et al., *La termitière*, 54–56; Burger, "Wasserversorgung," 229–30.

69 Hoeckx et al., eds., *Kroniek van Molius*, 270–71.

70 Bisset, "Arrow and Dart Poisons," 4–5; Gabriel and Metz, *A History*, 2:56; Garrison, *Notes*, 110–11; Schreiber, "Plant Poisons."

71 Brunner, ed., *Reise des P. Reginald Möhner*, 88.

72 Englmann, *Der Zauber der Macht*, 116; Teunisse, *Onderdaan in Oranje's oorlog*, 80.

73 The Hague, NA, Raad van State, inv. no. 2079: Order May 27, 1715.

74 Martinetz, *Vom Giftpfeil zum Chemiewaffenverbot*, 35–49.

the garrison claimed that the besieging Dutch troops shot bombs that spread a terrible smell. Others spoke of bombs filled with antimony. The governor was worried enough to order the inspection of unexploded projectiles. Nothing unusual was found, but several citizens still claimed to have noticed a strong scent of camphor. Camphor was sometimes mixed into gunpowder, especially for fireworks or incendiary bombs, and could very well have given these projectiles a different appearance. Its use in itself was not new. Fiscal accounts of the duke of Brabant mention the purchase of camphor for the making of gunpowder as early as 1411.⁷⁵

The French engineer de Vauban, who would certainly have mentioned the use of poisoned projectiles, was visibly more concerned with traditional miasmas. He wrote in his journal of the siege of Namur in 1692 that ten or twelve dead horses, lying near the front of the covered way, hindered the final attack on the castle more than the fire of the besieged did. However, every time the wind turned they had their share of stench. He clearly implied that the garrison wanted to disrupt the besiegers, but other issues might have played a role as well.⁷⁶ The chronicle of the Sint-Geertruiklooster in 's-Hertogenbosch recorded that during the siege of 1629, after horses taken as booty started to eat tree leaves for lack of fodder, the gunners drove them into the moat towards the enemy lines; some drowned in the process. Simply slaughtering and eating the horses could have been an alternative, but in Western Europe strong taboos existed against the eating of horse-meat, which effectively ensured that this became a very exceptional measure.⁷⁷ Even though the sources rarely provide definite proof of intention, it is clear that premodern armed forces were well aware that their enemies might try to spread disease among them.

Vulnerable Bodies

Military vulnerability to disease cannot be understood without taking changing notions about human and animal bodies into account. Army commanders perceived some bodies as being more suitable for military service than others. These views, and changes therein, had a major influence on army members' susceptibility or resistance to pathogens. In 1818, doctor Georg Heinrich Ritter summarized a notion prevalent among officers as follows: "a soldier must be as strong as iron, and be able to withstand anything, without experiencing any negative consequence."⁷⁸ In practical terms this means looking into selection criteria for combatants, and their horses, rather than armies at large. As argued in the previous chapter, there is little information available about so-called camp followers because of the unofficial nature of their presence. The requirements listed by Vegetius in his *De re militari* (written in 383–450) will be taken as a start-

⁷⁵ De Cauwer, *Tranen van bloed*, 225; van Werveke, *Die Erwerbung*, 11.

⁷⁶ The covered way refers to the space between the glacis, the open terrain near a fortress, and the moat. Vauban, *Journal*, 161.

⁷⁷ Felsenhart, "L'invasion," 349; Patist, *Het beleg van de stad Grave*, 46–47, 49, 64; van Bavel et al., *De kroniek*, 343; Wittmann, "Verhandeling," 118.

⁷⁸ Ritter, "Verhandeling," 32.

ing point because this work remained an authoritative military manual throughout the Middle Ages and subsequent centuries.⁷⁹

Vegetius specified that recruits had to be enlisted as adolescents, that they had to be tall and strong, and had to come from the countryside. Rural dwellers were in his opinion accustomed to all kinds of weather and used to hard labour.⁸⁰ There is another criterion, so obvious that neither Vegetius nor most other military writers bothered to comment on it: a combatant had to be male. While traditional gender divisions in an army context are well known, this criterion is not as evident as it might seem. Only service as a paid, and thus officially recognized, combatant, was strictly forbidden. Women who served as soldiers invariably did so as “men.” This makes their identification difficult, but not impossible. Jan van Ryckenroy from Roermond for example wrote in his chronicle that in 1589, after the taking of the castle of Bleijenbeek, a girl was discovered among the enemy dead, and John Stedman, a captain in the eighteenth-century Dutch army, noted in his diary that a Swiss regiment in Maastricht chased away two soldiers: man and wife. The identity of the latter was only discovered because she became pregnant. The enlistment of women as soldiers might have been facilitated by the absence of a thorough medical check-up.⁸¹

Not only is the nature of the examination of recruits unclear, there are actually relatively few sources that provide unambiguous evidence about a combatant's background. Rulers compiled lists of soldiers as early as the late thirteenth century, but before the late seventeenth or early eighteenth centuries few of these muster lists mention anything other than the soldier's name and function. Some of these names, or rather nicknames, do however give some indication of the soldiers' backgrounds. Muster lists of infantry units raised for the bishop of Liège in the 1550s show for instance that many soldiers adopted nicknames such as *Jonck Bloet* (“Youngblood”), *'t Kint* (“The Child”), *Jonck Hart* (“Youngheart”) and variations (e.g., *Verlorenkint*—“Lostchild”) which suggests young unmarried males, possibly teenagers.⁸²

Military personnel records became more detailed over time, and by the eighteenth century typically wrote down information such as a soldier's birthplace, age, height, trade, and features in order to reduce fraud. These eighteenth-century lists confirm that most soldiers enlisted in their late teens or early twenties.⁸³ It is quite possible, however, and indeed suggested by the study of skeletal remains and the age of a handful of Burgundian soldiers written down in a court record from 1469, that medieval combatants

⁷⁹ Allmand, *The De Re Militari of Vegetius*; Richardot, *Végèce et la culture militaire*.

⁸⁰ Vegetius, *De re militari*, bk. 1.

⁸¹ Thompson, ed., *Journal*, 103–4; van Ryckenroy, *Kroniek*, 239. See also Dekker and van de Pol, *Vrouwen in mannenkleren*, 24–25, 33–35, 105–7; Desbrière, *Chronique critique*, 140; Gaier, *Art et organisation*, 175; Leestmans, *Soldats*, 180–81; Lynn, *Giant of the Grand Siècle*, 343–46.

⁸² Liège, AEL, Etats, inv. no. 2965: Muster lists of infantry companies raised in 1552. See also Contamine, *Guerre, état et société*; Bell et al., *The Soldier*.

⁸³ Bois, *Les anciens soldats*, 133–40; Corvisier, *L'Armée française*, 2:615–37; Leestmans, *Soldats*, 22; Ruwet, *Soldats*, 64–66.

were on average somewhat older because they had to provide their own equipment.⁸⁴ Still, the majority served when in their twenties or thirties. This reflects a basic biological reality that most males are fully-grown around the age of twenty. From the age of thirty, muscle strength tends to decrease. These indications should be treated with caution, however, since different ways of army organization entailed a different type of recruit. Furthermore, as military personnel records make clear, it was an individual's capability to serve that really mattered, not official instructions about age.⁸⁵

Similar remarks could be made about horses used by the army. Given that a horse is only fully grown after four years, military regulations from the eighteenth and nineteenth centuries specified that units could only take horses between the ages of four and seven. Reviews from Dutch cavalry regiments from the early 1780s mention that eleven, twelve, and fourteen-year-old horses were replaced because they were "sick" or otherwise unable to perform their duties.⁸⁶ A mass grave of at least sixty-five horse skeletons, found at Borgharen and dating to the French siege of Maastricht in 1794, contains the remains of animals which were between three and sixteen years old when they died, the majority being between four and twelve. Even though one horse had not yet reached the age of four, it was as one of the largest individuals found.⁸⁷

The height of this horse is significant, because it relates to Vegetius's criterion that recruits had to be tall, although this was less important than strength. Jacques de Hemricourt, who wrote a treatise on the nobility from Hesbaye in the fourteenth century, called Godefroid, lord of Harduemont, "the smallest knight in the Prince-Bishopric of Liège, but a brave knight, and a great and strong captain." The phrasing of this sentence suggests that de Hemricourt considered men of small stature to be generally unsuitable for military service.⁸⁸ Detailed estimates of height only become available from the eighteenth century onwards, when personal records started to note a soldier's height more or less accurately. A systematic comparison between these eighteenth-century soldiers and Napoleonic conscripts proves that these men were significantly taller than the average male, even though many enlisted when not fully grown. The reduction of average heights in nineteenth-century conscript forces was primarily aimed at incorporating as many men as possible into the army, but also reflected more pressing health and tactical issues.⁸⁹

A larger physique needs more nutrients to keep functioning, or in other words: has less stamina. Medieval commanders might already have favoured taller combatants, but eighteenth-century notions about the ideal military body had evolved to such an extent that height in itself, rather than strength or another ability, became the primary

84 DeVries, "Teenagers"; Poncelet, "Le combat," 278–93.

85 Colombier, *Préceptes*, 149–52.

86 The Hague, NA, 1. 01.19, inv. nos. 1945, 1946: Reviews and reports of Dutch cavalry regiments, 1780s; Geisweit van der Netten, *Algemeen Samenstel*, 114–15.

87 Loonen and van de Graaf, "Het massapaardengraf van Borgharen," 31–38.

88 de Hemricourt, *Le Miroir des Nobles*, 1:117.

89 Bois, *Les anciens soldats*, 140–42; Govaerts, "Fire-Eaters," 19–21; Leestmans, *Soldats*, 189; Lynn, *The Bayonets of the Republic*, 46–47.

criterion for admission into elite units. Despite the fact that practically minded officers gradually became more assertive in voicing their criticism towards the end of the century, prejudices died hard.⁹⁰

Officers did not just select recruits because of their height, but also because of their background. It is unclear to what extent medieval captains heeded Vegetius's preference for rural dwellers. Urban militias became in fact more important during the Central Middle Ages because they were better organized and better armed than their rural counterparts.⁹¹ Many so-called men-at-arms, heavy cavalymen with two or more horses, cannot be considered as rural combatants either, since they switched regularly between urban and rural settings, often by owning houses in a town as well as the countryside.⁹² The aforementioned muster lists of the bishop of Liège's army in the sixteenth century indicate a predominance of urban recruits, but most came from relatively small settlements such as Tongres/Tongeren or Valkenburg rather than Liège itself.⁹³

Eighteenth-century personnel records likewise reveal an overrepresentation of soldiers from an urban background, especially from garrison and/or larger towns, but it is significant that elite units (cavalry, artillery, and miners) counted a larger number of rural dwellers in their ranks or were primarily composed of men born in the countryside.⁹⁴ These records thus suggest that high-status units, who could pick their members, did adhere to the criteria recommended by Vegetius. The arguments of the Belgian colonel de Thierry in 1835 confirm this. He published a small report in response to claims about excessive loss of horses in the army, declaring that his men had little affinity with horses and did not know how to take proper care of them. The colonel therefore strongly advised refraining from admitting certain recruits to the cavalry in the future: urban dwellers top the list. The preference for recruits from rural backgrounds was therefore not limited to physical stature as such but included a whole range of skills that officers associated with this origin.⁹⁵

In ideal circumstances new arrivals were actually not recruits at all, but veteran combatants.⁹⁶ During the parliamentary debate mentioned at the beginning of this chapter, the general responded to the alleged high mortality of the French armed forces by arguing that recruits drove up the death rates. Hans Jakob von Grimmelshausen, the author of the famous novel *Abentheuerliche Simplicissimus Teutsch*, wrote of recruits of the Walloon regiment de Merode in the Thirty Years War of whom large numbers could be seen resting below hedges alongside the road. He also noted that the verb marauding (*marode*)

90 *Essai sur l'armée hollandaise*, 30–32; Corvisier, *L'Armée française*, 2:637–54.

91 Bachrach, "Urban Military Forces"; Hosler, *John of Salisbury*, 66–68; Verbruggen, "Flemish Urban Militias."

92 Govaerts, "Mannen van wapenen," 312.

93 Liège, AEL, Etats, inv. no. 2965.

94 Corvisier, *L'Armée française*, 1:387–448; Ruwet, *Soldats*, 41–50; Zwitzer, *De militie van den staat*, 48–50.

95 de Thierry, *Mémoire*, 5–15.

96 Parrott, *The Business of War*, 163–67.



Figure 32. Medieval men-at-arms, miniature from the early fourteenth century, made in Liège or Maastricht. Note that the miniaturist has taken care to identify the horse as a stallion (London, BL, Stowe MS 17, fol. 244r). Reproduced with permission of the British Library Board.

in German derived from the name Merode.⁹⁷ His observation is etymologically incorrect, the word deriving from the French *maraude*, but is significant from the perspective of health preservation because it associated pillaging with novice troops who could not keep up. The French doctor Jean Colombier (1736–1789), who wrote an authoritative treatise on military health in the late eighteenth century, argued that there was nothing worse than enlisting children. They were useless to the army and almost all died.⁹⁸

Notions of an ideal military physique went further than the selection of specific types of recruits. They also encompassed intrusions into the chosen human and animal

⁹⁷ von Grimmelshausen, *Der Abentheurliche Simplicissimus Teutsch*, bk. 4, chap. 13.

⁹⁸ The data published by André Corvisier on the basis of personnel records indicate that mortality among recruits was actually higher than among veterans. Colombier, *Préceptes*, 124, 148; Corvisier, *L'Armée française*, 2:686–89.

bodies themselves. These measures originated both in the need to construct and maintain a specific “military” identity, distinct from that of other social groups, as well as issues of discipline and control. They are of major importance within the context of this chapter because of their potential detrimental effects on military health.

Medieval fiscal accounts provide quite detailed information on the horses lost by combatants, as argued in chapter five, but do not indicate whether the owners made deliberate changes to the horses’ appearance. They mention for instance horses with a “long” or “short” tail. Eighteenth- and early nineteenth-century military forces often docked their horses’ tails for aesthetic reasons, but medieval soldiers had rather different opinions on what an ideal horse should look like. One fiefholder of the duchess of Brabant shaved his horse’s manes and tail to make it “as ugly as possible,” so the bailiff would not want to take it with him on campaign to Guelders in 1388. His plan worked, but he did have to pay a fine. In a similar manner, if medieval accounts indicate gender, it is invariably “stallion” (*hengst*). This should not be taken to imply that the unnamed horses were geldings or mares. The medieval word *hengst* had a more general meaning than its modern equivalent and might have been used as a synonym for “warhorse” or “*destrier*.”⁹⁹

Medieval noblemen in fact expressed a strong preference for stallions, and even considered riding a mare humiliating (see figure 32). The French poet Eustache Deschamps lamented the loss of his horse in the 1388 Ardennes campaign and wrote that if the duke of Bar did not provide him with another one he would have to stay home or ride a mare, jack, or jenny.¹⁰⁰ Albertus Magnus, who wrote an authoritative encyclopedia on animals in the thirteenth century, stated that a warhorse had to be a stallion because he is more aggressive than a gelding.¹⁰¹ Despite this widespread belief, the use of geldings did become more common from the fourteenth century onwards, possibly due to the influence of armed forces from Eastern Europe (the French and German words for a gelding are respectively *hongre*—Hungarian, and *Wallach*—Wallachian). The oldest explicit reference to a gelding (*hongre*) in a military context comes from a 1347 account from Namur regarding a group of noblemen who were wounded near Calais. The horse in question belonged to a servant.¹⁰²

By the late seventeenth century the use of geldings and mares had become the norm in cavalry and dragoon regiments. A review of a dragoon company headed by captain de Thiribi, part of the army raised by the bishop of Liège in 1692, gives an exceptional

99 Brussels, ARA, 137.01, inv. nos. 12990, 12991; Arnhem, GA, Hertogelijk Archief, inv. no. 1580, fol. 9v; Arkenbout, *Frank van Borselen*, 199; Bolsée, ed., *La grande enquête*, 31; Herborn and Mattheier, ed., *Die älteste Rechnung*, 62–64; Martens van Sevenhoven, “Een betalingsordonnantieboek”; Miller, “‘Tails’ of Masculinity”; Renes and Wessels, “Loen ende Werck,” 127–28; Smit, *De rekeningen*, 2:54–56; van Doorninck, ed., *De tocht van Jan van Blois 1362*, 124, 125, 127, 133; van Wissekerke, *Van kwade droes tot erger*, 344–47.

100 Contamine, “Le cheval noble,” 1705; Deschamps, *Oeuvres*, 5:121–22.

101 Albertus Magnus, *De animalibus*, 2:1378.

102 Rotterdam, SAR, ONA, inv. no. 332, no. 32: January 28, 1644, no. 238: September 17, 1644; inv. no 417, no. 32: May 20, 1638; Balon, “Un train sanitaire,” 285; Davis, *The Medieval Warhorse*, 135–36; Fugger, *Gestüt*, 44–47; van Schevichaven and Kleijntjens, *Rekeningen*, 389.

description of both soldiers and their horses: of the animals for which gender is provided, seven were geldings and eighteen mares. A note at the end of the list specifies, however, that the animals denoted as "horse" were all geldings, which brings the total number of geldings to twenty-one.¹⁰³ During the eighteenth century the French army went a step further and even issued prohibitions against the use of stallions. The archetypical army horse remained without doubt male, as at least seventy percent of the horses found at the 1794 mass grave of Borgharen could be identified as such, but the gelding had replaced the stallion.¹⁰⁴

This development is noteworthy because it implies that military forces preferred the discipline and obedience that castrating implied above a stallion's natural aggression. The choice in favour of geldings is a very practical one: a stallion will fight other, unfamiliar, stallions for dominance of "the herd," especially if mares are present. A troop of geldings and mares is easier to control, a trait that could make a great difference during warfare. Still, not everyone agreed with this reasoning. The Dutch officer Geisweit van der Netten, who wrote several influential books on horses and cavalry service in the early nineteenth century, was a strong opponent of gelding. He argued that it affected the horses' health and energy.¹⁰⁵

The soldier's physique similarly became subject to aesthetic criteria, the height preference having been mentioned earlier. For eighteenth-century Dutch military courts the cutting of one's hair served as proof that the defendant had planned his desertion. The infantry regulations of 1772 stipulated that a soldier had to wear his hair in a tail of no less than sixty centimetres (two feet). If his own hair was not long enough, he had to use extensions made from horsehair.¹⁰⁶ The French doctor Colombier criticized these practices because they caused health issues on campaign, by increasing the chances of retaining parasites such as lice and ensuring that the hair remained permanently wet after a rainy day. Soldiers of the French republican army simply abolished the practice and cut their hair short in the 1790s. Other armed forces followed suit.¹⁰⁷

The second main element in the forging of a military identity was corporal punishment. Medieval commanders did use the death penalty in exceptional circumstances, but normally punished malefactors through fines, which is a more indirect form of corporal punishment, because it affected someone's economic well-being.¹⁰⁸ The general adoption of more direct forms of corporal punishment, notably caning, took place in the first decades of the sixteenth century, and was not limited to armies as such. Corporal punishment became an inseparable element of a military identity, however, not only because military forces continued to employ it long after it had been abandoned

103 Liège, AEL, Etats, inv. no. 2966: Liste de la compagnie capitaine de Thiribi du régiment monsieur général mayor de Jaymaert. See also Driessen, *Emundt van Oeteren*, 691.

104 Loonen and van de Graaf, "Het massapaardengraf van Borgharen," 35.

105 van Wissekerke, *Van kwade droes tot erger*, 95, 342–44.

106 *Reglement en generaele ordres voor de regimenten infanterie van den staat*, 198; Dorreboom, "Gelijk hij gecondemneert word mits deezen," 253, 258, 259.

107 Colombier, *Préceptes*, 41.

108 Geltner, *Flogging Others*, 21–23.

elsewhere in society, but also because they gave their own interpretation to these punishments. Soldiers retained a strong connection to nobility throughout the medieval and early modern period, and perceived being touched by an executioner or his assistants as dishonourable. For this reason, soldiers carried out punishments themselves, unless the offender was considered unworthy to continue serving.¹⁰⁹ This evolution can be illustrated through a comparison between two punishments for the same offence: one medieval, the other early modern. The *prévôt* of Bouconville in the Duchy of Bar condemned in 1411 a sentinel who had fallen asleep while guarding this fortress to a fine of sixty *sous*. Three hundred years later, in 1717, the commander of Namur sentenced two soldiers to running the gauntlet up and down twice: one had left his guard post, the other had fallen asleep.¹¹⁰

These notions caused a major divergence between the military, as an organization, and other types of armies that continued to function. When the governor of Roermond found a citizen absent from his guard post in 1656, he punished him in the proper military way: with a beating. The latter responded by taking his gun and threatening to shoot him. The city council resolved the situation by imprisoning the guard for a few days, but asked the governor to refrain in future from beating its citizens. When French troops started to expand the fortifications of Dinant in 1690–1691, the governor issued a proclamation that soldiers who entered the parapets or banquettes of the walls and/or soiled them risked corporal punishment. Citizens on the other hand only risked a fine.¹¹¹

The taking of an offender's freedom, which increasingly replaced caning from the eighteenth century onwards, was an important development within the context of army health because of the nature of the places in which he was confined. In medieval contexts this was typically a tower, gate, or the basement of the town hall, for the simple reason that these were enclosed spaces with someone present as a guard, typically a sentinel or gatekeeper. Imprisonment mainly served to hold people temporarily and oblige them to pay. The amount of comfort depended on a prisoner's wealth, given that one had to pay one's own costs of imprisonment.¹¹² Still, the stereotypical image of the medieval dungeon might have some factual basis. On August 18, 1465 the city council of Dinant wrote to its colleagues in Liège about one of their citizens who was held prisoner in Bouvignes. The Burgundians not only had refused to release him, but also threatened to put him in a hole filled with "worms" and wild beasts (*vermines et bestes sauvages*). Philippe de Vigneulles, a citizen of Metz who was held captive in the fortress of Chauvency near

109 Dorreboom, "“Gelijk hij gecondemneert word mits deezen,” 126–27, 132, 190–96, 208, 236–37; Geltner, *Flogging Others*, 63–65.

110 The Hague, NA, Raad van State, inv. no. 2079: Orders February 25, 1717; Marchal, *Inventaire*, 201.

111 Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 6:251–52; van Beurden, *De handelungen*, 125.

112 Fruin, *De oudste rechten*, 1:184; Geltner, *The Medieval Prison*; Gentenaar and Hupperetz, "Personeel en werkzaamheden," 188; Koreman, *De stadsrekening*, 148; Laurent, *Aachener Stadt-rechnungen*, 236; Moreau, *Bolwerk der Nederlanden*, 12, 16; Villa-Séblin Nicole, *La sénéchaussée*, 138–39.

Montmédy in 1490–1491, recorded in his chronicle that, after an attempted escape, his guards put him in the basement of a tower, where mice, rats, and other animals stole his bread.¹¹³

Even though these medieval fortifications lost much of their defensive value in subsequent centuries, they often continued to serve as prisons. More importantly, imprisonment became a punishment in itself.¹¹⁴ The order book of the Dutch “hunter” unit de Sternbach noted that a sergeant was put into “the hole” for neglecting his patrol duty in 1785. The garrison orders of Namur also referred to a certain prison as “the hole.” Colombier again provides a valuable perspective when he observed that there is no good reason to use an underground space as a *cachot*, since it is detrimental for the prisoners’ health.¹¹⁵ The regulations of the French non-commissioned officer from 1811 did in fact make a distinction between three different forms of confinement, from simply imprisonment in one’s own room to the *cachot*, where a soldier had to sleep on a straw covered floor and only received water and bread. A prisoner could not be kept in the *cachot* for more than four days.¹¹⁶

The third and final element in the forging of a military identity was the building of barracks. The building of large houses to accommodate soldiers dates back to the sixteenth century. At that point, however, it was very much for lack of any other suitable housing. From the late seventeenth and especially the eighteenth century onwards governments all over the Meuse Region initiated building programmes to provide garrison towns with barracks.¹¹⁷ This was primarily a control issue: housing soldiers in barracks made desertion far more difficult. Only seven percent of the soldiers from the Dutch-speaking part of the Prince-Bishopric of Liège who deserted from the Dutch army between 1770 and 1795 ran away from their barracks, compared to thirty-five percent quartered in private households.¹¹⁸

Complaints about the health hazards of barracks were commonplace, both in publications of military physicians and reports of military engineers (see figure 33). Consistent with prevailing medical theories most criticized the humidity and lack of air circulation.¹¹⁹ The French engineer de Vauban planned the construction of what could

I 13 The Latin word *vermis*, from which our word “vermin” derives, literally means “worm,” but during the Middle Ages it was used as a general term for a wide range of invertebrates, including non-flying insects, moths, snails, spiders, and leeches. Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 2:116–17; Lamort and Huguenin, *Les Chroniques*, 536.

I 14 Leestmans, *Soldats*, 82; Lefebvre, “Bastogne,” 357; Marchal, *Inventaire*, 348; Monbrun, *Considérations*, 7; Muller, “Bouillon,” 56.

I 15 The Hague, NA, Raad van State, inv. no. 2057: Garnisoensorderboek, February 20, 1786; Colombier, *Préceptes*, 87–88.

I 16 *Le guide des sous-officiers*, 277–86.

I 17 Leestmans, *Soldats*, 19; Milot, “Les garnisons,” 731; Parker, *The Army of Flanders*, 140–41; Rooms, *De organisatie*, 246–50.

I 18 Based on a database of a hundred and ninety-nine deserters, originating from the Dutch-speaking part of the Prince-Bishopric of Liège who served in the Dutch army between 1770 and 1795. Govaerts, “Fire-Eaters.”

I 19 Colombier, *Préceptes*, 158–65; Huvet, “Topographie médicale”; Kerckhoffs, *Hygiène militaire*,

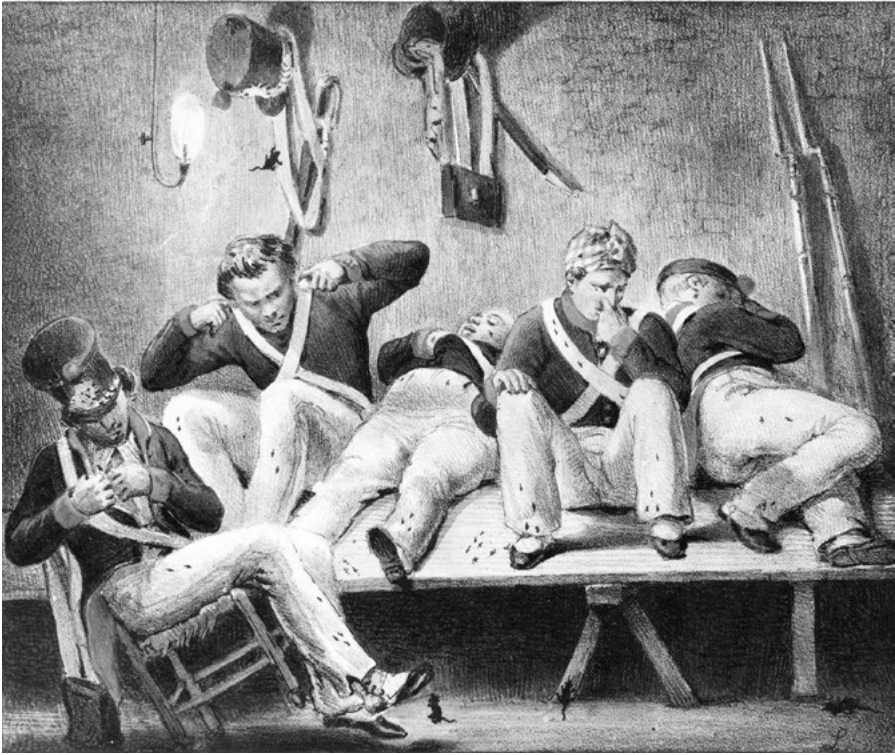


Figure 33. Dutch militiamen (*schutters*) in their mouse- and flea-infested barracks, 1830s (Soesterberg, NMM, inv. no. 00104106). Reproduced with permission of the Nationaal Militair Museum, Soesterberg.

be considered one of the longest barracks in Europe at that time, in Givet alongside the Meuse in 1680 (almost 430 metres). After an inspection in 1691 he noted that it was difficult to pass through the area because he encountered manure everywhere. He thus gave instructions to ensure that from then on they were regularly cleaned.¹²⁰ The fact that the commander of Namur likewise instructed his officers in 1716 to keep the barracks dirt-free suggests that this had not yet become standard practice. One hundred years later the worst problems occurred in barracks not located near a stream, such as those of Rocroi. The latrines built next to the main wall in 1832 apparently produced such strong “memphitic and pestilential vapours” during the summer months that the neighbours claimed that it was impossible to live there, even when all the doors and windows remained locked.¹²¹ So, the need to forge a specific military identity came at the cost of the soldiers’ own health.

65–67; Milot, “Les garnisons,” 725–26.

¹²⁰ Guénoun, “Deux edifices,” 80–81.

¹²¹ The Hague, NA, Raad van State, inv. no. 2079: Orders October 12, 1716; inv. no. 2081: Generale

As significant as the selection of army members and further physical intrusions were, the most important aspect of military physique remained proper nourishment. This derived of course from the widespread adoption of Galenic theory, which classified food and drink as one of the six non-naturals. Medieval fiscal accounts are surprisingly detailed and, in many ways, even more informative than sources from subsequent centuries. The accounts kept by the city of Aachen regarding its expenses during the siege of the fortress of Dyck in 1383, for instance, allow a reconstruction of the food eaten on a particular day of the week. The basic food was bread, beer, and meat, mostly poultry, with fish (herring and to a lesser extent salmon and river fish), eggs, and/or cheese mostly reserved for days of fasting. Parsley, garlic, beans, mustard, garden vegetables (*moes*), oil, wine, milk, and game, the latter as gifts from the bishop of Cologne, are also mentioned.¹²²

Medieval accounts in fact provide clear patterns as far as nutrition is concerned: cooks prepared food in large cauldrons, alcoholic beverages (beer and/or wine) were the norm, and the food was quite rich in meat (poultry, cattle, sheep, pig, game), fish (herring, cod, pike, carp, salmon), dairy products (cheese and butter), eggs, bread, and herbs or spices (mostly parsley and to a lesser extent mustard). Fruit and vegetables were relatively rare: cooked peas, and almonds, onions, garlic, and *moes* being the most common. Calculating the exact nutrient intake of an average combatant is difficult because the quantities specified in accounts have to be converted into modern measures, which involves all sorts of assumptions and estimates, but it does seem to have been quite generous.¹²³

The diet of early modern soldiers pales by comparison: provision of meat and bread (or its alternatives: biscuits and rice) could more or less be guaranteed, but fish, eggs, and dairy products became much rarer or disappear from the menu. This might be related to changing religious beliefs, since many soldiers no longer respected days of fasting from the sixteenth century onwards, but the French doctor Colombier explicitly stated in 1775 that most privates did not have enough money to buy fish or eggs.¹²⁴ Furthermore, because armies grew larger over time, and the number of wagons each unit

Orders, art. 14; inv. no. 2081: November 8, 1738, April 5, 1741, October 15, 1741; *Orders en reglementen Maastricht (1749)*, art. 21; *Reglement en ordres 's-Hertogenbosch (1770)*, art 9; Barbe, "Rocroy, ville de garnison," 107, 115–16.

122 Laurent, *Aachener Stadtrechnungen*, 276–86. Remarkably enough, honey is mentioned rarely, except in the context of horse medicine. Krug, "The Wounded Soldier."

123 Bar-le-Duc, ADM, B 1853, fols. 10–16, 18; Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 135v; Boffa, "Le ravitaillement," 204–7; Collin, "Le travail," 26–28; Contamine, *Guerre, état, société*, 646–54; de Groot, *Stadsrekeningen*, 1396, fols. 32–35, 1402, fol. 19, 1403, fols. 25–26, 1405, fols. 14–15, 1407, fols. 18, 21–23, 27–28, 1412, fols. 16–20, 42–44; Gaier, "L'approvisionnement," 557–61; Harari, "Strategy and Supply," 302–4; Herborn and Mattheier, ed., *Die älteste Rechnung*, 70; Hosler, *John of Salisbury*, 76–79; Kuppers, ed., "De stadsrekeningen," 39, 148, 160; Liégeois, "Compte de la recette de Chiny," 141, 163; Marchal, *Inventaire*, 74–76; Rogers, *Soldiers' Lives*, 11; Servais, *Annales historiques du Barrois*, 2:316–17; van den Brandeler, ed., "Rekening der onkosten," 180–84; van Schevichaven and Kleijntjens, *Rekeningen*, 278–79; van Werveke, *Die Erwerbung*, 7–13, 34–38.

124 Colombier, *Préceptes*, 62, 130; Grauwels, ed., *Dagboek*, 43, 159, 168–69.

brought with it had to be reduced in order to preserve some mobility, provision of even the most basic food could become problematic: from the late sixteenth century onwards soldiers were issued a specific form of bread, the so-called commission or munition bread, which was rather coarse and made of a mixture of rye (two-thirds) and wheat (one-third), but could be supplied by contractors at relatively short notice.¹²⁵

Drinking water also became relatively more important. Hendrik Conscience and Jan Teunisse, antagonists in the Ten Day's Campaign (1831), both recounted that because of the scarcity of water in the Campine/Kempen they were reduced to drinking dew and muddy water from wagon tracks. The latter claimed it affected the soldiers' eyesight.¹²⁶ The increasing importance of water could explain why dysentery became one of the most important scourges of armies. Seventeenth-century soldiers responded to this threat by mixing vinegar or olive oil with water before drinking or cooking. This method is still attested during the Napoleonic Wars, which suggests that it was a widespread and ongoing practice.¹²⁷ The medical qualities of wine were already well known in the Middle Ages and it is quite possible that combatants drank wine and beer rather than water for health reasons as well as taste.¹²⁸

Since regulations rather than fiscal accounts constitute the main evidence for the food supply of early modern forces, it is possible that differences with medieval armies were in practice much less pronounced. There was also a significant distinction between life in garrisons or quarters and in the field, but even when on campaign the diet of soldiers might have been richer than the regulations indicate. So-called sutlers or *vivandier(e)s* had an important role in military supply and many paintings depict them selling various items, including food, to soldiers. Plundering was a much-used alternative when official supplies did not suffice.¹²⁹ A councillor's act from Sautour (1643) lists the possessions of a cavalryman from the garrison of Givet killed in a skirmish with the local militia. These include a loaf of bread, an apple, a pear, and a small axe (presumably to cut wood). The fact that the councillors went to such trouble to record the deceased's possessions suggests that they feared retaliations by the soldier's comrades.¹³⁰

125 de Cauwer, *Tranen van bloed*, 174, 182–83; de Graaf, *Oorlog*, 362; de Keralio, Lacuée, and Servan, *Encyclopédie méthodique. Art militaire*, 3:573–91; Duyck, *Journal*, 3:399–400; Iung, "L'organisation," 271, 295–98; Kroener, *Les routes*, 89; Perjés, "Army Provisioning," 11–14; Rooms, *De organisatie*, 205; van Laere, "Montmédy," 87, 164–201.

126 Conscience, *De omwenteling*, 110–11; Teunisse, *Onderdaan in Oranje's oorlog*, 78.

127 Burschel, *Söldner*, 259; de Brack, *Avant-Postes*, 366; Haneveld and van Royen, *Vrij van zichtbare gebreken*, 180–84; Monbrun, *Considérations*, 12; Ritter, "Handeling," 28, 63–65; Rogers, *Soldiers' Lives*, 94–95.

128 Rogers, *Soldiers' Lives*, 94–95.

129 Burschel, *Söldner*, 231–41; De Cauwer, *Tranen van bloed*, 175; de Graaf, *Oorlog*, 361; Leestmans, *Soldats*, 195; Lynn, *Giant of the Grand Siècle*, 108–14, 122–24; Redlich, "Der Marketender"; Rooms, *De organisatie*, 209–10; Rorive, *La guerre de siège*, 228–38; Sabron, *De oorlog*, 2:77; Spaans, "Legerkampen," 176; Teunisse, *Onderdaan in Oranje's oorlog*, 62; van Bavel et al., *De kroniek*, 335; van Ryckenroy, *Kroniek*, 85–86, 135–36, 142, 150, 152, 159; Viltart, "S'alimenter," 266–73.

130 Sautour, 6933: Act January 3, 1643 (transcript Génémag).

The information provided by medieval fiscal accounts can also be quite difficult to interpret, for these documents rarely mention exactly what food was supplied to specific members of an army. During the 1411 campaign in Luxemburg, for instance, a merchant from Namur supplied the duke of Brabant's army with three barrels of tuna fish, and two of seal.¹³¹ These were undoubtedly intended for the duke's own table, as were eight barrels of river fish. The "many people of arms" who stayed at Virton on the other hand received only one barrel of river fish, but large quantities of cod. The high bailiff of 's-Hertogenbosch did not include eight barrels of old herring, destined for the defenders of the fortress of Middelaar, in his 1387–1388 accounts because when one of the barrels was opened the herring turned out to be so rotten that nobody would eat from it, nor could it be sold. It was thrown into the Meuse instead.¹³² In this way, one might argue that our comparison between the diet of medieval and (early) modern armies is baseless because evidence for the latter is biased towards the subordinate ranks, non-commissioned officers, and privates.

Still, combatants of high social status, such as men-at-arms, were far more common in medieval armies than commissioned officers in early modern military forces. In other words: the diet of the average combatant changed markedly from the fifteenth and/or sixteenth century onwards because the social status of soldiers declined significantly in the same period (see chap. 4). The chronicler Lodewijk van Velthem described the "Meuse lords" (*Maselanders here*) who served the count of Flanders in 1297 as being so fond of wine and good food that no one could satisfy their wants.¹³³ The master hunter of the duke of Bar stayed more than a month in the lordship of Souilly near Verdun in 1402 so he could supply his master's army, which was besieging the fortress of Dudelange, on the Bar–Luxemburg frontier, with game. Four years later the *prévôt* of this fortress supplied wine for the flasks of the duke's horsemen.¹³⁴ These actions derive logically from the noble status of men-at-arms. Noblemen expected to eat the same food they consumed when staying in their own households. The similarity of the evidence regarding the consumption of meat and fish in fiscal accounts of military expeditions with the animal bones found during the excavations of medieval castles is striking.¹³⁵

In this context the outbreak of scurvy, a disease generally associated with crews on long sea voyages and armies under siege, in the garrison of Givet in 1847 deserves particular attention.¹³⁶ It occurred after the garrison had been weakened by typhoid and affected the military hospital most. Aside from the traditional emphasis on miasmas

131 Seals were classified as fish in the Middle Ages and could therefore be eaten on days of fasting.

132 Brussels, ARA, 137.01, inv. no. 2784 (transcript Henk Beijers Archiefcollectie); van Werveke, *Die Erwerbung*, 8. See also Boffa, *Warfare*, 54.

133 van Velthem, *Spiegel Historiae*, pt. 5, bk. 3, vv. 3553–3558.

134 Marchal, *Inventaire*, 186; Servais, *Annales historiques du Barrois*, 2:340–41, 2:391. See also Deloffre, "Guerres et brigandages," 280; Dinstühler, ed., *Die Jülicher Landrentmeister-Rechnung*, 91–124.

135 Eryvnc, "Medieval Castles"; Eryvnc and Woollett, "Top-Predator or Survivor"; Gautier, Hoffsummer, and Vanguetaine, "Faune médiévale"; Gautier and Fiers, "Restes animaux."

136 McCord, "Scurvy and the Nations' Men-of-War"; McCord, "Scurvy and the World's Armies."

and the corresponding measure of transporting sick soldiers from the hospital or their barracks, both adjacent to the Meuse, to the fortress of Charlemont, located on higher ground, the official report emphasized discrepancies between different units. Apparently, the cuirassiers counted only a single sick soldier even though they occupied the same barracks as their infantry comrades. Doctor Scoutetten, the author of the report, therefore suggested that the higher pay of these men, the direct descendants of medieval men-at-arms from a tactical if not social viewpoint, shielded them from a sudden rise in food prices, as military pay remained constant. This case is not only noteworthy because it confirms the importance of socio-economic status for discrepancies within armed forces, but also because it demonstrates that scurvy struck a nineteenth-century army in peacetime, which supposedly should have benefited from three hundred years of medical progress.¹³⁷ Rather than gradual improvement military health, as exemplified by the soldiers' food intake, seems to have declined over time.

Disease Prevention

We have seen that armed forces' vulnerability to disease should be seen in conjunction to evolving notions about military physique, the body, and how it should be fed, so we can now turn to more explicit mechanisms of disease prevention in an army context. Fortifications constitute a logical start given their central role in long-term interactions between armies and ecosystems. The traditional image of the polluted medieval city has come under increasing criticism in the last decade with a growing number of historical studies demonstrating that waste disposal and hygiene standards were of major concern to medieval urban authorities. Despite this recent emphasis on the relative cleanliness of the medieval city its organization came at the cost of its periphery.¹³⁸

Because comparatively few people lived there, fortifications became the place par excellence for waste disposal.¹³⁹ In 1439, for instance, one of the towers protecting Wijck (Maastricht) was apparently so filthy that no one would stand guard there.¹⁴⁰ Fortifications were hardly unique in this regard since every abandoned building or uninhabited structure was susceptible to be used in such a way. The restrictive nature of the fortifications at the edges of a settlement reinforced such practices, however, as archaeologists found two cesspits from the sixteenth century in the arches of the city wall of 's-Hertogenbosch. When Maaseik was struck by an epidemic in 1575 the council likewise ordered its two gravediggers to work only at night and remain in a tower during the day. In eighteenth-century Sedan public slaughterhouses, latrines, and collection

137 Scoutetten, "Note sur une épidémie de scorbut."

138 Coomans, "In Pursuit of a Healthy City"; Creighton and Higham, *Medieval Town Walls*, 45, 235; Geltner, "Public Health"; Thomas, "Hygiène," 287–304.

139 Grave, SLC, Archief Gemeente Grave, inv. no. 218, fol. 204v; Boonen, "De Maaseiker wallen," 63; Bormans, "Extraits des cris du péron," 189–90; Bormans, "Table des registres," 12:27; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 3:155, 3:162–63; Jacquet-Ladrier, "Les épidémies," 134; Parmentier, *Pays de Charleroi*, 68, 82; van Zuijlen, *Inventaris*, 2:903.

140 Moreau, *Bolwerk der Nederlanden*, 95, 106, 123.

points for waste disposal were all located alongside the walls to keep them away from the town's centre.¹⁴¹

This pollution not only encouraged the growth of ruderal plants such as nettles or thistles (see chap. 2), but also had a major influence on the introduction of domesticated carp (*Cyprinus carpio f. domestica*) in Western Europe from the late thirteenth century onwards. Their presence is already attested in 1289 Namur. Carp are able to survive in slow or stagnant, oxygen-poor water with much vegetation, such as moats or ponds. They swim to the surface to breathe and feed on bottom- or plant-dwelling animals. This made them a valuable alternative for native river fish, which were becoming increasingly rare at that time as a result of pollution, overfishing, and the use of smaller streams for milling and other activities (as we see with the disappearance of catfish and salmonids).¹⁴²

Still, even carp would not have survived long in polluted water so the maintenance of basic hygiene standards in the fortifications became a vital issue. Significantly, these efforts retained a close link with the conservation of the fortifications themselves (see chap. 2). The city council of Aachen, for example, rewarded watchmen in 1385 for removing manure and their colleagues in Dordrecht commanded citizens to clean the moats in 1509 in order to prevent fires and the bad air that could cause the plague. The city council of Rotterdam also supplied two chamber pots to the members of shooting guilds who guarded the walls in 1556–1557.¹⁴³

Military organizations were, because of their close connection to fortifications, particularly concerned with standards of hygiene. Eighteenth-century garrison regulations emphasized that sentries had to keep their post clean and prevent anyone from relieving himself or otherwise soiling its surroundings. These directives were enforced with very practical measures: the guard's officer simply did not let a soldier off guard duty until his post was dirt-free. Citizens who transgressed either risked losing their hats or having to clean up their mess themselves. A respectable person wore a hat when going outside, which made its taking a symbolic punishment (aside from the obvious economic cost).¹⁴⁴ In 1811 a military engineer stationed in Sedan warned the town council about the water in the fortress's moat, which had become stagnant. The citizens had to close

141 Boonen, *Ziekten en genezers*, 8–9, 76–77, 87; Dardart, “La rue à Sedan,” 85, 185–86, 188–89, 191–92; van Haaster, *Archeobotanica*, 22–23.

142 de Groot, *Stadsrekeningen*, 1415, fol. 48; Deligne, “Carp in the City,” 285–95; Hoffmann, “Environmental Change”; Piérard, ed., *Les plus anciens comptes*, 1:201–2, 1:230, 1:241; Thomas, “Hygiène,” 270–79.

143 Fruin, *De oudste rechten*, 1:347–48; Laurent, *Aachener Stadtrechnungen*, 299; Pick, “Verpflichtungsurkunden,” 236–38; Unger and Bezemer, *Oudste stadsrekeningen*, 239.

144 Archiv Haus Welbergen, inv. no. 754: Accounts city of Goch 1626–1677, fol. 81; The Hague, NA, Raad van State, inv. no. 2078: Orders Castle of Namur, art. 12, Orders for the guards, arts. 8, 20, 21; inv. no. 2079: Orders April 4, 1714, September 1, 1715, February 12, October 12, and October 24, 1716, January 22, 1717; inv. no. 2081: Orders August 19, November 10, 1738; inv. no. 2087: Orders August 27, 1761; *Ordonnance du roi* (June 25, 1750), art. 172, 281; *Reglement en ordres 's-Hertogenbosch* (1770), arts. 8, 47; *Reglement en ordres Maastricht* (1786), arts. 34, 35, 39; Bormans, Lahaye, and Brouwers, ed., *Cartulaire de Dinant*, 6:251–52;

off their access to the moat, in the form of latrines, sewers, etc., or the military would carry out the necessary adjustments themselves.¹⁴⁵

Armed forces had the advantage that they could always resort to violence, or threats, if other measures failed. This link to violence, however, questions the very character of military control, for soldiers themselves also contributed to the range of (semi) illegal activities associated with fortifications by organizing duels.¹⁴⁶ One might in fact wonder how effective military regulations actually were. The water in the moats was considered less than healthy: de Vauban specified in his journal of the siege of Namur that on June 25, 1692, towards the end of the siege, the defenders cooked water drawn from a cistern in the castle moat before using it to make bread. The castle's wells had become unusable at this point, one due to a direct hit by artillery fire and the other because a soldier had fallen into it and drowned. This pond dates back to at least the fifteenth century and served to collect rainwater running down from the plateau.¹⁴⁷ The eighteenth-century garrison of Rocroi, on the other hand, had a special ramp leading to the moat so that horses could drink there. This also increased the chances of the water becoming polluted.¹⁴⁸

Ultimately even military commanders could not escape the fact that fortifications remained the most obvious place for disposing waste, particularly for the very men who guarded the fortifications. The medieval accounts of Grave from the late fifteenth century mention payments for the repair of privies in front of, or near, the gates and at the guardhouses, and those of Venlo from 1409 refer to a privy on one of the towers.¹⁴⁹ The fact that archaeologists regularly recover hundreds of animal bones from fortress moats is revealing in itself. The French governor of Maaseik also ordered the construction of latrines on the city walls in 1673 as prevention against disease, and in 1794 gravediggers at 's-Hertogenbosch buried the garrison's dead in one of the bastions or outlying forts for lack of other space. Dead horses were interred in the drill square near the citadel.¹⁵⁰ Armed forces had a significant role in efforts to improve general hygiene in and near the fortifications because of their close connection to these spaces, but their attempts never fully succeeded.

Disease prevention did not stop with maintaining fortifications, however. Commanders also put considerable effort into making sure their subordinates upheld certain standards of cleanliness. While historical studies about military medicine place much emphasis on the fact that medical treatises, starting with Arnald of Villanova's famous regimen on military camps, the *Regimen Almarie*, discuss hygiene precautions such

145 Dardart, "La rue à Sedan," 92, 191–92, 196–97, 201.

146 Liège, AEL, Echevins de Liège, inv. nos. 286, 750; Biemans, *August von Bonstetten*, 55; van der Heijden and Sanders, eds., *De levensloop*, 85.

147 Bragard et al., *La termitière*, 54–56; de Vauban, *Journal*, 151.

148 Barbe, "Rocroy, ville de garnison," 90.

149 Grave, SLC, Archief Gemeente Grave, inv. no. 218, fols. 73v, 82v, 117, 159v, 172r, 173r; de Groot, *Stadsrekeningen*, 1409, fol. 29.

150 Boonen, "De Maaseiker wallen," 82–83; Mommers, "De gezondheidstoestand," 75.

as examining the quality of the water or burying the dead properly, it is quite unclear whether this reflects an increasing awareness of preventative health.¹⁵¹

As far as the Meuse Region is concerned, we are fortunate to have access to an exceptional eyewitness testimony of army life in the Central Middle Ages. The abbot of Sint Truiden/Saint-Trond (in the Prince-Bishopric of Liège) accompanied a mounted army of about two thousand horsemen marching down the Meuse valley in 1107 to join the emperor at Verdun, and left an account of his experiences in his abbey's chronicle. The monk apparently thought that he would be able to lodge in a house every night and was absolutely horrified to see his new travel companions pitch camp in the open field. He complained that the stench of the excreta left by the horses and men "who did not remove themselves from them—his servant and himself—to relieve themselves" tormented him daily and made him vomit repeatedly. He also grumbled about the swarms of flies that harassed him by day and the mosquitos that stung him at night. At first glance this evidence fits into the traditional image of a medieval army which neglects to take even the most elementary health precautions. Yet the abbot also mentioned that the *milites* and squires set up tents for the nobles, constructed huts for themselves and their horses, and camped in a well-shaded environment near a stream. In other words: they followed health precautions also prescribed in Vegetius's *De re militari*.¹⁵²

The role played by the Aachen urban militia in the sieges of the fortresses of Dyck and Reifferscheid in 1383 and 1385 provides another excellent example because the richness of the city's accounts can be complemented by six letters the contingent's commanders wrote during the latter siege to the rest of the city council. None speak of the presence of disease, but they do mention essential health precautions such as payments to clean the tunics of moths, for the making of tents, and the repairing of shoes. It is also clear that one physician and two surgeons, with attendants, were present. The accounts indicate that the 1385 contingent totalled more than one hundred men, perhaps even close to two hundred, since they do not include servants and other support personnel. The urban militia lost a few combatants, but to enemy action rather than disease.¹⁵³

This is hardly the only evidence regarding the existence of basic hygiene in medieval army camps. Honoré Bonet's *L'Arbre des batailles*, dating from the 1380s, a prescriptive work on the conduct of war, stipulated that an army's marshal had to look after the sick and wounded and make sure they got better. He also had to take care that no one bathed in the drinking water of the horses because that affected the latter's eyesight.¹⁵⁴ The fiscal accounts of Albert of Bavaria, Count of Holland, specify that a certain Haestgen vander Vuyr received a payment of one *schild* on July 8, 1393 because he supplied soap

¹⁵¹ Garrison, *Notes*, 94–95; McVaugh, ed., *Regimen Almarie*, 167–72, 197–200.

¹⁵² *Foetor enim fimi equorum et hominum, non longe a nobis ad secessum declinantium, paene me cotidie enccabat, crebro perurgens ad vomitum.* The term *miles* (plural *milites*) refers here to a mounted warrior who was of subordinate status, compared to actual nobles. The transformation of these groups into "knights" is still the subject of major debates: de Borman, *Chronique de l'abbaye de Saint-Trond*, 1:102–3.

¹⁵³ Laurent, *Aachener Stadtrechnungen*, 61, 89–95, 277, 278, 279, 281, 292, 296.

¹⁵⁴ Bonet, *L'Arbre des batailles*, 96–97.



Figure 34. Fifteenth-century miniature, made in the Burgundian Netherlands, representing the siege of Narbonne by Charlemagne's army. Note the horseman charging at the quintaine on the left, and the foot soldier in the middle, who seems to be digging a drainage ditch next to the imperial tent (Brussels, KBR, MS 9068: *Les Croniques et conquests de Charlemaigne*, fol. 73). Reproduced with permission of the Bibliothèque Royale de Belgique/Koninklijke Bibliotheek van België.

"that one needed in the army" (*diemen inden heer behoefde*). His troops besieged the house (castle) of Altena at that time.¹⁵⁵ One of the versions of the English military ordinances, dating to the early fifteenth century when English soldiers overran the southern half of the Meuse Region, likewise commanded that offal from slaughtered animals in camps had to be buried to prevent infections.¹⁵⁶ These were health precautions essentially similar to those taken by seventeenth- and eighteenth-century armed forces.¹⁵⁷

Archaeological research might be far more informative in this regard. Excavations in Bouge, a village next to Namur on the east bank of the Meuse, found remains of fire-

155 A *schild* is a golden coin minted in the County of Holland. The amount of soap bought cannot have been large, for the count also paid two men who brought him cherries on multiple occasions one *schild* each. De Boer, Faber, and van Gent, eds., *De rekeningen, 1393–1396*, lx–lxii, 124.

156 Curry, "The Military Ordinances"; Hargreaves, "The Long Road," 440, 442.

157 Colombier, *Préceptes*, 245–64; de Keralio, Lacuée, and Servan, *Encyclopédie méthodique. Art militaire*, 2:408–12; Hexham, *The Second Part of the Principles of Art Military*, 23–24; Lenihan, *Fluxes, Fevers, and Fighting Men*, 89–90; Stevin, *Castrametatio*, 41.

places, left by three separate army encampments. The oldest of these camps dates to the late fifteenth or early sixteenth century, and included a shallow ditch measuring thirty metres in length, three metres in width, and about one metre in depth to the east of the location of the hearths. The authors of the report suggested that it might have served as the camp's boundary. Another, and far more intriguing option could be that this ditch had a role in the camp's waste disposal system or water drainage, possibly serving as (one of) the camp's latrine(s). A second excavation, at Frameries near Mons, discovered the remains of shallow ditches, about five and a half metres long, in an army camp from the early modern period (late sixteenth to eighteenth centuries). These might have prevented rainwater from flowing into the tents (see figure 34), but they also contained food waste and charcoal. A final interesting detail from Bouge is the discovery of a post-fifteenth-century skeleton buried rather hastily in a ditch rather than a proper grave.¹⁵⁸

Burying corpses remained a responsibility largely left to local inhabitants or the family and friends of the deceased rather than army members in general; sometimes the numbers might be counted.¹⁵⁹ This created major problems when large numbers of bodies were involved. According to the chronicler Jean de Stavelot, the miasmas of the dead at the battlefield of Othée (1408) forced the Burgundian army to relocate to adjacent villages. The soldiers did, however, retrieve the bodies of leading noblemen, and brought those to Maastricht to be interred.¹⁶⁰ It is possible that the corpses, initially buried in mass graves, were reinterred in 1410, when a chapel was constructed on the battlefield with a large cemetery around it. It is worth noting that the village might have suffered from an epidemic in the immediate aftermath of the battle.¹⁶¹

Subsequent centuries saw no significant change in this regard. Ambroise Paré wrote in his treatise on military surgery that he wanted to leave the battlefield of Saint-Quentin (1557) due to the stench of the wounded and dead. He also remembered numerous flies swarming as a result of the humidity of the bodies and the heat of the sun, blocking the sunlight, and spreading the plague wherever they settled.¹⁶² His experiences were not that different from the farmer, Winand Mengels, who visited the battlefield of Lafelt (1747) after the fighting had ended. He was particularly horrified to see his fellow villagers robbing the dead and wounded instead of helping them. The corpses, deprived of all their belongings, were eventually buried in mass graves.¹⁶³ The Dutch army might have passed a regulation in 1673 that all filth, carcasses, and other foul-smelling matter had to be removed from the roads on which the soldiers marched, but it is quite unclear

158 Authom and Denis, "Exploration"; Denis, "Frameries"; Siebrand and Collette, "Namur/Bouge," 276–277.

159 Devillers, "Documents relatifs," 97–98; Gagné, "Counting the Dead," 800–803; Gaier, *Art et organisation militaires*, 69–70.

160 de Stavelot, *Chronique*, 119.

161 Domken, "Histoire," 49–50, 207–9.

162 Packard, ed., *Ambroise Paré*, 242–43. Original French text in Paré, *La bataille de Saint-Quentin*, 8.

163 Mengels, *Chronyk*, 39–46.

if this regulation was ever enforced.¹⁶⁴ The above-mentioned mass grave of horses near Maastricht, buried in a siege trench, as well as a skeleton of a soldier who died at one of the sieges of Namur indicates that many bodies were interred in existing ditches or wherever they fell.¹⁶⁵

The large numbers of horses many armies brought with them could aggravate these problems, given the amount of waste produced by a horse. The newly established journal of French military medicine, for example, attributed an epidemic affecting the garrison of Sedan in 1776–1777 to the location of the barracks' wells. These had to be built next to a depository for horse manure in order not to hinder military exercises.¹⁶⁶ Most contemporaries, however, perceived horse waste as an asset rather than a problem, for it had a key role as fertilizer in agricultural societies. French regulations from 1750 stated that the *majors des place*, staff officers in a military garrison, could dispose of the manure from cavalry regiments as well as the contents of the latrines providing that they ensured that the buildings were not damaged.¹⁶⁷

As for soldiers, maintenance of basic hygiene quickly became reduced to simply taking care of one's equipment. The famous military manual of Johann Jakob von Wallhausen, published in 1615, already mentioned that the *Kapitän d'armes*, a non-commissioned officer responsible for a company's arms, had to take care of his unit's sick. The regulations issued to his men in 1757 by the colonel of the Horion regiment, a unit raised in Liège for French service, indicate a focus on cleanliness, but also show that the colonel was mainly concerned with the image his men presented to the general public. The soldiers had to wash their hands and faces regularly and powder their hair. Sixty years later captain von Bonstetten wrote in his diary about inspections of his men's laundry, food, feet, and underwear. At that point basic hygiene had clearly become incorporated into the military's range of mechanisms for discipline.¹⁶⁸

The role of military discipline becomes far more ambiguous if one considers prohibitions regarding swimming or bathing. The governors of the eighteenth-century garrison of Namur forbade their soldiers from swimming or bathing in the Sambre or the Meuse alongside the city from the training grounds near the Bulet gate until beyond the training grounds of the Saint-Nicolas gate. In 1760 the commander even instituted special patrols to ensure that his orders were respected. The garrison regulations of Maastricht mention similar prohibitions for the Meuse between Maastricht and Wijck.¹⁶⁹ The inclusion of specific places near these cities' centres is of major significance. Mili-

¹⁶⁴ Kerkhoff, "Over de geneeskundige verzorging," 73.

¹⁶⁵ Dijkman, "Archeologische testimonia," 263; Loonen and van de Graaf, "Het massapaardengraf van Borgharen," 30; Tillière, "Histoire de Jamoigne," 20; Tilmant, "Découverte fortuite."

¹⁶⁶ Rambaud, "Observations sur la fièvre putride et maligne."

¹⁶⁷ *Ordonnance du roi* (June 25, 1750), art. 672, 673; Barbe, "Rocroi, ville de garnison," 103, 119–20; Douchamps-Lefèvre, *Inventaire*, 3:270; Driessen, *Emundt van Oeteren*, 674; Illaire et al., eds., *Les cahiers de doléances*, 589; Le Moigne, "Le rôle économique," 204, 215–16.

¹⁶⁸ Biemans, *August von Bonstetten*, 146, 151, 156–57; Leconte, "Notes sur les régiments liégeois," section B; von Wallhausen, *Kriegskunst zu Fuss*, 29.

¹⁶⁹ The Hague, NA, Raad van State, inv. no. 2078: Orders for the commander of the guards on the

tary commanders might have recognized the value of these activities, but they did not want naked soldiers splashing around where citizens could see them. Officers banned smoking for similar reasons not only near gunpowder storages, but also on the street or when on guard duty. The ashes had to be deposited in ashtrays.¹⁷⁰

In specific circumstances the military might actually have spread basic health standards among society at large. The mutineers of the Spanish Habsburg army who occupied Weert in 1601–1602, for instance, ordered the mayors to remove filth from the streets and repair the gutters under the city walls. The town council also had to make sure that the guardhouses were regularly cleaned.¹⁷¹ The military concern with keeping the immediate environment of guard posts dirt-free in fact not only benefited fortifications but also urban centres, since soldiers guarded important locations, such as the town hall or markets. A letter from a civilian recruiter for the French Royal Liégeois regiment in Maaseik (1789) even specifies that he bought a recruit new spats and had his linen washed before sending him to the officer in charge of recruiting. Conversely, the garrison commander of Namur had to remind his men in 1760 to respect the city's regulations to keep the streets clean. In this way the legislation passed by military and urban authorities was complementary rather than conflicting.¹⁷²

Women present with the army also played important, and generally gender-specific, roles. Medieval and sixteenth-century armies had special officials tasked with both organizing the camp followers and maintaining basic hygiene: the king of the "ribauds" and the "whores' sergeant" (*Hurenweybel*). The former performed all sorts of menial tasks for rulers or urban councils and also supported armies on campaign. The latter had to ensure that the *Tross* or camp followers, did their duty, which included cleaning the camp's latrines.¹⁷³ The regulations of the eighteenth-century garrison of Namur stipulated that soldiers' wives had to clean the barracks on Wednesdays and Saturdays, once drummers had beaten the order around one p.m., while *cantinières* were still expected to help treat the wounded in the nineteenth-century French army.¹⁷⁴

Military quarantine measures were far more far-reaching, however, than the traditional association of women with prostitution. A soldier serving in the Spanish garrison of Namur testified before the provincial court that he had spontaneously offered his help to carry sick soldiers who had arrived in the city in 1689. When his officers

Medianée, arts. 4, 5; inv. no. 2081: Generale Orders, arts. 14, 24; inv. no. 2087: June 14, 1759, June 10, 1760; *Reglement en orders Maastricht (1786)*, art. 35.

170 Biemans, *August von Bonstetten*, 111; Kerckhoffs, *Hygiène militaire*, 174–75; Poswick, *Histoire*, 197, 199.

171 Klaversma, *Weert tussen 1062 en 1602*, 271–79.

172 Liège, AEL, Conseil Privé, 2634: Letter of Servaes Hauben, Maaseik, May 27, 1789; The Hague, NA, Raad van State, inv. no. 2079: Orders June 27, 1717; inv. no. 2087: Orders July 23, 1760.

173 Balon, "Un train sanitaire," 275, 290; Burschel, *Söldner*, 244; Coomans, "The King of Dirt"; Hacker, "Women and Military Institutions," 653; van Werveke, *Die Erwerbung*, 43; Viltart, "Le roi des ribauds"; Vollmuth, *Die sanitätsdienstliche Versorgung*, 144–45, 150–51.

174 The Hague, NA, Raad van State, inv. no. 2081: Generale Orders, arts. 12, 13; Cardoza, *Intrepid Women*, 79–82, 123–25.



Figure 35. Soldiers gathering forage, late seventeenth century (Guérard, *L'Art militaire*).

learned about this, they beat him and forbade him from approaching the same sick soldiers again.¹⁷⁵ The eighteenth-century Dutch navy on the other hand controlled incoming ships suspected of bringing epidemic disease. The Admiralty of the Maze (Meuse) established a special harbour near Hellevoetsluis where ships arriving from the East Indies had to remain in quarantine from seven to forty days. This suggests that the historical concept of a frontier included health aspects as well. Guards stationed at fortress gates likewise had to turn away people suspected of spreading disease.¹⁷⁶

Yet maintaining military health was not solely a top-down process. Common soldiers were also quite capable of constructing shelters and seeking food themselves if the need arose. The disruptive activity traditionally denoted as “foraging,” for instance, encompassed a wide range of actions, ranging from thousands of soldiers collecting forage to individual men and women stealing a cow or gathering wood (see figure 35). Armed forces were very vulnerable to an enemy attack when foraging, which meant that such activities should ideally only be carried out under the commander’s supervision. The chronicle of Emond de Dynter records for example that during the siege of Grave in 1388 a considerable part of the Brabant forces went foraging on their own, despite instructions only to do so under the marshal’s command. In a subsequent Guelders counter-

¹⁷⁵ Jacquet-Ladrier, “Vivre à Namur en temps de guerre,” 166.

¹⁷⁶ Denys, *Police et sécurité*, 244–45; Leuftink, *Harde heelmeesters*, 186–88; van Wissekerke, *Van kwade droes tot erger*, 309–22.

attack many were killed, which demoralized the army.¹⁷⁷ It comes as no surprise, therefore that seventeenth- and eighteenth-century armies included “foraging” in the range of activities employed at military training camps (see chap. 1).

Commanders obviously wanted to control the movement of combatants, but there is far more at stake here than responding adequately to enemy action. The pertinent question was whether individual army members were deemed capable of managing to maintain their own good health. Conflicts about foraging also relate to tensions between formal versus informal knowledge.¹⁷⁸ The French military doctor Colombier suggested that experienced soldiers should guide newer members when looking for vegetables or herbs on campaign, so they did not bring anything poisonous or useless, and his Dutch colleague Joseph Kerckhoffs (1789–1867), the medical officer in charge of the Roermond garrison, argued in 1815 that soldiers should be prevented from gathering plants with which they were unfamiliar.¹⁷⁹

These perceptions were hardly unique. In 1747 the French commandant at Huy ordered the guards at the gates to ensure that no plums entered the city because they caused dysentery. The commanders of Namur gave similar instructions to their subordinates in 1740, 1741, and 1760. These officers shared a general assumption that the eating of unripe or rotten fruit was a major cause of dysentery and saw it as their responsibility to prevent lower-ranking soldiers, who in their view did not have the necessary knowledge, from doing something that damaged their health. Jean Colombier, who did recognise the benefits of eating fresh fruit, vehemently criticized this practice in his 1775 handbook.¹⁸⁰

Even though physicians and surgeons regularly, if not invariably, accompanied armies from at least the Central Middle Ages, it is quite unclear to what extent they could control medicinal practices within their armies. The Freiherr von Natzmer recounted in his memoirs that as a young ensign in the Dutch army he became ill from a “camp disease” (*Lagerkrankheit*), in the aftermath of the failed siege of Maastricht in 1676. His comrades put him on a wagon with other sick soldiers, after which he started to suffer from dysentery. He then drank *lapis prunellae*, a mixture of saltpeter, sulphur, and barley water, felt better, left the wagon, and arranged to stay at an inn. He relapsed later and had to go to a local doctor. Of special interest here is that he learned about this concoction from the count of Dohna, a Prussian general whom he served as a page before entering the army. This recipe must have been, or have become, quite widespread, since Samuel Hahnemann mentioned it as an ineffective treatment in his famous eighteenth-century *Apothekerlexikon*. Still, during the Napoleonic Wars many soldiers continued to trust in the healing properties of gunpowder.¹⁸¹

177 de Dynter, *Chronique*, 3:124, 3:625–626; Hosler, *John of Salisbury*, 79–81.

178 Shively Meier, *Nature's Civil War*, 134–51.

179 Colombier, *Préceptes*, 244; Kerckhoffs, *Hygiène militaire*, 91–92.

180 The Hague, NA, Raad van State, inv. no. 2081: August 25, 1740, September 18, 1740, October 3, 1741; inv. no. 2087: August 6, 1760; Colombier, *Préceptes*, 71–72; Pringle, *Observations*, 88–90; Rouche, “Journal de l'entrée.”

181 Hahnemann, *Apothekerlexikon*, 2:104–12; Howard, *Napoleon's Doctors*, 205; von Adlersfels-

Medicinal use of gunpowder is not only indicative of soldiers helping themselves, but might actually be rooted in specific medical theories. Colombier argued for example that the smoke of tobacco and gunpowder drove miasmas away. The perceived importance of miasmas was such that the burning of aromatic herbs became standard practice in spaces where wounded or sick combatants were kept. A fiscal account relating to the care given to wounded horsemen from Namur in 1347 accordingly notes the purchase of herbs for the room where the wounded lay.¹⁸² The regulations for “the prevention and curing of diseases” of the Dutch army (1673) required the burning of herbs in hospitals or other places where sick soldiers stayed. These hospitals also adopted the medieval practice of keeping gardens so they could grow their own herbs.¹⁸³

The emphasis on gardens is crucial because they existed everywhere soldiers stayed for extended periods of time: fortifications, army camps, and hospitals. This implies at the very least that some soldiers had acquired basic botanical knowledge. Doctor Jean Pierre Paul Bovy, who grew up in the citadel of Liège in the late eighteenth century, still recalled the magnificent gardens of the garrison’s officers when writing his memoirs in the late 1830s. Many plant species found in nineteenth-century fortifications in fact originated in nearby gardens. It is only uncertain who maintained these (see chap. 2).¹⁸⁴

Natural knowledge within an army context went beyond the formal medical practitioners. In the fourteenth century Guy de Chauliac (ca. 1300–1368), a university-educated surgeon, made a list of people who he thought should not be allowed to practise medicine. He mentioned among others “men-at-arms or Teutonic knights and others who serve in war,” who “with conjurations and concoctions, oil, wool, and leaves of cabbages dress all wounds, and base on this that God has put his virtue in words, herbs and stones.”¹⁸⁵ The notebook of the Swiss soldier Michael Andrist, who served in the garrisons of ’s-Hertogenbosch and Maastricht in the 1780s, included several basic treatments against drunkenness, tremors in the hands and feet, infections of the fingers (*panaritium*), nose bleeds, and bad breath. It is conceivable that knowledge of the plants employed in such recipes (wild arum, rosemary, lavender, marjory, St. John’s wort, stinging nettles, betony, creeping cinquefoil, and similar) was widespread among common soldiers.¹⁸⁶

The close connection between army life and travel brought men of war into contact with unfamiliar creatures, but soldiers did not have to explore other continents to encounter exotic species. In 1467–1468, for example, a wild animal (*schamper Tier*) was captured near the *Landwehr* of Aachen, and then shown to the city council. The city’s

Ballestrem, ed., *Memoiren*, 5–6, 25–26.

182 Balon, “Un train sanitaire,” 275, 283; Colombier, *Préceptes*, 84, 165.

183 Corvisier, *L’Armée française*, 2:659; Kerkhoff, “Over de geneeskundige verzorging,” 73; Ritter, “Verhandeling,” 93.

184 Bovy, *Promenades*, 1:67–69, 1:71–72, 1:79; Lhoist-Colmon and Gabriel, “La colline,” 73; Ritter, “Verhandeling,” 38; van der Heijden and Sanders, eds., *De levensloop*, 248.

185 Mounier-Kuhn, *Chirurgie de guerre*, 68, 85–97.

186 Soesterberg, NMM, inv. no. 00216132: Notebook of soldier Michael Andrist, fols. 19r–21v. See also Peters, ed., *Peter Hagendorf*, 59, 60.

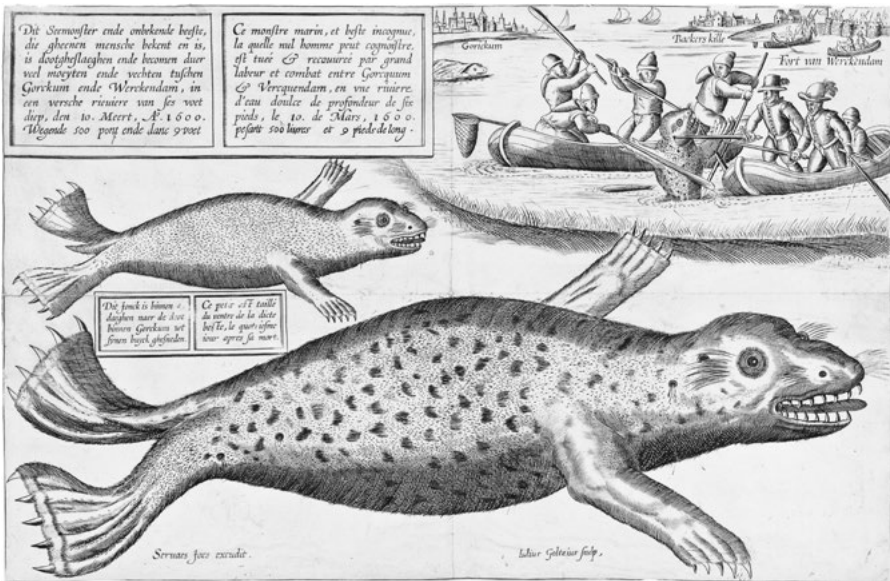


Figure 36. Engraving of the killing of a hooded seal in the Meuse/Merwede, by Julius Goltzius, 1600 (HVG, Collectie Atlas van Gijn, VG864: Julius Goltzius, Een zeehond in de Merwede, 1600). Reproduced with permission of the Huis van Ghijn.

accounts do not identify the species, but since it was put on display, it is reasonable to suggest that it was considered rare for some reason. It might have been a lynx, given that this is an animal that is native to the area, but very rarely seen.¹⁸⁷ In 1600, on the other hand, soldiers and fishermen killed a “sea monster” in the Meuse estuary near the fort (*schans*) of Werkendam, which turned out to be a pregnant hooded seal. This species is significantly larger than a harbour seal, and normally lives around the North Pole.¹⁸⁸ A French dragoon named Marquant, a native of Commercy, stayed for some time in Malmö during the 1792 invasion of the Southern Netherlands, and recorded a description of a black grouse in his notebook, because he had never seen such an animal before. This bird requires a very specific habitat and may have disappeared from most of the Meuse Region by the eighteenth century (see also chap. 3). Today, the Hohes Venn is one of its last refuges in Western Europe.¹⁸⁹

Armies therefore contributed in several ways to the preservation and spread of zoological and botanical knowledge. The accounts of the Count of Blois from 1362 mention that his farrier went to Dordrecht to buy horse medicine (theriac, laurel oil, dialtea, turpentine, dragon’s blood, olive oil, *sagimen vitri*) for his forthcoming military expedition to Guelders. He also took care to compile a book on this matter (*boec van medicinen van*

¹⁸⁷ Kraus, *Die Aachener Stadtrechnungen*, 426.

¹⁸⁸ ‘t Hart, “Zeehondenjacht,” 100.

¹⁸⁹ Vallée and Pariset, eds., *Carnet*, 220–21.

paerden). This might have been a copy of another work, which the farrier could not bring with him. Farriers continued to have a major role in horse medicine until the founding of veterinary schools in the late eighteenth and early nineteenth centuries.¹⁹⁰ Gédéon Bonivert, a Huguenot from Sedan, served as a lieutenant in the British army in the 1690s, and collected plants, lichens, and fungi in the Low Countries, England, and Ireland. Part of his herbarium has still been preserved.¹⁹¹

One could question the representativity of these examples, given the close connection between medicine and botany, or the fact that these men were relatively well educated. The Dutch militiaman (*schutter*) Jan Teunisse from Amsterdam wrote down how his comrades and he made soup in the Campine/Kempen during the Ten Days' Campaign (1831). He was lucky enough to obtain salt, but those who did not threw some herbs into the cauldron instead. Apparently, it made their soup look like mud and blackened their lips and tongue.¹⁹² The aim here, however, is not to prove that the average soldier had extensive natural knowledge, especially if he came from an urban background, but that armies as organizations played a significant role in the spread of biological knowledge. Basic forms of natural knowledge were almost a prerequisite for military life. As Erik A. Lund has argued, a general had to be able to estimate the amount of grassland needed to produce forage for his men's horses, while the common trooper had to actually gather grass and herbs. The same applies to cutting wood, hunting, fishing, and digging or destroying dams, dikes, or trenches.¹⁹³

Highlighting this informal knowledge also helps us to reconsider traditional gender divisions within armies. Regulations for the Dutch army from 1729 specified that soldiers' wives were allowed to shoe military horses. They presumably obtained the practical know-how from having to fend for themselves during campaigns. The garrison orders of Namur include one peculiar order from July 12, 1742, which says that soldiers could search for wild strawberries in nearby forests, but not bring them into town. Apparently, they peeled the fruits, which ruined them. The fact that soldiers themselves are targeted here, and not their families, who are mentioned elsewhere in the garrison orders, is noteworthy.¹⁹⁴

What these examples make clear is that the role of the Dutch and French military in the discovery of the mosasaur genus, as mentioned in the introduction, relate to much wider practices of armies' spreading and conservation of natural history. Basic forms of biological knowledge were indispensable for army members to preserve their own health as well as that of the animals on which they depended. Medical practitioners, such as Dr. Hoffmann, commemorated in the name of the *mosasaurus hoffmanni*, played

190 van Doorninck, ed., *De tocht van Jan van Blois 1362*, 130–31; van Wissekerke, *Van kwade droes tot erger*, 197–223.

191 Dandy, ed., *The Sloane Herbarium*, 37, 93–94; Wijnands, "Plants."

192 Teunisse, *Onderdaan in Oranje's oorlog*, 77–78.

193 Lund, *War for the Every Day*, 9–16, 65–69, 76–77, 88–92.

194 The Hague, NA, Raad van State, inv. no. 2081: July 12, 1742; Dibbetz, *Groot militair woordenboek*, 612.

a key role in this regard, but at the same time many common soldiers and their families also proved to be quite knowledgeable about plant and animal life.

Conclusion

Armies had a major role in bringing about changes in healthcare, but the grand narrative of progress in which armed forces suddenly became aware of disease prevention during the Renaissance can no longer be maintained. This assumption originates in a misunderstanding of medieval armies and a tendentious reading of the available sources, or an altogether lack of primary source material to begin with. Medieval armies suffered from epidemics during sieges and extended campaigns in different environmental contexts, but such circumstances can hardly be considered typical for the kind of warfare, namely mounted raiding, that went on in the Meuse Region most of the time.

Rather than persisting in such a mistaken teleology, this chapter has argued that epidemics might have become more common towards the end of the fifteenth century, as a result from shifts towards larger and more permanent armed forces, which were also more likely to move into different disease environments. From 1250 to 1850 medical theories first formulated in Antiquity, and frameworks developed during the Central Middle Ages, notably the hiring of physicians and surgeons to accompany armies on campaign, continued to define healthcare within armed forces. Informal medical practitioners, such as soldiers, their families, and farriers, also retained an important role in the preservation of both humans' and animals' physical wellbeing. It was not until the nineteenth century that military doctors, equipped with new medical principles, took full control. Even though some elements support an idea of "progress," as it is traditionally understood, the historical reality is far more complex.

CONCLUSION

The role of military men in the discovery of the mosasaur genus, a major contribution to natural history, was clearly not an isolated event, but should be seen as emblematic for the wide-ranging, and often surprising, spectrum of army–ecosystem interactions. Armies' conscious and concerted protection and conservation of ecosystems did indeed precede the rise of environmentalism by at least several centuries, as demonstrated throughout this study, whose chapters represent the ecosystem concept: frontiers, fortifications, disturbances, policing, and army health.

Fortifications in the Meuse Region enhanced the diversity of the landscape by their use of linear elements such as ditches, hedges, stone walls, and underground galleries. The plant and animal diversity in nineteenth-century fortresses was so extensive that it drew the attention of contemporary naturalists. Armed forces also created or conserved wilderness in the form of woodlands, inundations, and heathlands. Some of these served as defensive elements within frontiers, others developed as a consequence of military training practices. Many have now become nature reserves. Simply maintaining the health of the people and animals that constituted an army led to the construction or preservation of gardens.

This protective role has its limits. Armed forces preserved specific landscapes, biotic communities, and species, but in the long run their contribution remained largely restricted to militarized landscapes, landscapes for which military use was a defining element. Armies played a very significant role in the conservation of unique ecosystems within frontiers and fortifications, but outside these contexts they only interfered when normal regulating forces (such as forest or field guards) proved to be insufficient. Soldiers mainly became involved in policing practices when restricting access to ecosystems or natural resources resolved around attempts to control the movements of people and horses perceived as indispensable for them.

Armies were an essential, but not exclusive, factor in the ecological richness of militarized landscapes along the Meuse. These landscapes came about as a result of complex and constantly changing interactions between several protagonists. Aside from geographical and geological features, other social groups, animals, and plants also proved quite capable of exerting an influence, sometimes in direct competition with soldiers. The use of mining galleries and inundation basins was largely determined by local hydrography and soil structure. The spread of garden plants in fortifications cannot be explained by referring solely to gardens managed by army members, but also needs to take the presence of calcareous materials, gardens cultivated by local inhabitants, and the capacity of plants themselves to colonize new spaces into account.

The ecological richness of these landscapes, then, was to some extent unintended. Armed forces protected specific ecosystems, and promoted landscape diversity, because this diversity had military value, not because they had an interest in the natural world in the same way as environmentalist organizations. Military courts and regulations, referring to the military as an organization, did not consider environmental degradation as a particularly important crime, unless it was considered as a form of insubordination.

When armies did interfere in the protection of ecosystems, they often had to act against their own colleagues or adversaries. The importance of natural history in a military context likewise derived from the need to ensure army members' own wellbeing and simple survival on campaign.

At the other end of the spectrum the role of military disturbances proved to be as ambiguous as protective behaviour in the strict sense of the word. Premodern armies could exert destructive forces similar to natural disasters on ecological systems, even with the relatively primitive tools at their disposal, but the short- and long-term effects of such disasters remains open to debate. Permanent degradation was more an exception rather than the rule, testimony to the surprising resilience of the affected humans, animals, and plants. Despite large-scale cutting down of wood, trampling of agricultural fields, floodings, and burned houses, very few settlements were abandoned permanently as the result of warfare.

Disturbances were also not necessarily detrimental to the survival of ecological systems. Some ecosystems can only exist when processes of ecological succession are slowed down or interrupted. Frontiers and fortifications present a very strong case for long-term interactions, but they could only be conserved through short-term disturbances or interventions: simple maintenance and military training exercises. If peasants, citizens, or paid labourers did not remove vegetation from the walls and ditches at regular intervals, the walls would have crumbled and the ditches became land. The grazing of sheep in military fortifications and the keeping of carp in water-filled ditches were likewise very practical measures to ensure basic maintenance.

The emphasis on human intervention is primordial, because all ecosystems within the Meuse Region were man-made to some extent. Unwanted species, such as wolves, but also weeds and thorn bushes, could therefore profit from the lack of repression during warfare and re-establish themselves. This also draws attention to the agency of animals and plants, for the capability of these species to react quickly to such sudden opportunities is remarkable. Even though this spread of wilderness, or uncontrolled nature, was quickly reversed as soon as peace returned, restoring a community and associated ecosystems to a pre-war state could take several decades.

It is in fact unclear to what extent warfare in itself is an adequate factor to explain permanent ecological changes. The best examples of such long-term effects, such as the deforestation of the banks of the Meuse River and the disappearance of vineyards in the northern half of the Meuse Region during the early modern period, cannot be understood by considering armed conflicts on their own. Deforestation processes originated in a pressing need for wood as fuel and timber. Arms and gunpowder production, as well as shipbuilding, had a far more important role in this regard than sieges, which, while very destructive, were relatively rare and short-term events. In the case of vineyards and herring fisheries, warfare seems to have simply accelerated the impact of climate change.

The continuous role of environmental pressures, weather, and climate, but also geographical and geological features, on the behaviour of armies should therefore not be underestimated. It confirms the value of referring to reciprocal interactions between armies and ecological systems. The often-harmful effects of the weather on fortifications and army members were a constant factor throughout the 1250–1850 period, and in

many ways they still are. While engineers did devise increasingly effective measures to control local hydrography, actual supply of water in times of need, as a defensive line or as drinking water, remained problematic. The Meuse itself continued to be a constant source of problems because it was fed by rainwater. Depending on the season, multiple fords could appear or disappear, river traffic could become impossible, and, worst of all, the Meuse could leave its riverbed and flood the very defences built on its banks.

Military forces responded to these challenges by creating their own artificial wilderness. They made or contributed to the construction of canals, and planted or protected woods on heathlands, near frontiers, and in the outworks of fortresses. This demonstrates the difficult distinction between man-made environments on the one hand, symbolized by gardens, and uncontrolled nature, symbolized by wilderness, on the other. Ideas about wilderness also contained a very practical yet cynical element, for the areas perceived as being outside one's own garden, outside one's main defences, were far more likely to become victims of the disruptive activities of armies, which in turn encouraged the spread of actual wilderness or geographical features and species considered to be undesirable.

Because of this importance of ecological pressures substantial differences could be observed within the Meuse Region. The choice of particular forms of defence, such as water versus woodlands or mining galleries, was largely determined by soil characteristics. Marching armies preferred the banks of the Meuse itself or fertile agricultural lands such as Hesbaye, and avoided large stretches of perceived wilderness, in the shape of the seemingly endless wood- or heathlands of the Argonne, Ardennes, and Hohes Venn whenever possible. These areas still experienced a significant military presence, but it assumed different forms. Such stretches of wilderness served as frontiers, refuges, sources of wood, and military training grounds. In this way, armed forces actually contributed to the apparently unchanging geographical characteristics of these areas.

Political or economic factors were essential as well. Many scholars have overemphasized their importance, however, and neglected ecological impacts. Fortifications built alongside the Meuse River did not just defend river crossings, but also served to collect tolls. The Campine/Kempen saw relatively limited military action until it found itself in the middle of war-making parties during the Eighty Years War. The construction of new village forts (*schansen*), often in the most inaccessible part of a settlement, was a direct response to changing political circumstances. The policy of neutrality of the Prince-Bishop of Liège from the late fifteenth century onwards, which entailed a relative absence of standing armies and fortresses adapted to resist artillery, was of major consequence for army-ecosystem interactions.

Standing armies and artillery fortresses refer to two main, well-known changes within the early modern period. They brought about tensions between the military as an organization and more traditional forms of military service, and contributed to the use of former soldiers as government officials tasked with controlling natural resources. The spread of gunpowder weapons simultaneously encouraged further diversity within a limited number of medieval fortifications and brought about the abandonment of most others. The use of larger armies, which also tended to move regularly between different disease environments, increased morbidity and mortality rates, with early modern

soldiers on average being more likely to succumb to an epidemic than their medieval predecessors.

Despite these developments, major continuity could be observed in the Meuse Region between the Central Middle Ages and the nineteenth century. Key aspects of current armed forces, such as the military–civilian divide, gunpowder weapons, passports, engineers, university-educated doctors, industrialized arms production, and military domains, originated in this era, but at the same time older traditions and structures continued to play a significant role. The garden–wilderness contrast dominated the military perception of frontier landscapes, medieval stone fortifications retained their defensive value, wolves profited from warfare to spread to new areas, distinctions between armed forces and the general population were not drawn too rigidly, and soldiers still had some control over the preservation of their own health.

The years 1250 to 1850 can therefore be seen as an intermediary period in the history of the Meuse Region, during which military attempts to control ecosystems became more intensive, without causing a break with older management practices. Most of the tools army members employed to maintain and improve their own place in ecological systems (axes, spades, shovels, and torches, but also man and animal labour, manure, and herbal remedies) had been around for thousands of years. Human interventions are not necessarily detrimental. They can actually increase biodiversity by creating more variation within landscapes. Armies contributed to this diversity because their needs often opposed those of other social groups. They protected or damaged specific biotic communities to preserve their own health or gain a strategic advantage. Historical armed forces had close and extensive contacts with the other components of ecosystems. Military commanders valued horses and waterways because movement would have become almost impossible without them, while their subordinates had to gather food and forage on the spot, and needed wood for the building of fortifications, the making of weapons, and shielding themselves from the cold.

In modern armed forces, by contrast, soldiers have to devote much less attention to such matters, for military engineers and doctors ensure that environmental constraints on military operations (such as difficult terrain or disease) are reduced as much as possible. Military organizations are not unique in this regard, since humans' general impact on ecological systems has become so intensive and all-encompassing during the last century and a half that many other species are driven to extinction. The nineteenth century can be considered as a main turning point because several key changes occurred in a relatively short time-frame: military forces established their own domains, which civilians were no longer allowed to enter; they adopted on a massive scale new gunpowder weapons (the machine gun, breech-loading rifles, and artillery), fortifications (concrete and barbed wire), means of transport (railways and steamships), and communication (the telegraph and radio), and university-educated doctors introduced innovative medical theories, all of which became especially important in increasingly global and industrialized conflicts.

Any chronological limit is to some extent artificial. The successful German invasion of France in 1940, for instance, was made possible by French generals' misguided perception of the Ardennes as an impassable wilderness, and even though this campaign will

forever be associated with tanks and other mechanized vehicles, the *Wehrmacht* still depended on the labour of tens of thousands of horses. The use of plants in fortifications did not disappear with the introduction of concrete and barbed wire, but remained important in the context of camouflage. Interactions between armies and ecosystems remained as complex as in the Middle Ages. In fact, current debates about the ecological impact of military forces demonstrate that even today these impacts are quite ambiguous and cannot be reduced to environmental destruction or conservationism.

In this way, the military–ecological interactions examined here shed new light on military history in general. Rather than focusing on technology and the beginning of modernity, it demonstrates the continuous importance of frameworks established during the Middle Ages and draws attention to the ecological aspects of state formation. The emphasis on ecosystems rather than political actors contributes to a more global military history in which technology and military doctrines are just two elements among many in the complex interactions between armies and ecological systems. Instead of highlighting the impact of gunpowder and drill, it is worth explaining to what extent European armies could establish themselves on other continents because they managed to adapt to and influence local ecosystems, something that they would not have been able to do without native support and indigenous knowledge.

This emphasis on placing discussions about the ecological impacts of military forces on a sound historical footing is not to ignore the very real changes that have come about in recent decades through the efforts of environmentalist organizations. The spread of chemical and atomic weapons has added a whole new level to problems regarding the “environmental footprint” of the military. Self-congratulatory statements that today’s military forces are doing something unprecedented or are more environmentally conscious than their predecessors are not only simplistic but also counterproductive because they imply that further efforts are unnecessary or at least not urgent. Armies’ destructive capabilities have increased significantly in the last century and a half. It is only logical that conservationist efforts have to be stepped up in parallel. Merely continuing practices that are centuries old and calling them “progressive” and “modern” will not do.

The Meuse Region in the period 1250–1850 provides an excellent case study that challenges traditional interpretations of the relationship of armed forces with their surrounding world partly because of its strategic importance, but also because it is relatively small when seen in a global, or even European context. What the debate really needs therefore is more research regarding historical army–ecosystem interactions, preferably in a long-term and transnational perspective. This will reveal whether the army–ecosystem interactions that can be observed in the basin of the Meuse River are unique or resemble those in other regions. Armies around the world have influenced ecosystems and were influenced by them from the very beginning of human warfare, firm evidence of which dates back at least to the Neolithic period. Despite the praiseworthy efforts of peace organizations it is unlikely that the near future will see the end of warfare. A better understanding of how armies and ecosystems interacted in the past will be indispensable for dealing with the ecological consequences of today’s and future military actions. In this way, we might be able to bring about a real green turn in the present world as well as military history.

Appendix

OVERVIEW OF PLANTS FOUND IN THE FORTIFICATIONS OF MAASTRICHT IN 1868 BASED ON DUMOULIN, *GUIDE DU BOTANISTE*

Species	Location
Common snapdragon (<i>Antirrhinum majus</i>)	First city wall of Maastricht (Lang Grachtje)
European columbine (<i>Aquilegia vulgaris</i>)	Old (medieval) wall
Tower mustard (<i>Arabis glabra</i>)	Medieval city walls
Nettle-leaved goosefoot (<i>Chenopodium murale</i>)	Walls fortifications
Long-headed poppy (<i>Papaver dubium</i>)	Ramparts fortifications
Corsican stonecrop (<i>Sedum dasyphyllum</i>)	Rocks and walls in Maastricht
Common alder (<i>Alnus glutinosa</i>)	Coppice wood outside the Boschpoort
Grey alder (<i>Alnus incana</i>)	Coppice wood outside the Boschpoort
Wild cherry (<i>Prunus avium</i>)	Coppice wood outside the Boschpoort
Aspen (<i>Populus tremula</i>)	Coppice wood outside the Boschpoort
Bird cherry (<i>Prunus padus</i>)	Coppice wood outside the Boschpoort
White wood-rush (<i>Luzula luzuloides</i>)	Coppice wood outside the Boschpoort
Wood speedwell (<i>Veronica montana</i>)	Coppice wood outside the Boschpoort
Violet helleborine (<i>Epipactis purpurata</i>)	Coppice wood outside the Boschpoort near the canal
Bur-chervil (<i>Anthriscus caucalis</i>)	Rampart of the Boschpoort and on the talus (slope) of a nearby battery (artillery emplacement)
Weasel's snout (<i>Misopates orontium</i>)	Outside the Boschpoort
Golden dock (<i>Rumex maritimus</i>)	Outside the Boschpoort
Pepper-saxifrage (<i>Silaum silaus</i>)	Outside the Boschpoort
Dwarf elder (<i>Sambucus ebulus</i>)	Fortifications outside the Boschpoort
Downy oat-grass (<i>Helictotrichon pubescens</i>)	Fortifications and fields outside the Boschpoort
Good king Henry (<i>Blitum bonus-henricus</i>)	Fortifications and fields outside the Boschpoort
Red goosefoot (<i>Oxybasis rubra</i>)	Fortifications and fields outside the Boschpoort
Red hemp-nettle (<i>Galeopsis ladanum</i>)	Fortifications and fields outside the Boschpoort
Round-leaved cranesbill (<i>Geranium rotundifolium</i>)	Dry places outside the Boschpoort
Sharp-leaved fluellen (<i>Kickxia elatine</i>)	Fields outside the Boschpoort
White wood rush (<i>Luzula luzuloides</i>)	Covered way of Fort Willem (Caberg)

Current presence in the area	Remarks
Rare	Garden plant of Mediterranean origin
Rare	
Threatened with extinction	
Very rare	Archaeophyte
Relatively common	
Rare	Garden plant of Mediterranean origin
Relatively common	Probably planted by the garrison
Relatively common	Probably planted by the garrison
Relatively common	Probably planted by the garrison
Relatively common	Probably planted by the garrison
Relatively common	Probably planted by the garrison
Rare	Also at Fort Willem (see below)
Rare	
Extinct	
Very rare in 1868. Currently rare	
Rare	Archaeophyte. Also outside the Wijckerpoort (see below)
Rare	
Rare	
Rare	
Relatively common	
Very rare	Archaeophyte. Also outside the Wijckerpoort (see below)
Relatively common	
Very rare	Also outside the Wijckerpoort (see below)
Rare	
Rare	Archaeophyte
Rare	Also near the Boschpoort (see above)

Species	Location
Wild carrot (<i>Daucus carota</i>)	Fortifications between the Tongerse Poort and Brusselse Poort (on the west side of the city)
Pink water-speedwell (<i>Veronica catenata</i>)	Fortifications between the Tongerse Poort and Brusselse Poort
Yellow anemone (<i>Anemone ranunculoides</i>)	Fortifications between the O.L. Vrouwepoort (near the Meuse) and Sint-Pieterspoort (near the Jeker) on the south side of the city
Brown sedge (<i>Carex disticha</i>)	Ditches of the Sint-Pieterspoort and O.L. Vrouwepoort
Narrow small-reed (<i>Calamagrostis stricta</i>)	Ditches of the Sint-Pieterspoort and O.L. Vrouwepoort
Fringed water-lily (<i>Nymphoides peltata</i>)	Canal between the O.L. Vrouwepoort and Sint-Pieterspoort
Sulphur cinquefoil (<i>Potentilla recta</i>)	Outside the O.L. Vrouwepoort and Sint-Pieterspoort next to a road leading to the glacis
Meadow cranesbill (<i>Geranium pratense</i>)	Fortifications outside the O.L. Vrouwepoort
Nottingham catchfly (<i>Silene nutans</i>)	Fortifications outside the Sint-Pieterspoort
Jagged chickweed (<i>Holosteum umbellatum</i>)	Walls and fortifications outside the Sint-Pieterspoort
Thale cress (<i>Arabidopsis thaliana</i>)	Talus of a ditch near the Meuse at Sint-Pieter
Golden dock (<i>Rumex maritimus</i>)	Ditches in the fortifications at Sint-Pieter
Meadow barley (<i>Hordeum secalinum</i>)	Glacis fortifications near the Meuse at Sint-Pieter
Grey mouse-ear (<i>Cerastium brachypetalum</i>)	Dry places outside fort Sint-Pieter on ramparts
Wood avens (<i>Geum urbanum</i>)	Sunken lane near fort Sint-Pieter
Wild thyme (<i>Thymus serpyllum</i>)	Fortifications Sint-Pietersberg
Lesser trefoil (<i>Trifolium dubium</i>)	Fortifications Sint-Pietersberg
Common cottongrass (<i>Eriophorum angustifolium</i>)	Old trench in the direction of Kanne
Black horehound (<i>Ballota nigra subsp. meridionalis</i>)	Ditches alongside a road outside the old Wijckerpoort (on the east side of the Meuse)
Weasel's snout (<i>Misopates orontium</i>)	Outside the Wijckerpoort
Good king Henry (<i>Blitum bonus-henricus</i>)	Fields and fortifications outside the Wijckerpoort
Red hemp-nettle (<i>Galeopsis ladanum</i>)	Fields and fortifications outside the Wijckerpoort
Meadow barley (<i>Hordeum secalinum</i>)	In the fields outside the Wijckerpoort
Whorl-grass (<i>Catabrosa aquatic</i>)	Ditches in the fortifications at Amby
Reflexed stonecrop (<i>Sedum rupestre</i>)	Walls of the fortifications near a dock on the way to Borgharen
Common water-plantain (<i>Alisma plantago aquatica</i>)	Ditches in the fortifications

Current presence in the area	Remarks
Relatively common	
Very rare	
Rare	
Relatively common	
Extinct	
Rare	
Rare	Neophyte
Rare	
Very rare	
Very rare	
Relatively common	
Rare	
Very rare	Also outside the Wijckerpoort (see below)
Very rare	Neophyte
Relatively common	
Very rare	
Relatively common	
Very rare	This trench might be a relic of one of the sieges of Maastricht
Rare	Archaeophyte
Rare	Archaeophyte. Also near the Boschpoort (see above)
Very rare	Archaeophyte. Also near the Boschpoort (see above)
Very rare	Also near the Boschpoort (see above)
Very rare	Also at Sint-Pieter (see above)
Rare	
Rare	
Relatively common	

Species	Location
Marsh-marigold (<i>Caltha palustris</i> subsp. <i>palustris</i>)	Ditches in the fortifications
Blue water-speedwell (<i>Veronica anagallis-aquatica</i>)	Ditches in the fortifications
Marsh-bedstraw (<i>Galium palustre</i>)	Ditches in the fortifications
Fennel pondweed (<i>Potamogeton pectinatus</i>)	Ditches in the fortifications
Cuckoo flower (<i>Cardamine pratensis</i>)	Humid areas within the fortifications
Dark mullein (<i>Verbascum nigrum</i>)	Humid areas within the fortifications
Hedge bedstraw (<i>Galium mollugo</i>)	Fields of the fortifications
Germander speedwell (<i>Veronica chamaedrys</i>)	Meadows and fields of the fortifications
Fairy flax (<i>Linum catharticum</i>)	Dry places in the fortifications
Little yellow rattle (<i>Rhinanthus minor</i>)	Dry places in the fortifications
Rough hawk's-beard (<i>Crepis biennis</i>)	Everywhere in the fortifications
Chives (<i>Allium schoenopraum</i>)	Fortifications
Cow parsley (<i>Anthriscus sylvestris</i>)	Fortifications
Narrow leaved hawk's-beard (<i>Crepis tectorum</i>)	Fortifications
Lopsided oat (<i>Avena strigosa</i>)	Fortifications
Reed sweet-grass (<i>Glyceria maxima</i>)	Fortifications
Hogweed (<i>Heracleum sphondylium</i>)	Fortifications
Salad burnet (<i>Sanguisorba minor</i> subsp. <i>minor</i>)	Fortifications
Meadow buttercup (<i>Ranunculus acris</i>)	Fortifications
Bulbous buttercup (<i>Ranunculus bulbosus</i>)	Fortifications
Creeping buttercup (<i>Ranunculus repens</i>)	Fortifications
Greater yellow-rattle (<i>Rhinanthus alectorolophus</i>)	Fortifications
Curly dock (<i>Rumex crispus</i>)	Fortifications
Broad-leaved dock (<i>Rumex obtusifolius</i>)	Fortifications
Hybrid dock (<i>Rumex x pratensis</i>)	Fortifications
Meadow saxifrage (<i>Saxifraga granulata</i>)	Fortifications
Meadow goat's-beard (<i>Tragopogon pratensis</i> subsp. <i>pratensis</i>)	Fortifications
Common cornsalad (<i>Valerianella locusta</i>)	Fortifications

BIBLIOGRAPHY

Manuscript Sources

Amsterdam, Rijksmuseum (RM):

Object nos. RP-P-OB-77.339, RP-P-OB-77.682, RP-P-OB-77.706, RP-P-OB-78.784-250

Arlon, Archives de l'Etat (AEA):

062 Archives du Conseil de Luxembourg, inv. nos. 1121, 1287

Arnhem, Gelders Archief (GA):

Hertogelijk Archief, inv. nos. 445, 1580

Bar-le-Duc, Archives Départementales de la Meuse (ADM)

Série B Cours et juridictions avant 1790:

B 1280, 1281, 1853, 1854, 1879, 1907, 1936.

Bern, Burgerbibliothek (BB):

FA von Bonstetten

EK 2008/400 Skizzenbuch von August von Bonstetten

Brussels, Algemeen Rijksarchief / Archives générales du royaume (ARA):

Cartes et plans manuscrits, no. 73, 116

— . Koninklijke Bibliotheek van België / Bibliothèque royale de Belgique (KBR)

Manuscrits:

9068, 9242, 22089

Cartes et plans:

MS IV 5.567

— . Centre de documentation du Musée royal de l'Armée / Documentatiecentrum van het

Koninklijk Museum van het Leger en de Krijgsgeschiedenis (CDMRA)

Ancien Régime, inv. no. II/20

Chicago, Art Institute of Chicago:

1927.5653

Dordrecht, Huis Van Gijn (HVG)

Collectie Atlas van Gijn:

VG864 Julius Goltzius, Een zeehond in de Merwede, 1600

Dresden, Die Sächsische Landesbibliothek- Staats-und Universitätsbibliothek (SLSU)

inv. no. 334171156

Grave, Streekarchief Land van Cuijk (SLC)

Archief Gemeente Grave, inv. nos. 217, 218

The Hague (Den Haag), Koninklijke Bibliotheek (KB)

Medieval Manuscripts:

Wapenboek Beyeren

— . Museum voor Communicatie (MC)

Collectie Doesburg:

Letter nos. 45-83

— . Nationaal Archief (NA)

1.01.19. Archief van de Raad van State:

inv. nos. 1947, 1968, 2057, 2074 I-II, 2078, 2079, 2081, 2087, 2088, 2598, 2599

1.01.45 Hoge Krijgsraad en Zeekrijgsraden:

inv. no. 262

- 2.13.9 Stamboeken onderofficieren en minderen na 1813:
inv. no. 597
- Hasselt, Rijksarchief (RAH)
Schepenbank Rekem:
inv. no. 938
Schepenbank Stokkem:
inv. no. 162
Notariaat:
Notaris Caenen, Rekem, microfilm no. 1462471
Notaris Claessens, Maaseik, microfilm no. 1462274
- 's-Hertogenbosch, Brabants Historisch Informatie Centrum (BHIC)
178 Resoluties Raad van State:
inv. nos. 188, 193, 326, 331, 332
5121 Schepenbank Sint-Michielsgestel:
inv. no. 45
- Liège, Archives de l'Etat (AEL)
Archives Echevins de Liège. Procès Criminels:
inv. nos. 286, 750
Conseil Privé:
inv. no. 2634
Etats du Pays de Liège et Comté de Looz:
inv. nos. 268, 2965, 2966, 2974, 3007
Fonds Hollands:
inv. no. 396
- London, British Library (BL):
Manuscripts, Stowe MS 17
- Maaseik, Stadsarchief (MS)
Oud Archief, Magistrale Rol:
Stadsrekening 1782–1783
- Maastricht, Regionaal Historisch Centrum Limburg (RHCL)
Frans Archief:
inv. nos. 613, 710, 1177.
- 01.01. Staten van het Overkwartier van Gelre:
inv. nos. 552, 556
- 01.187E Hoofdgerecht Thorn en het kerspel Thorn:
inv. no. 1386
- 01.176 Schepenbank Breust:
inv. no. 1491
- 01.004 Hof van Gelder te Roermond, tevens Leenhof van het Overkwartier:
inv. no. 1636
- 04.01 Provinciaal Bestuur van Limburg:
inv. nos. 18, 30, 81, 124
- 07.E01 Oud Militaire Archieven:
inv. nos. 1, 2, 5, 9, 17, 40
- 16.0502 Familie de Bounam de Ryckholt:
inv. no. 598
- 20.085B Indivies laaggerecht Maastricht, procesdossiers:
inv. no. 4487

- Namur, Archives de l'Etat (AEN)
Chartier des Comtes de Namur:
inv. no. 448
Conseil Provincial de Namur:
inv. no. 4266
Conseil de Guerre Provincial
inv. nos. 227, 1424, 2678
- Paris, Bibliothèque nationale de France (BnF)
Département des manuscrits. Français:
122, 160, 344
Département Arsenal:
MSS 6452 (456), 6452 (457), 6452 (458B,1), 6452 (458B,3), 6453 (461), 6453 (462)
Département Cartes et plans:
GE BB-246 (IX, 128-129), GE D-14449, GE D-16345
- Private Collection (Maastricht)
Discharge and passport for Gregoire Vilansin, Maastricht, December 26, 1677.
Documents concerning the establishment of the colonel's company
of the regiment Bouillon, 1757
- Rotterdam, Atlas van Stolk (AS):
inv. no. 3224
- . Stadsarchief (SAR)
Oud Notarieel Archief (ONA):
inv. nos. 46, 86, 91, 92, 93, 96, 108, 142, 204, 248, 332, 341, 344, 390, 397,
407, 417, 452, 465, 466, 495, 632
- Soesterberg, Nationaal Militair Museum (NMM):
inv. nos. 00104106, 00216132
- Tongeren / Tongres, Stadsarchief (SAT)
Ancien Regime:
inv. nos. 1, 2 Resoluties Stadsmagistraat
Sint-Jacobsgasthuis:
Charter June 9, 1491
Schepenbank Overrepen-Kolmont
III Diverse Stukken
- Vincennes, Service Historique de la Défense (SHD):
GR 1Yc 158, GR 20Yc 99

Printed Sources

Abbreviations

- ACAM: Annales du Cercle Archéologique de Mons
 ASAN: Annales de la Société Archéologique de Namur
 AIAL: Annales de l'Institut Archéologique du Luxembourg
 BCRH: Bulletin de la Commission Royale d'Histoire
 BIAL: Bulletin de l'Institut Archéologique Liégeois
 BSAHDL: Bulletin de la Société d'Art et d'Histoire du Diocèse de Liège
 BSHAM: Bulletin des Sociétés d'Histoire et d'Archéologie de la Meuse
 BSSL: Bulletin de la Société Scientifique et Littéraire du Limbourg
 OLL: Het Oude Land van Loon (from 76 (1997) superseded by *Limburg—Het Oude Land van Loon*)
 RN: Revue du Nord
 ZAG: Zeitschrift des Aachener Geschichtsvereins

Primary Sources and Documents

- Anon. "Attaque de Dinant par le parti des La Marck, vers 1490." ASAN 11 (1870–71): 256–57.
 —. *Besluiten van het staats-bewind der Bataafsche Republiek*, December 9, 1803.
 —. *Bulletin des lois de l'empire français XI^e série, deuxième semestre de 1862. Partie supplémentaire*, vol. 20. Paris, 1863.
 —. *Discours prononcés par M. Desjobert député de la Seine-Inférieure dans la discussion du budget des dépenses pour 1848, au sujet de l'état sanitaire des troupes de l'armée de terre et de la marine*. Paris, 1847.
 —. *Enquete ende informatie upt stuck van der reductie ende reformatie van den schiltaelen, voertijts getaxeert ende gestelt geweest over de landen van Hollant ende Vrieslant gedaen in den jaere MCCCXCIII*. Leiden: Brill, 1876.
 —. *Essai sur l'armée hollandaise*. London, 1793.
 —. *Figure d'un loup ravissant trouvé en la Forest des Ardennes. Et de la destruction par luy faite en plusieurs bourgs, villages, & dependances d'icelle Forest au mois de Decembre dernier passé*. Troyes, 1587.
 —. *Le Guide des sous-officiers de l'infanterie française*. Paris, 1811.
 —. *Informacie up de staet faculteyt ende gelegentheyt van de steden ende dorpen van Hollant ende Vrieslant om daerna te reguleren de nyeuwe schiltalee gedaen in de jaere MDXIV*. Leiden: Sijthoff, 1866.
 —. *Militair Wetboek der Vereenigde Nederlanden*. Amsterdam, 1836.
 —. *Nauwkeurig dag-verhaal van 't campement bij Oosterhout*. The Hague, 1732.
 —. *Orders en reglementen voor den dienst in het guarnisoen der stad Maastricht, plaatse van Wyk, en onderhoorige forten*. Maastricht, 1749.
 —. *Ordonnance du roi concernant les gouverneurs et lieutenants généraux des provinces, les gouverneurs et états-majors des places, et le service dans lesdites places. Du 25 Juin 1750*. Paris, 1750.
 —. *Ordonnance du Roi concernant le Corps du Génie du 31 Décembre 1776*. Metz, 1777.
 —. *Recueil général des lois et ordonnances depuis le 7 aout 1830*, vol. 11. Paris, 1841.
 —. *Reglement en generaele ordres voor de regimenten infanterie van den staat*. The Hague, 1772.
 —. *Reglement en ordres voor het garnisoen van 's Hertogenbosch*. 's-Hertogenbosch, 1770.
 —. *Reglement en orders voor het garnisoen van Maastricht*. Maastricht, 1774.

- . *Reglement en orders voor het garnizoen van Maastricht*. Maastricht, 1786.
- . *Reglements et ordonnances du roy pour les gens de guerre*, vol. 9. Paris, 1695.
- . *La Vie quotidienne dans les Ardennes aux XVII^e et XVIII^e siècles à travers les chroniques de Jean Taté et du Cadet Dameris*. Charleville-Mézières: Société d'Etudes Ardennaises, 1985.
- Abel, Ch. and E. de Bouteiller, eds. *Journal de Jean Bauchez greffier de Plappeville au dix-septième siècle*. Metz, 1868.
- Adlersfels-Ballestrem, Eufemia von, ed. *Memoiren des Freiherrn Dubislaw Gneomar von Natzmer*. Berlin, 1881.
- Aken, Hein van, ed. *Roman van Heinric en Margriete van Limborch*. Edited by Laurent Philippe Charles van den Bergh. 2 vols. Leiden, 1846–47.
- Albertus Magnus, *De animalibus libri XXVI*. Edited by Hermann Stadler. 2 vols. Munster: Aschendorff, 1916–20.
- Arnould, Maurice-A. *Les dénombrements de foyers dans le comté de Hainaut (XIV^e-XVI^e siècle)*. Brussels: Commission Royale d'Histoire, 1956.
- Bacha, Eugène, ed. *La Chronique Liégeoise de 1402*. Brussels, 1900.
- Bardin, Etienne Alexandre. *Dictionnaire de l'armée de terre ou recherches historiques sur l'art et les usages militaires des anciens et des modernes*. 17 vols. Paris, 1841–51.
- Bavel, H. van et al., eds. *De kroniek van het St. Geertruiklooster te 's-Hertogenbosch. Die chronijcke der Stadt ende Meijerije van 's-Hertogenbosch. Een tekstuitgave*. 's-Hertogenbosch: Stadsarchief, 2001.
- Bellynck, A. *Flora de Namur ou description des plantes spontanées et cultivées en grand dans la province de Namur observées depuis 1850*. Namur, 1855.
- Berkven, A. M. J. A. *Plakkatenlijst Overkwartier 1665–1794*. 2 vols. Nijmegen: Gerard Noodt Instituut, 1990.
- Beurden, A. F. van. *De handelingen van den magistraat der stad Roermond van het jaar 1596 tot en met het jaar 1696*. Roermond, 1903.
- Biemans, J. *August von Bonstetten. Een Zwitsers militair schetst 's-Hertogenbosch 1815–1824*. Nijmegen: Vantilt, 2016.
- Bikar, A. "Aperçus de l'état militaire de nos ancêtres des Pays-Bas autrichiens et des autres territoires qui ont constitué plus tard la Belgique, depuis le début du 18^e siècle jusqu' aux Révolutions de 1789." *Revue Belge d'Histoire Militaire* 29, no. 3 (1991): 145–74 and 29, no. 4 (1991): 233–50.
- Biot Jean-Baptiste et al. *Nouveau dictionnaire d'histoire naturelle*. 36 vols. Paris, 1818–19.
- Bodard, Pierre, ed. *Recueil des ordonnances du Duché de Bouillon*. Brussels: Ministère de la Justice, 1977.
- Boendale, Jan van. *Brabantsche yeesten*. Edited by J. F. Willems and J. H. Bormans. 3 vols. Brussels, 1839–69.
- Boer, D. E. H. de, D. J. Faber, and H. P. H. Jansen, eds. *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie III De rekeningen van de gerechtelijke ambtenaren. Deel 1393–1396*. The Hague: Nijhoff, 1980.
- . *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie I: De rekeningen van de tesorier en de dijkgraaf van de Grote Waard. Deel 1393–1396*. The Hague: Instituut voor Nederlandse Geschiedenis, 1997.
- Bolsée Jacques, ed. *La grande enquête de 1389 en Brabant*. Brussels: Commission Royale d'Histoire, 1929.
- Bondam, A. C. "Oudste stadsrekening van Heusden van 1457, uitgegeven naar het afschrift van C. C. N. Krom." *Handelingen van het Provinciaal Genootschap van Kunsten en Wetenschappen in Noord-Brabant* for 1884–85 (1885): 97–129.

- Bonet, Honoré. *L'Arbre des batailles*. Edited by Ernest Nys. Brussels, 1883.
- Boretius, Alfredus and Victor Krause, eds. *Capitularia regum Francorum*. 2 vols. Hannover, 1883–97.
- Borgnet, Jules. *Cartulaire de la commune de Ciney*. Namur, 1869.
- Borman, Camille de, ed. *Le livre des fiefs du comté de Looz sous Jean d'Arckel*. Brussels: Commission Royale d'Histoire, 1875.
- . *Chronique de l'abbaye de Saint-Trond*. 2 vols. Liège: Société des Bibliophiles Liégeois, 1877.
- Bormans, Stanislas. "Chambre des finances des princes évêques de Liège. Table des octrois et rendages." *BIAL* 7 (1865): 1–105.
- . "Extraits des cris du péron de la cité de Liège." *BSSLL* 10 (1869): 161–220.
- . "Table des régistres aux recès de la cité de Liège, 1566–1793." *BSSLL* 11 (1871): 255–80; 12 (1872): 13–76; 13 (1874): 5–68; and 14 (1878): 5–94.
- . ed. *Cartulaire de la commune de Couvin*. Namur, 1875.
- . ed. *Les fiefs du comté de Namur*. 5 vols. Namur, 1875–79.
- . Léon Lahaye, and Dieudonné Brouwers, ed. *Cartulaire de la commune de Dinant*. 8 vols. Namur, 1880–1908.
- Bory de Saint-Vincent, Jean Baptiste. *Description du Plateau St.-Pierre de Maestricht*. Brussels, 1819.
- Bouvier, Gilles le. *Le livre de la description des pays*. Edited by Ernest-Théodore Hamy. Paris, 1908.
- Bovy, Jean Pierre Paul. *Promenades historiques dans le pays de Liège*. 2 vols. Liège, 1838–39.
- Brack, F. de. *Avant-postes de cavalerie légère suivi du manuel du service de la cavalerie légère en campagne par le comte de la Roche-Aymon*. 2 vols. Breda, 1831–34.
- Brandeler, P. van den, ed. "Rekening der onkosten, gemaakt door die van Dordrecht bij het beleg van Gorinchem in 1407." *Kronijk van het Historisch Genootschap te Utrecht* 12 (1856): 177–95.
- Bretel, Jacques. *Le Tournoi de Chauvency*. Edited by Maurice Delbouille. Liège: Droz, 1932.
- Brialmont, Alexis Henri. *Etudes sur la défense des états et sur la fortification*. 3 vols. Paris, 1863.
- Brown, Robert. *An Impartial Journal of a Detachment from the Brigade of Foot Guards, commencing 25th February, 1793 and ending 9th May 1795*. London, 1795.
- Brunner, P. L., ed. *Reise des P. Reginbald Möhner, Benedictiners von St. Ulrich in Augsburg als Feldcaplans bei den für Spanien geworbenen und unter dem Commando des Markgrafen Leopold Wilhelm von Baden geführten deutschen Regimentern in die Niederlande im Jahre 1651*. Augsburg, 1872.
- Bryant, Nigel, ed. *Perceforest: The Prehistory of King Arthur's Britain*. Cambridge: Brewer, 2011.
- Buchon, J. A. C., ed. *Oeuvres Complètes de Pierre de Bourdeille*. 2 vols. Paris, 1848.
- Burgers, J. W. J. and E. C. Dijkhof, eds. *De oudste stadsrekeningen van Dordrecht, 1283–1287*. Hilversum: Verloren, 1995.
- Caldecott-Baird, Duncan, ed. *The Expedition in Holland, 1572–1574. From the Manuscript of Walter Morgan*. London: Seeley, 1976.
- Callot, Jacques, *Les Misères et les mal-heurs de la guerre*. Paris, 1633.
- Cessac, Jean-Girard Lacuée, comte de. *Le Guide des officiers particuliers en campagne, ou des connoissances militaires nécessaires pendant la guerre*. 2 vols. Paris, 1785.
- Clairac, Louis André de la Mamie de. *L'Ingénieur de campagne, ou traité de la fortification pas-sagère*. Paris, 1749.
- Cleves, Philip of. *Instruction de toutes manieres de guerroyer, tant par terre que par mer, et des choses y servant*. Paris, 1558.
- Collin, Hubert. *Guide des Archives des Ardennes*. Charleville-Mézières: Archives des Ardennes, 1974.

- Colombier, Jean. *Préceptes sur la santé des gens de guerre ou hygiène militaire*. Paris, 1775.
- Conscience, Hendrik. *De omwenteling van 1830. Herinneringen uit myne eerste jeugd*. Antwerp, 1858.
- Cormontaigne, Louis de. *Architecture militaire, ou l'art de fortifier*. 2 vols. The Hague, 1741.
- Cornette. *Mémoire sur la formation du salpêtre et sur les moyens d'augmenter en France, la production de ce sel*. Paris, 1779.
- Coun, Theo. "Een Middelnederlandse rol van ca. 1420 over de betwistingen tussen Jan II, heer van Pietersheim, en de stad Maastricht." *Limburg—Het Oude Land van Loon* 89 (2010): 87–96, 269–84, 345–55.
- Courzon, Henri de, ed. *La règle du Temple*. Paris, 1886.
- Cuvelier, Joseph. *Dénombrements de foyers en Brabant, XIV^e–XVI^e siècle*. 2 vols. Brussels: Commission Royale d'Histoire, 1912–13.
- Cuvier, George. "Sur le grand animal fossile des carrières de Maestricht." *Annales du Muséum Nationale d'Histoire Naturelle* 12 (1808): 145–76.
- Deloffre, Guy. "Guerres et brigandages au XV^e siècle en Hainaut, Pays d'Avesnes, Thiérache et Ardennes." *Mémoires de la Société Archéologique et Historique de l'Arrondissement d'Avesnes (Nord)* 29 (1985): 263–514.
- Deniéport. "Routes de terre et d'eau (III)." *Ardenne Wallonne* 90 (2002): 48–54.
- Deschamps, Eustache. *Oeuvres complètes*. Edited by Auguste-Henry-Edouard de Queux de Saint-Hilaire. 11 vols. Paris, 1878–1903.
- Devillers, Léopold. "Documents relatifs à l'expédition de Guillaume IV contre les Liégeois: 1407–1409." *BCRH* 4 (1877): 85–120.
- . and A. Pinchart. *Extraits des comptes de la recette générale de l'ancien comté de Hainaut. Tome premier, 1334–1400*. Mons: Cercle Archéologique de Mons, 1871.
- Devos, André. "Deux jours d'herborisation dans la vallée de la Meuse, aux environs de Givet et d'Hastière." *Bulletin de la Société Royale de Botanique de Belgique* 5, no. 2 (1866): 121–43.
- . "Compte rendu de la sixième herborisation (1867) de la Société royale de Botanique." *Bulletin de la Société Royale de Botanique de Belgique* 6, no. 1 (1867): 289–322.
- . "Les plantes naturalisées ou introduites en Belgique." *Bulletin de la Société Royale de Botanique de Belgique* 9 (1870): 5–122.
- Dibbetz, Johan. *Het Groot Militair Woordenboek*. The Hague, 1740.
- Diderot, Denis and Jean le Rond d'Alembert, eds. *Encyclopédie, ou dictionnaire raisonné des sciences, des arts, et des métiers*. 28 vols. Paris, 1751–66.
- Dilich, Johann Wilhelm. *Peribologia oder Bericht Wilhelmi Dilichij Hist: Von Vestungsgebewen Vieler Orter*. Frankfurt am Main, 1640.
- Dinstühler, Horst. *Die Jülicher Landrentmeister-Rechnung von 1434/1435. Beobachtungen zur Wirtschafts- und Verwaltungsgeschichte eines Territoriums im 15. Jahrhundert*. Bonn: Bouvier, 1989.
- Dodoens, Rembert. *Cruijdeboeck*. Antwerp, 1554.
- Doorninck, P. N. van. "Inneming en plundering van het huis Poederooyen op 14 april 1493, volgens bescheiden uit het staatsarchief te Wetzlar." *Bijdragen en Mededelingen Gelre* 10 (1907): 225–35.
- . ed. *De tocht van Jan van Blois om Gelre 1371–1372*. Haarlem, 1898.
- . ed. *De tocht van Jan van Blois met hertog Aelbrecht naar Gelre Nov. 1362*. Haarlem, 1899.
- . and P. C. Molhuysen, eds. *Briefwisseling der hertogen van Gelre en van Gulik 1389–1393*. Haarlem, 1903.
- Douxchamps-Lefèvre, Cécile. *Inventaire analytique des Enquêtes judiciaires du Conseil de Namur 1488–1794*. 6 vols. Brussels: Archives Générales du Royaume, 1966–81.

- Drooghaag, Joseph. "Visitation en Limbourg et Outre-Meuse: l'état des forteresses ducales en 1406." *BCRH* 178 (2012): 175–219.
- Dumoulin, L. J. G. *Guide du botaniste dans les environs de Maastricht, ou indication des phanérogames et des cryptogames vasculaires*. Maastricht, 1868.
- Dürer, Albrecht. *Etliche Unterricht zu befestigung der Stett, Schlosz und Flecken*. Nürnberg, 1527.
- Duyck, Anthonis. *Journaal*. Edited by Lodewijk Mulder. 3 vols. The Hague, 1862–66.
- Dynter, Emond de. *Chronique des ducs de Brabant (Chronica nobilissimorum ducum Lotharingiae et Brabantiae ac regum Francorum)*. Edited by Pierre François Xavier de Ram. 3 vols. Brussels, 1854–60.
- Eenens, A. *Ontginning der Kempensche heiden door het leger*. Ghent, 1844.
- Eerden-Vonk, M. A. van der. *Raadsverdragen van Maastricht 1367–1428*. The Hague: Instituut voor Nederlandse Geschiedenis, 1992.
- Ennen, Leonard. *Quellen zur Geschichte der Stadt Köln*. 6 vols. Cologne, 1860–79.
- Fairon, Em., ed. *Chartes confisquées aux bonnes villes du pays de Liège et du comté de Looz après la bataille d'Othée (1408)*. Brussels: Commission Royale d'Histoire, 1937.
- Fallot, Laurillard and E. Lagrange. *Cours d'art militaire, ou leçons sur l'art militaire et les fortifications*. Brussels, 1845.
- Faujas de Saint-Fond, Barthélemy. *Histoire naturelle de la montagne de Saint Pierre de Maastricht*. Paris, 1799.
- . *Natuurlijke historie van den St. Pieters berg bij Maastricht*. Translated by J. D. Pasteur. Amsterdam, 1802.
- Fayen, Arnold R., ed. *Lettres de Jean XXII*. 2 vols. Rome: Institut historique belge de Rome, 1908–12.
- Ferraris, Joseph Jean François, comte de. *Carte de Cabinet des Pays-Bas autrichiens, levée à l'initiative du comte de Ferraris (édition des cartes au 25.000^e accompagnée des Mémoires historiques, chronologiques et économiques)*. 22 vols. Brussels: Crédit Communal, 1965–74.
- Fitte, de la. *Mémoire militaire sur la frontière de Flandre et de Hainaut depuis la mer jusqu'à la Meuse, c'est-à-dire depuis Dunkerque jusqu'à Charlemont*. Basel, 1797.
- Foullon, Servais. *Chronique de Servais Foullon, abbé de Saint-Trond*. Edited by Guillaume Simenon. Liège: Société des Bibliophiles Liégeois, 1910.
- Freitag, Adam. *Architectura militaris nova et aucta, oder neue vermehrte Fortification, von regular Vestungen, von irregular Vestungen und Aussen Wercken, von praxi offensiva und defensiva*. Leiden, 1631.
- Froissart, Jean. *Chroniques*. Edited by Kervyn de Lettenhove. 26 vols. Brussels: 1867–77.
- Fruin, J. A. *De oudste rechten der stad Dordrecht en van het baljuwschap van Zuidholland*. 2 vols. The Hague: Nijhoff, 1882.
- Fugger, Markus. *Wie und wa man ein Gestüt von guten edlen Kriegßgrossen auffrichten, underhalten, die jungen von einem jar zu dem anderen erziehen soll, biß sy einem Bereytter zum abrichten zu undergeben, unnd so sy abgericht, langwurig in guttem gesundt zu erhalten*. Augsburg, 1578.
- Gaudi, Fridrich Wilhelm von. *Versuch einer Anweisung für Officiers von der Infanterie, wie Feldschanzen von allerhand Art angelegt und erbauet, und die verschiedene andere Posten in Defensionsstand gesesst werden können*. Wesel, 1767.
- Gayot, Eugène. *Atlas statistique de la production des chevaux en France*. Paris, 1850.
- Geisweit van der Netten, C. A. *Algemeen samenstel der militaire pligten, kundigheden en dienstverrichtingen*. Groningen, 1803.

- . *Antwoord op de vraag der Nederlandsche huishoudelijke maatschappij te Haarlem, welke de redenen zijn, dat men in de Nederlanden de paardenfokkerij niet met dien gewenschten uitslag bekroond ziet als wel in andere landen?* Haarlem, 1830.
- Geoffroy-Saint-Hilaire, Etienne. "Mémoire sur le genre et les espèces de Vespertilion, l'un des genres de la famille des chauve-souris." *Nouvelles Archives du Muséum d'Histoire Naturelle* 8 (1806): 187–205.
- Gillessen, Leo, ed. *Die ältesten Kellnereirechnungen des Jülicher Amtes Randerath 1465/66 und 1499/1500*. Aachen: Heimatverein der Heinsberger Lande, 2003.
- Godron, D. A. *Flore de Lorraine*. 2 vols. Nancy, 1843–44 and 1857.
- Graatsma, B. G. et al., eds. *De flora van de omstreken van Maastricht in de 19e eeuw. Een bewerking van de tekst van een in 1832 door L. J. G. Dumoulin gehouden lezing*. Maastricht: Natuurpublicaties Limburg, 2003.
- Grainger, Jacob, *Historia febris anomaliae Batavae annorum 1746, 1747, 1748 accedunt monita siphylica*. Edinburgh, 1753.
- Grauwels, Jozef, ed. *Regestenlijst der oorkonden van de landkommanderij Oudenbiezen en onderhorige kommanderijen*. 4 vols. Brussels: Algemeen Rijksarchief, 1966–69.
- . *Dagboek van gebeurtenissen opgetekend door Christiaan Munters 1529–45*. Assen: Van Gorcum, 1972.
- Grimmelshausen, Hans Jakob von. *Der Abentheurliche Simplicissimus Teutsch*. Nürnberg, 1669.
- Groot, Harry de, ed. *De stadsrekeningen van Venlo*. 2 vols. Venlo, 2008.
- Gruau, Louys, *Nouvelle invention de chasse pour prendre et oster les loups de la France*. Paris, 1613.
- Guillery, H. *La Meuse. Etudes faites par ordre du gouvernement belge, I: Rapport du 23 décembre 1839*. Brussels, 1840.
- Guérard, Nicolas, *L'Art militaire ou les exercices de Mars*. Paris, ca. 1693.
- Habets, Joseph. "Drie chronijkjes van St-Agnetenklooster der orde van den H. Augustinus te Maeseyck, 1430–1589." *Publications de la Société Historique et Archéologique dans le Duché de Limbourg* 6 (1869): 383–440.
- . ed. *Chronijk der Landen van Overmaas en der aangrenzende gewesten door eenen inwoner van Beek bij Maastricht*. Roermond, 1870.
- . "Costumen der vrije heerlijkheid Wittem." *Publications de la Société Historique et Archéologique dans le Limbourg* 19 (1882): 144–78.
- Hagendorf, Peter, *Peter Hagendorf: Tagebuch eines Söldners aus dem Dreissigjährigen Krieg*. Edited by Jan Peters. Göttingen: V&R Unipress, 2012.
- Hahnemann, Samuel, *Apothekerlexikon*. 4 vols. Leipzig, 1793–99.
- Hamaker, H. G., ed. *De rekeningen der grafelijkheid van Holland onder het Henegouwsche Huis*. 3 vols. Utrecht, 1875–78.
- Hansay, A. "Documents inédits concernant la mise en defense des campagnes lossaines à l'époque moderne." *BCRH* 95 (1931): 11–222.
- Hanssen, H. *Inventaris van het oud archief der stad, municipaliteit en gemeente Venlo*. Venlo, 1919.
- Hardenberg, H. *Overzicht der voornaamste bepalingen betreffende de sterkte, zamenstelling, betaling, verzorging en verpleging van het Nederlandsche leger sedert den Vrede van Utrecht in 1713 tot den tegenwoordigen tijd hoofdzakelijk op voet van vrede*. 2 vols. The Hague, 1858–61.
- Harzé, A.-G. de. "Manuscrit relative aux batailles de Rocour et de Lafeld, 1745–1750." Edited by Ch. Thys. *BSSLL* 7 (1865): 259–306.
- Hasselbrink, Johann Caspar, *Manuductio ad Architecturam Militarem oder gründliche Einleitung zur Krieges-Bau Kunst*. Wolfenbüttel, 1710.

- Havet, Julien, ed. *La frontière d'Empire dans l'Argonne; enquête faite par ordre de Rodolphe de Habsbourg, à Verdun, en mai 1288*. Paris, 1881.
- Haynin, Jean d', *Mémoires de Jean, sire de Haynin et de Louvignies, 1465–1477*. Edited by D. D. Brouwers. 2 vols. Liège, 1905–06.
- Heenvliet, Cornelis Jacobsz. van. *Jacht-Bedryff*. Edited by A. E. H. Swaen. Leiden: Brill, 1948.
- Heijden, Lia van der and Jan Sanders, eds. *De levensloop van Adriaan van der Willigen (1766–1841). Een autobiografie uit een tijdperk van overgang*. Hilversum: Verloren, 2010.
- Heisterbach, Caesarius of, *Dialogus miraculorum*. Edited by Josephus Strange. 2 vols. Cologne, 1851.
- Helen, Jan van. *Rymkronyk van Jan van Helu betreffende den slag van Woeringen van het jaar 1288*. Edited by J. F. Willems. Brussels, 1836.
- Helmich, Splinter, *Journaal*. Edited by R. Fruin. "Journaal van Splinter Helmich, soldaat en later hopman in dienst van den lande, van 1572 tot 1589." *Kroniek van het Historisch Genootschap te Utrecht* 31 (1875): 159–281.
- Hemricourt, Jacques de. *Le Miroir des Nobles de Hesbaye*. Edited by Camille de Borman, Alphonse Bayot and Edouard Poncelet, vols. 1–2 of *Oeuvres de Jacques de Hemricourt*. Brussels: Kiessling, 1910–25.
- . *Le Traité des Guerres d'Awans et de Waroux*. Edited by Camille de Borman, Alphonse Bayot and Edouard Poncelet, vol. 3 of *Oeuvres de Jacques de Hemricourt*. Brussels: Lamer-tin, 1931.
- Herbin de Halle, P. E. *Des bois propres au service des arsenaux de la marine et de la guerre*. Paris, 1813.
- Herborn, Wolfgang. "Die sogenannte Fischmeisterei-Rechnung des Jülicher Fischmeisters von 1398/1399." *Neue Beiträge zur Jülicher Geschichte* 10 (1999): 57–99.
- . and Klaus J. Mattheier, eds. *Die älteste Rechnung des Herzogtums Jülich. Die Landrentmeister-Rechnung von 1398/1399*. Jülich: Jülicher Geschichtsverein, 1981.
- Hexham, Henry. *The Second Part of the Principles of Art Military*. Delft, 1642.
- . *A Journall, of the taking in of Venlo, Roermont, Strale, the memorable seige of Mastricht, the towne & castle of Limburch under the able, and wise conduct of his Excie: the Prince of Orange, anno 1632*. Delft, 1633.
- Hocsem, Jean de, *La chronique de Jean de Hocsem*. Edited by Godefroid Kurth. Brussels: Kiessling, 1927.
- Hoeckx, J. A. M. et al., eds. *Kroniek van Molius. Een zestiende-eeuwse Bossche priester over de geschiedenis van zijn stad. 's-Hertogenbosch*: Heinen, 2003.
- Horgan, Frances, ed. *The Romance of the Rose*. Oxford: Oxford University Press, 1999.
- Hoven, F. J. J. van. *Flora van 's-Hertogenbosch of naamlijst van de planten welke in de stad 's-Hertogenbosch en omstreken in het wild gevonden worden, met aanwijzing van derzelver groeiplaatsen*. Heusden, 1848.
- Huvet. "Topographie médicale de la ville de Commercy." *Journal de Médecine, Chirurgie et Pharmacie militaire* 5 (1786): 1–17.
- Illaire, Martine et al., eds. *Les cahiers de doléances ardennais 1789*. Charleville-Mézières: Archives départementales des Ardennes, 1989.
- Isambert, François André, [s.n.] Decrusy, and A. H. Taillandier, eds. *Recueil général des anciennes lois françaises*, 29 vols. Paris, 1821–33.
- Janssen de Limpens, K. J. Th., ed. *Geldersche Wyssenissen van het hoofdgerecht te Roermond "t Nye Boeck" (1459–1487)*. Utrecht, 1953.
- Juten G. C. A. "Engelbrecht I van Nassau 1415–1418." *Taxandria* 40 (1933): 15–34.

- Keralio, Louis-Felix Guinement de, Jean-Girard Lacuée, and Joseph Servan, *Encyclopédie méthodique. Art militaire*. 3 vols. Paris, 1787.
- Kerckhoffs, J. Rom. Louis, *Hygiène militaire ou avis sur les moyens de conserver la santé des troupes*. Maastricht, 1815.
- Koreman, J. *De stadsrekening van Maastricht over het jaar 1399/1400*. Assen: Van Gorcum, 1968.
- Kraus, Thomas R., ed. *Die Aachener Stadtrechnungen des 15. Jahrhunderts*. Düsseldorf: Droste, 2004.
- . *Regesten der Reichsstadt Aachen*, vol. 6. Cologne: Droste, 2008.
- Kuppers, W. J., ed. "De stadsrekeningen van Geldern 1386–1423: Inleiding, teksteditie, indices." PhD diss., University of Amsterdam, 1992.
- Labourasse, Henri A. *Glossaire abrégé du patois de la Meuse, notamment de celui des Vouthons*. Arcis-sur-Aube, 1887.
- Lamort, Samuel and Huguenin Jean-François. *Les chroniques de la ville de Metz*. Metz, 1838.
- Laperche-Fournel, Marie-José, ed. *L'Intendance de Lorraine et Barrois à la fin du XVII^e siècle. Edition critique du Mémoire "Pour l'instruction du Duc de Bourgogne"*. Paris: CTHS, 2006.
- Laukhard, Friedrich Christian. *F. C. Laukhards, vorzeiten Magister der Philosophie und jetzt Muskietiers unter dem Thaddenschen Regiment zu Halle, Leben und Schicksale, von ihm selbst beschrieben und zur Warnung für Eltern und studierende Jünglinge herausgegeben*. 5 vols. Halle, 1792–1802.
- Laurent, Charles et al., eds. *Receuil des ordonnances des Pays-Bas. 2e Série: 1506–1700*. 8 vols. Brussels: Goemaere, 1893–1978.
- Laurent, J. *Aachener Stadtrechnungen aus dem XIV. Jahrhundert*. Aachen, 1866.
- Laurière, Eusèbe de et al., eds. *Ordonnances des rois de France de la troisième race*. 22 vols. Paris, 1723–1849.
- Leclercq et al., eds. *Liste Chronologique des édits et ordonnances de la principauté de Liège de 1507 à 1684*. Brussels, 1860.
- Lefèvre, P. "Documents relatifs aux dégâts causés à l'abbaye d'Averbode et à ses propriétés au cours des guerres du XV^e siècle." *Analecta Praemonstratensia* 41 (1965): 35–78.
- Lejeune, A. L. S. *Flore des environs de Spa, ou distribution selon le système de Linnaeus, des plantes qui croissent spontanément dans le département de l'Ourte et dans le départements circonvoisins, pour servir de suite à la Flore du Nord de la France de Mr. Roucel*. 2 vols. Liège, 1811–13.
- Lejeune Philippe. "La charte de franchises du Bas-château de Salm-en-Ardenne [23 janvier 1362]." *BCRH* 139 (1973): 1–28.
- Lenz, Eduard, *Ueber technische Truppen, mit besonderer Beziehung auf die in Oesterreich und Preussen angenommenen Systeme, dann über die Art ihrer Ausbildung*. München, 1827.
- Liégeois, Edouard. "Compte de la recette de Chiny pour l'année 1378–1379." *AIAL* 44 (1909): 125–66.
- Liénard, Félix. "Catalogue des lépidoptères observés et recueillis aux environs de Verdun." *Mémoires de la Société Philomathique de Verdun* 4 (1850) 358–499.
- . "Addendum du catalogue des lépidoptères." *Mémoires de la Société Philomathique du Verdun* 5 (1853) 289–302.
- Ligne, Charles-Joseph de, *Fantaisies militaires*. Edited by W. A. de Heusch. Paris, 1914.
- Lisle de Moncel, Nicolas de, *Méthodes et projets pour parvenir à la destruction des loups dans le royaume*. Paris, 1768.
- Lith-Droogleever Fortuijn A. M., J. G. M. Sanders, and G. A. M. van Synghel, eds. *Kroniek van Peter van Os. Geschiedenis van 's-Hertogenbosch en Brabant van Adam tot 1523*. The Hague: Instituut voor Nederlandse Geschiedenis, 1997.

- Lusy, Antoine de, *Le journal d'un bourgeois de Mons 1505–1536*. Edited by Armand Louant. Brussels: Commission Royale d'Histoire, 1969.
- Mary Lyon, Bryce Lyon, and Henry S. Lucas, *The Wardrobe Book of William de Norwell 12 July 1338 to 27 May 1340*. Brussels: Commission Royale d'Histoire, 1983.
- Macaré, Rethaan, ed. "Dagverhaal van den veldtog van keizer Karel V in 1554." *Kronijk van het Historisch Genootschap te Utrecht* 7 (1851) 280–308.
- Machaut, Guillaume de. *Oeuvres de Guillaume de Machaut*. Edited by Ernest Hoepffner. 3 vols. Paris, 1908–21.
- Marchal, Ad. *Inventaire-sommaire des archives départementales antérieures à 1790. Meuse, tome 1^e: Archives Civiles, Série B, Articles 1–3160*. Paris, 1875.
- Marquet, Léon and Samuel Glotz, eds. *Une relation allemande méconnue (1550) des fêtes données par Marie de Hongrie, à Binche et à Mariemont, en août 1549*. Binche: Société d'Archéologie et des Amis du Musée de Binche, 1991.
- Martens van Sevenhoven, A. H. "Een betalingsordonnantieboek van hertog Eduard." *Bijdragen en Mededelingen Gelre* 30 (1927): 197–218.
- Mathieu, M. L. "Notice sur les orgues géologiques de la colline de Saint-Pierre, près Maastricht." *Journal des Mines* 34 (1813): 197–201.
- Maujean-Denis, [s.n.]. "Additions et rectifications à la flore de la Meuse." *Mémoires de la Société Philomatique de Verdun* 1 (1840): 205–15.
- Meihuizen, L. S. *De rekening betreffende het graafschap Gelre 1294/1295*. Groningen: Wolters, 1953.
- Meisner, Daniel. *Sciographia Cosmica*. Nürnberg, 1642.
- Melder, Gerard. *Korte en klare instructie van regulare en irregulare fortificatie*. Utrecht, 1658.
- Merker, J. G. W. *Verhandeling over het belang der vestingen voor den staat*. 2 vols. Brussels, 1826–27.
- Meyrac, Albert, ed. *Traditions, Coutumes, Légendes et Contes des Ardennes*. Charleville, 1890.
- Mengels, Winand. *Chronyk van het dorp Opcanne bij Maastricht (1740–1778)*. Edited by V. de Steurs. Roermond, 1887.
- Mettensis, Alpertus. *De diversitate temporum*. Edited by Georgius Heinrichus Pertz, Monumenta Germaniae Historiae. Scriptorum 4, 700–723. Hannover, 1841.
- Molinet, Jean. *Chroniques de Jean Molinet*. Edited by Georges Doutrepont and Omer Jodogne, 3 vols. Brussels: Palais des Académies, 1935–37.
- Monbrun, J. C. *Considérations sur l'hygiène militaire*. Paris, 1826.
- Mons, Gislebert of. *La chronique de Gislebert de Mons*. Edited by Léon Vanderkindere. Brussels: Commission Royale d'Histoire, 1904.
- Moulin Claudine and Pauly Michel, eds. *Die Rechnungsbücher der Stadt Luxemburg*. 10 vols. Luxembourg: CLUDEM, 2007–18.
- Mutel, Auguste. *Flore française destinée aux herborisations: ou description des plantes croissant naturellement en France, ou cultivées pour l'usage de l'homme et des animaux, avec l'analyse des genres et leur tableau d'après le système de Linné*. Paris, 1834.
- Niermeijer, Jan Frederik. *Bronnen voor de economische geschiedenis van het Beneden-Maasgebied*. 2 vols. The Hague: Nijhoff / Instituut voor Nederlandse Geschiedenis, 1968–97.
- Nijssen, Rombout. "Een akkoord tussen de heer en de gemeente van Genoelselderen over hun heerwagen, 13 november 1431." *Limburg—Het Oude Land van Loon* 88 (2009): 187–91.
- Noizet de Saint Paul and Jean François Gaspard. *Traité complet de fortification*. 2 vols. Paris, 1792–99; and 1818.
- Oebchelwitz, L. W. F. van. *De Nederlandsche stalmeester*. The Hague, 1763.
- Outremeuse, Jean des Preis dit d'. *Chronique de Jean des Preis dit d'Outremeuse*. Edited by Adolphe Borgnet and Stanislas Bormans, 7 vols. Brussels, 1864–87.

- Packard, Francis R., ed. *Life and Times of Ambroise Paré*. New York: Hoeber, 1921.
- Paquay, Jan, ed. "Kroniek der stad Bilzen uit de 15de eeuw." *BSSLL* 33 (1915): 17–44.
- . "Kroniek der Luiksche Oorlogen uit de XVe eeuw." *Verslagen en Mededelingen van de Koninklijke Vlaamse Academie voor Taal-en Letterkunde* (1928): 203–46.
- Paré, Ambroise, *La bataille de Saint-Quentin*. Edited by F. Pouy (Saint-Quentin, 1874).
- Pégeot, P., O. Derniame, and M. Hénin, eds. *Les lettres de rémission du duc de Lorraine René II (1473–1508)*. Turnhout: Brepols, 2013.
- Perlbaach, Max, ed. *Die Statuten des Deutschen Ordens nach den ältesten Handschriften*. Halle: Niemeyer, 1890.
- Philippoteaux, A. "Gages des soldats de la garde. 28 Janvier, 19 Novembre 1583." *Collection de documents rares ou inédits concernant l'histoire de Sedan* 8 (1887): 14–16.
- Phoebus, Gaston. *Le livre de la chasse*. Edited by Robert and André Bossuat. Paris: Lebaud, 1986.
- Pick, R. "Aus dem Aachener Stadtarchiv, I. Verpflichtungsurkunden städtischer Beamten." *ZAG* 8 (1886): 218–255.
- Piérard. "Instruction sur la plantation et la culture des arbres dans les terrains militaires." *Mémorial de l'officier du génie* 10 (1829): 309–34.
- . "Rapport sur une espèce de pomme adressée à la société." *Annales de la Société d'Horticulture de Paris* 8 (1831): 93–94.
- Piérard, Christiaene, ed. *Les plus anciens comptes de la ville de Mons (1279–1356)*. 2 vols. Brussels: Commission Royale d'Histoire, 1971–73.
- Pierrot, Ph., J. Cardot, and A. Vuillaume. *Catalogue des plantes vasculaires de l'arrondissement de Montmédy avec indication de leurs stations, propriétés et usages divers*. Montmédy, 1891.
- Polain, Mathieu Lambert, ed. *Recueil des ordonnances du Duché de Bouillon, 1240–1795*. Brussels, 1868.
- . and Stanislas Bormans, eds. *Recueil des ordonnances de la principauté de Liège. 2^e Série: 1507–1684*. 3 vols. Brussels, 1869–72.
- Poncelet, Edouard. "Nouveaux documents relatifs à la guerre dite 'de la Vache de Ciney.'" *BCRH* 7 (1897): 494–510.
- Pringle, John, *Observations on the Diseases of the Army, in Camp and Garrison*. London, 1752; 1753.
- Puységur, Jacques de Chastenot marquis de, *Art de la Guerre par principes et par règles*. 2 vols. Paris, 1749.
- Quicke Fritz. "Une enquête sur les droits et revenus du duc de Limbourg, seigneur de Dalhem et des pays d'Outremeuse (1389–1393)." *BCRH* 96 (1932): 347–416.
- Raadt, Jean-Théodore de. "Liste des hommes de Robert de Namur qui ont livré au duc de Wenceslas de Luxembourg, de Brabant, etc., des chevaux pour l'expédition à Chauny, vers 1364." *Annales de la Société d'Archéologie de Bruxelles* 10 (1896): 149–51.
- Rabutin, François de. *Commentaires des guerres en la Gaule Belgique (1551–1559)*. Edited by Gailly de Taurines. 2 vols. Paris, 1932–44.
- Rambaud, [s.n.]. "Observations sur la fièvre putride et maligne qui a régné à l'hôpital militaire de Sedan, pendant l'hiver de l'année 1776 à 1777." *Journal de Médecine Militaire* 2 (1783): 480–90.
- Rase, Céline. *Maréchal Julien and Bodart Emmanuel, Inventaire des archives du Conseil de guerre provincial de Namur 1816–1879*. Brussels: Archives générales du royaume, 2011.
- Remmers, B. W. A. M. "Een schadelijst van Nederasselt uit den oorlog van 1794." *Bijdragen en Mededelingen Gelre* 32 (1929): 261–98.

- Remy, Jules. "Excursion botanique à travers les Ardennes françaises." *Annales des Sciences Naturelles, Botanique* 12 (1849): 320–34.
- Richer, Fulgence, *Abrégé chronologique de l'Histoire de la ville de Mouson avec ses dépendances et pays circonvoisins (1774)*. Edited by M. Parent. Sedan, 1982 and 1986.
- Richer of Saint-Rémi. *Histories*. Edited by Justin Lake. 2 vols. Cambridge, MA: Harvard University Press, 2011.
- Ritter, Georg Heinrich. "Verhandeling ter beantwoording der vrage: 'Welke zijn de oorzaken der besmettelijke ziekten welke meestal in belegerde plaatsen ontstaan en welke zijn de beste middelen, op natuur- en scheikundige aanwijzingen gegrond, om dezelve voor te komen of weg te nemen?'" *Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem* 9 (1819): 1–98.
- Roland, C. G., ed. "Chronique Namuroise." *ASAN* 29 (1910): 115–32.
- Roussel de, [s.n.]. *Etat militaire de France, pour l'année 1789*. Paris, 1789.
- Ryckenroy, Jan van. *Kroniek der stad Roermond van 1562–1638*. Edited by Friedrich Nettesheim. Roermond, 1876.
- Saint Genois, Jules, Baron de, *Inventaire analytique des chartes des comtes de Flandre*. 3 vols. Ghent, 1843–46.
- Saxe, Maurice de. *Mes Rêveries, suivies d'un choix de correspondance politique, militaire et privée*. Edited by Jean-Pierre Bois. Paris: Economica, 2002.
- Schevichaven, H. D. J. van and J. C. J. Kleijntjens, eds. *Rekeningen der stad Nijmegen 1382–1543*. 3 vols. Nijmegen, 1910–19.
- Scoutetten, Henri. "Note sur une épidémie de scorbut." *Bulletin de l'Académie Royale de Médecine* 12 (1846–47): 885–91.
- Smit H. J., ed. *De rekeningen der graven en gravinnen uit het Henegouwsche huis*. 2 vols. Amsterdam, 1924–29.
- Solemne, David de. *La Charge du Mareschal des Logis tant General que Particulier, soit de toute une Armée de Cavallerie et Infanterie en General, que d'une Brigade et Regiment de Pied et à Cheval*. The Hague, 1632.
- Speckle, Daniel. *Architectura von Vestungen, Wie die zu unsern zeiten mögen erbawen warden an Stätten, Schlössern und Clusen zu Wasser, Land, Berg und Thal*. Strasbourg, 1589.
- Stavelot, Jean de. *Chronique de Jean de Stavelot*. Edited by Ad. Borgnet. Brussels: Hayez, 1861.
- Stevens, Theo. *Het Land van Ham. Schepenbank: 1571–1796*. 6 vols. Ham: Heemkunde Ham, 2013–14.)
- Stevin, Symon. *Castrametatio, dat is legermeting*. Rotterdam, 1617.
- Taisne, Philipe. *Atlas van de domeingoederen in het ambt Montfort*. Edited by G. Venner. Maastricht, 1976.
- Tellès d'Acosta, *Instruction sur les bois de marine et autres*. Paris, 1782.
- Terlinden, Vicomte, ed. *Les souvenirs historiques de Joseph Walter. Officier de l'armée des Etats Beligiques Unis, sur les événements militaires de la Révolution brabançonne (1789–1790)*. Brussels: Musée Royal de l'Armée et d'Histoire Militaire, 1972.
- Terwel, Jean Ernest. *Les notices cadastrales de Terwel sur les villages de la frontière de Champagne, en 1657*. Edited by Roger Graffin. Paris, 1902.
- Teunisse, Ingeborg, ed. *Onderdaan in Oranje's oorlog. Dagboek van een Amsterdamse schutter ten tijde van de Belgische Onafhankelijkheidsoorlog (1830–1832)*. Zutphen: Walburg, 2002.
- Thierry, E. de. *Mémoire en réponse aux assertions erronées de quelques membres de la chambre des représentans, sur la grande mortalité des chevaux dans l'armée*. Ghent, 1835.
- Thompson, Stanbury, ed. *Journal of John Gabriel Stedman*. London: Mitre, 1962.

- Uitterhoeve, Albert, ed. *Die Baurechnungen und Inventarlisten von Burg Rode (1389–1407)*. Herzogenrath: Arbeitskreis Geschichte, 1983.
- Unger, J. H. W. and W. Bezemer, eds. *De oudste stadsrekeningen van Rotterdam*. Rotterdam, 1899.
- Vallée G., ed. "Le journal du marquis de Langeron. Deux voyages sur la frontière (1773, 1774)." *Carnet de la Fourragère* 37 (1896): 160–72.
- . and H. Pariset, eds. *Carnet d'étapes du dragon Marquant. Démarches et actions de l'Armée du Centre pendant la campagne de 1792*. Paris, 1898.
- Vandewal, Steven. "De kroniek van prior Jan van Elsrack (1551–1556)." *De Bulletin. Verzameling van opstellen over Tongeren en omgeving* (2013): 231–55.
- Vannérus, Jules and Grob Jacques, eds. *Dénombrements des feux des duché de Luxembourg et comté de Chiny. Bd 1: Documents fiscaux de 1306 à 1537*. Brussels, 1921.
- Vauban, Sébastien Le Prestre de. *Journal de ce qui c'est passé de plus considerable à la prise de Namur, assiégée par le roi en personne, le 25 mai, et rendu à l'obéissance de Sa Majesté le 29 juin 1692*. In *Vauban et Namur, le temps d'un siège (mai–juin 1692)*. Edited by Philippe Bragard Namur: Les Amis de la Citadelle de Namur, 2008.
- . *Traité de la Défense des Places*. Vol. 2 of *Oeuvres Militaires du Maréchal Vauban*. Edited by Philippe François de Latour-Foissac. 3 vols. Paris, 1794/1795.
- Velthem Lodewijk van. *Lodewijk Van Velthem's voortzetting van den Spiegel historiael (1248–1316)*. Edited by Herman vander Linden et al. 3 vols. Brussels: Académie Royale de Belgique; Commission Royale d'Histoire, 1906–38.
- Verkooren, Alphonse, ed. *Inventaire des chartres et cartulaires de Brabant et de Limbourg et des Pays d'Outre-Meuse, le partie: Chartres originals et vidimées*. 8 vols. Brussels 1910–23.
- Vilain, Charles Joseph François, *Mémoires militaires sur la campagne de l'armée Belgique dans les Pays-Bas Autrichiens pendant la révolution de 1790*. London, 1791.
- Ville, Anthoine de, *De la charge de gouverneurs des places*. Paris, 1639.
- Vlemingcx, J. F. and C. J. van Mons, *Essai sur l'ophthalmie de l'armée des Pays-Bas*. Brussels, 1825.
- Waitz, Georg, ed. *Chronica Regia Coloniensis*. Monumenta Germaniae historica, Scriptores rerum Germanicarum 18. Hannover, 1880.
- Wall, Pieter Hendrik van de, *Handvesten, privilegien, vrijheden, voorregten, octrooijen en costumen; midsgaders sententien, verbonden, overeenkomsten een andere voornaame handeligen der stad Dordrecht*. 3 vols. Dordrecht, 1770.
- Wallhausen, Johann Jakob von. *Kriegskunst zu Fuss*. Oppenheim, 1615.
- Wellens Robert. "Un compte relatif aux fêtes de Binche et de Mariemont en 1549." *BCRH* 124 (1959): 275–97.
- Wittmann, Frans Joseph. "Verhandeling ter beantwoording der vrage: 'Welke zijn de oorzaken der besmettelijke ziekten welke meestal in belegerde plaatsen ontstaan en welke zijn de beste middelen, op natuur- en scheikundige aanwijzingen gegrond, om dezelve voor te komen of weg te nemen?'" *Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem* 9 (1819): 99–182.
- Zuijlen, R. A. van. *Inventaris der archieven van de stad 's-Hertogenbosch, chronologisch opge maakt en de voornaamste gebeurtenissen bevattende*. 3 vols. 's-Hertogenbosch, 1861–66.

Secondary Literature

- Anon. "Le loup dans nos archives." In *Ô Loup ! De nos campagnes à nos imaginaires*, edited by Benoît Goffin, 249–62. Morlanwelz: Musée Royal de Mariemont, 2012.
- Aarts, Bas and Hermans, Taco. "Castle Building along the Border of Brabant and Holland (c. 1290–c. 1400)." In *Château et frontière*, edited by Peter Ettel et al., 17–26. Château Gaillard 26. Caen: Presses Universitaires de Caen, 2014.
- Aarts, S. A. J. J. "'Montferland' en de consequenties. De vroege burchten bij Alpertus van Metz." In *Middeleeuwse kastelen in veelvoud: nieuwe studies over oud erfgoed*, edited by Hans L. Jansen en Wendy Landwé, 13–59. Wijk bij Duurstede: Nederlandse kastelenstichting, 2009.
- Adeney, Thomas Julia. "The Exquisite Corpses of Nature and History: The Case of the Korean DMZ." *The Asia-Pacific Journal* 43, no. 3 (2009): 1–17.
- Adriaenssen, Leo. *Staatsvormend geweld. Overleven aan de frontlinies in de meierij van Den Bosch, 1572–1629*. Tilburg: Zuidelijk Historisch Contact, 2007.
- Agoston, Gabor. "Where Environmental and Frontier Studies Meet: Rivers, Forests, Marshes and Forts along the Ottoman–Hapsburg Frontier in Hungary." In *The Frontiers of the Ottoman World*, edited by A. C. S. Peacock, 57–80. Oxford: Oxford University Press, 2009.
- Aimond, Charles. *Les relations de la France et du Verdunois de 1270 à 1552*. Paris: 1910.
- Allmand, Christopher Thomas. *The De Re Militari of Vegetius: The Reception, Transmission, and Legacy of a Roman Text in the Middle Ages*. Cambridge: Cambridge University Press, 2011.
- Anrooij, W. van. *Spiegel van ridderschap. Heraut Gelre en zijn ereredes*. Amsterdam: Prometheus, 1990.
- Antonielli, Livio and Claudio Donati, eds. *Corpi armati e ordine pubblico in Italia (XVI–XIX sec.)*. Soveria Mannelli: Rubettino, 2003.
- Arkenbout, A. A. *Frank van Borselen ca 1400–1470. Het dagelijkse leven op zijn hoven in Zeeland en het Maasmondegebied*. Rotterdam: Historische Publicaties Rotterdam, 1994.
- Arnold, Benjamin. *German Knighthood 1050–1300*. Oxford: Clarendon Press, 1985; 1999.
- Arnold, Ellen F. *Negotiating the Landscape: Environment and Monastic Identity in the Medieval Ardennes*. Philadelphia: University of Pennsylvania Press, 2013.
- Augoyat, Antoine-Marie. *Aperçu historique sur les fortifications, les ingénieurs et sur les corps de génie en France*. Paris, 1860.
- Authom, Nicolas and Marceline Denis. "Exploration de campements militaires liés aux sièges de la ville de Mons (fin 16^e–18^e siècle?), au site 'Belle-vue' à Frameries." *Chronique de l'Archéologie wallonne* 25 (2017): 76–77.
- Ayton, Andrew. *Knights and Warhorses. Military Service and the English Aristocracy under Edward III*. Woodbridge: Boydell, 1994; 1999.
- Babinger, Franz. "Die Donau als Schicksalstrom des Osmanenreich." *Südosteuropa-Jahrbuch* 5 (1961): 15–27.
- Bachrach, Bernard S. "Animals and Warfare in Early Medieval Europe." In *Armies and Politics in the Early Medieval West*, edited by Bernard S. Bachrach, 707–51. New York: Routledge, 1993.
- . "Urban Military Forces of England and Germany c.1240–c.1315, a Comparison." In *Mercenaries and Paid Men: The Mercenary Identity in the Middle Ages*, edited by John France, 231–42. Leiden: Brill, 2008.
- . "Military Industrial Production in Thirteenth-Century England: The Case of the Crossbow Bolt." In *Comparative Perspectives on History and Historians: Essays in Memory of Bryce Lyon (1920–2007)*, edited by David M. Nicholas, Bernard S. Bachrach, and James M. Murray, 243–58. Kalamazoo: Medieval Institute Publications, 2012.

- . "Civilians and Militia in Ottonian Germany. Warfare in an Era of Small Professional Armies." In *Civilians and Warfare in World History*, edited by Nicola Foote and Nadya Williams, 110–31. London: Routledge, 2017.
- Bader, Axel. *Wald und Krieg. Wie sich in Kriegs- und Krisenzeiten die Waldbewirtschaftung veränderte. Die deutsche Forstwirtschaft im Ersten Weltkrieg*. Göttingen: Universitätsverlag, 2011.
- Baes, Christian. "Un episode de la querelle Habsbourg-Valois: la campagne de Henri II aux Pays-Bas en 1554." *Revue Belge de Philologie et d'Histoire* 73, no. 2 (1995): 319–41.
- Bahro, Steffi. "... En de soldaat trok de wereld in." Afgedankte soldaten in het geheugen van de Europese sprookjes." *Volkskunde* 111, no. 4 (2010): 421–40.
- Baillien, Henry. *Tongeren. Van Romeinse civitas tot middeleeuwse stad*. Assen: Van Gorcum, 1979.
- Baker, Alan R. H. *Geography and History. Bridging the Divide*. Cambridge: Cambridge University Press, 2003.
- Balace, Francis. "La maréchaussée liégeoise à la fin du XVIII^e siècle." *Militaria Belgica* 3, nos. 4–5 (1982): 131–39.
- Balon, J. "Un train sanitaire namurois durant le siège de Calais en 1347." *ASAN* 39 (1930): 269–99.
- . "L'organisation militaire des Namurois au XIV^e siècle." *ASAN* 40 (1932–33): 1–86.
- Bankoff, Greg. "Wood for War: The Legacy of Human Conflict on the Forests of the Philippines, 1565–1946." In *War and the Environment. Military Destruction in the Modern Age*, edited by Charles E. Closmann, 32–48. College Station: Texas A&M University Press, 2009.
- Barbe, Marie-France. "Rocroy, ville de garnison." *Revue Historique Ardennaise* 34 (1999–2000): 87–162.
- . Sylvie Laverdine, and Françoise Parizel, *Moulins des Ardennes par monts et par vaux*. Charleville-Mézières: Terres Ardennaises, 2013.
- Barbier, Etienne. "La Grande Pitié de Bar-Le-Duc au dix-septième siècle." *BSHAM* 12 (1975): 249–58.
- Barends, S. et al., eds. *Het Nederlandse landschap. Een historisch-geografische benadering*. Utrecht: Matrijs, 1986; 1991.
- Bartlett, Robert. "The Impact of Royal Government in the French Ardennes: the evidence of the 1247 enquête." *Journal of Medieval History* 7 (1981): 83–96.
- . *The Making of Europe. Conquest, Colonization and Cultural Change 950–1350*. London: Penguin, 1993.
- Bas, W.G. de. "De Kalix Berna of Kalbergen." *De Militaire Spectator* 85 (1916): 63–70.
- Bastin, Eric. *La justice militaire en Belgique de 1830 à 1850. L'auditeur militaire, "valet" ou "cheville ouvrière" des conseils de guerre?* Louvain-la-Neuve: Presses universitaires de Louvain, 2012.
- Bautier, Robert Henri and Anne Marie Bautier. "Contribution à l'histoire du cheval au Moyen Age. L'élevage du cheval." *Bulletin philologique et historique* (1978): 9–75.
- Bavel, Bas van. *Goederenverwerving en goederenbeheer van de abdij van Mariënweerd (1129–1592)*. Hilversum: Verloren, 1993.
- . *The Invisible Hand? How Market Economies Have Emerged and Declined since AD 500*. Oxford: Oxford University Press, 2016.
- Bechmann, Roland. *Trees and Man. The Forest in the Middle Ages*. Translated by Katharyn Dunham. New York: Paragon House, 1984; 1990.
- Becquet, Alf. "Montaigle." *ASAN* 6 (1859): 91–139.
- Behault de Dornon, Armand de. "Un tournoi à Mons au XIV^e siècle." *ACAM* 19 (1886): 385–411.

- Behr, Hans-Joachim. "Garden und Vergardung. Das Problem der herrenlosen Landsknechte im 16. Jahrhundert." *Westfälische Zeitschrift* 145 (1995): 41–72.
- Bélanger, Pierre and Alexander Arroyo. *Ecologies of Power: Countermapping the Logistical Landscapes & Military Geographies of the U.S. Department of Defense*. Cambridge, MA: MIT Press, 2016.
- Belhoste, Jean-François. "Une sidérurgie frontalière." In *La métallurgie du fer dans les Ardennes (XVI^e-XIX^e)*, edited by Louis André, Jean-François Belhoste and Patrice Bertrand, 9–25. Châlons sur Marne: Ministère de la Culture et de la Communication, 1988.
- . "Bois et fers pour la marine: deux fournitures extraites de la forêt XVII^e-XVIII^e siècles." In *Forêt et marine*, edited by Andrée Corvol, 95–112. Paris: Harmattan, 1999.
- Belissa, Marc. "La question des frontières naturelles pendant la Révolution et l'Empire." In *Frontières et espaces frontaliers du Léman à la Meuse. Recompositions et échanges de 1789 à 1814*, edited by Claude Mazauric and Jean-Paul Rothiot, 117–28. Nancy: Presses Universitaires de Nancy, 2007.
- Bell Adrian R. et al. *The Soldier in Later Medieval England*. Oxford: Oxford University Press, 2013.
- Belle, J.-L. van. *Le premier projet de police ou l'histoire des van der Stegen, derniers drossards de Brabant (XVII^e-XIX^e s.)*. Braine-le-Château: La Taille d'Aulme, 1997.
- Belonje, J. "Beplantingen op vestingwerken." *Bulletin van de Koninklijke Nederlandse Oudheidkundige Bond* 70 (1971): 91–97.
- Below, G. von. "Die Leistungen des Amtes Wassenberg zum Jülicher Festungsbau im Jahre 1576." *ZAG* 18 (1896): 1–18.
- Bennett, Matthew. "The Medieval Warhorse Reconsidered." In *Medieval Knighthood, V: Papers from the Sixth Strawberry Hill Conference, 1994*, edited by Stephen Church and Ruth Harvey, 19–40. Woodbridge: Boydell, 1995.
- Berend, Nora. "Medievalists and the Notion of the Frontier." *The Medieval History Journal* 2 (1999): 55–72.
- Berens, Willi. *Territoriale Entwicklung & Grenzbildung im belgisch-deutschen Grenzraum*. Eupen: Förderverein des Archivwesens in der Deutschsprachigen Gemeinschaft Belgiens, 2005.
- Bernays E. "Les loups au pays de Namur." *Namurcum* 14 (1937): 8–11.
- Bertrand, Patrice. "Les trois tours de Givet." *Revue Historique Ardennaise* 16 (1981): 1–30.
- . "La forge et la fabrique royale d'armes de Nouzon." In *La métallurgie du fer dans les Ardennes (XVI^e-XIX^e)*, edited by Louis André, Jean-François Belhoste and Patrice Bertrand, 89–102. Châlons sur Marne: Ministère de la Culture et de la Communication, 1988.
- . "Une construction continue. Premiers résultats d'une enquête pour la période 1554–1750." In "Charlemont." Special issue, *Ardenne Wallonne* (1993): 13–28.
- Best, Geoffrey. "The Historical Evolution of Cultural Norms Relating to War and the Environment." In *Cultural Norms, War and the Environment*, edited by Arthur W. Westing, 18–28. Oxford: Oxford University Press, 1988.
- Bevaart, W. *Nederlandse defensie 1839–1874*. The Hague: Historical Section of the Royal Netherlands Army, 1993.
- Billen, Claire. "Het Waalse platteland. Een nieuwe kijk op de 17de eeuw?" In *België in de 17de eeuw. De Spaanse Nederlanden en het prinsbisdom Luik*, edited by Paul Janssens, 260–70. Ghent: Snoeck, 2006.
- Bitterling David, *L'Invention du pré carré: Construction de l'espace français sous l'Ancien Régime*. Paris: Michel, 2009.
- Bisset, N. G. "Arrow and Dart Poisons." *Journal of Ethnopharmacology* 25 (1989): 1–41.
- Black, Jeremy. *Rethinking Military History*. New York: Routledge, 2004.
- . *Geopolitics and the Quest for Dominance*. Bloomington: Indiana University Press, 2015.

- Blanchard, Anne, *Les ingénieurs du "roy" de Louis XIV à Louis XVI*. Montpellier: Université Paul-Valéry, 1979.
- Bodart, Emmanuel, *Société et espace urbains au bas Moyen Âge et au début de l'époque moderne. Morphologie et sociotopographie de Namur du XIII^e au XVI^e siècle*. Namur: Société archéologique de Namur, 2017.
- Boeren, P. C. *Twee Maaslandse dichters in dienst van Karel de Stoute*. Den Haag: Nijhoff, 1968.
- Boffa, Serge. "Les soutiens militaires de Jean I^{er}, duc de Brabant, à Philippe III, roi de France, durant les expéditions ibériques (1276–1285)." *RN* 78 (1996): 7–33.
- . "Le ravitaillement d'une troupe brabançonne. Un 'certificat' relatif aux expéditions dans le Hainaut sous le règne de Jean IV (27 déc. 1424–29 mai 1425)." In *Hainaut et Tournaisis. Regards sur dix siècles d'histoire. Recueil d'études dédiées à la mémoire de Jacques Nazet (1944–1996)*, edited by Claire Billen, Jean-Marie Duvosquel, and André Vanrie, 195–219. Brussels: Archives et Bibliothèques de Belgique, 2000.
- Boffa, Sergio, *Warfare in Medieval Brabant, 1356–1406*. Woodbridge: Boydell, 2004.
- Bogros, Denis. "Les chevaux de la cavalerie française à la fin du XVII^e siècle." *Histoire, économie et société* 15, no. 1 (1996): 105–12.
- Bois, Jean-Pierre. *Les anciens soldats dans la société française au XVIII^e siècle*. Paris: Economica, 1990.
- Boomgaard, Peter. *Frontiers of Fear. Tigers and People in the Malay World, 1600–1950*. New Haven: Yale University Press, 2001.
- Boone, Ides, Bea De Cupere, and Wim Van Neer. "Social Status as Reflected in the Food Refuse from Late Medieval Sites in Namur (Belgium)." *Revue Belge de Philologie et d'Histoire* 80, no. 4 (2002): 1391–94.
- Boonen, Martin. "Repressie van vaandelvluchtige soldaten te Maaseik (1629–1633)." *OLL* 33 (1978): 29–51.
- . "De Maaseiker wallen." *De Maaseikenaar* 16, nos. 2–3 (1985): 41–104.
- . "Maaseiker soldeniers en huurlingen." *De Maaseikenaar* 27, no. 1 (1996): 10–15.
- . *Misdaad en straf. Criminaliteit en strafrecht gedurende het ancien régime in Maaseik*. Maaseik, 2009.
- . *Ziekten en genezers in het vroegere Maaseik*. Maaseik: Werkgroep Documentatie Maaseik, 2014.
- . et al. "Bosgeschiedenis Euregio Rijn–Waal: Nederlands deel." In *Bosgeschiedenis Euregio Rijn–Waal / Waldgeschichte Euregio Rhein–Waal*, 199–290. Wageningen: Probos, 2012.
- . Patrick Jansen, and Ido Borkent, *Beplantingen op verdedigingswerken. Geschiedenis Beheer Praktijkvoorbeelden*. Utrecht: Matrijs, 2012.
- Borgnet, Jules. *Histoire des compagnies militaires de Namur*. Brussels: Hayez, 1852.
- . *Examen des sources de l'histoire de Bouvignes*. Namur, 1862.
- . "Troubles du Comté de Namur en 1488." *ASAN* 2 (1851): 27–56.
- Bosch, Toon, *Om de macht over het water. De nationale waterstaatsdienst tussen staat en samenleving 1798–1849*. Zaltbommel: Europese Bibliotheek, 2000.
- Bossenbroek, Martin, *Volk voor Indië. De werving van Europese militairen voor de Nederlandse koloniale dienst, 1814–1909*. Amsterdam: De Bataafsche Leeuw, 1992.
- Bothe, Jan Philipp, "How to 'Ravage' a Country: Destruction, Conservation, and Assessment of Natural Environments in Early Modern Military Thought" *The Hungarian Historical Review* 7:3 (2018) 510–40.
- Bouchat, Marc. "L'occupation française de Dinant et les travaux de fortification par les ingénieurs militaires entre 1675 et 1703." *Ardenne Wallonne* 68 (1997): 3–10; 69 (1997): 31–38; 70 (1997): 35–41; 71 (1997): 43–48; and 72 (1998): 34–41.

- Boudriot, Jean. "Chêne et vaisseaux royaux." In *Forêt et marine*, edited by Andrée Corvol, 339–48. Paris: Harmattan, 1999.
- Boullet, Lucien. *Histoire de Rocroi*. Mézières: Société d'Etudes Ardennaises, 1958.
- Bourguignon, Marcel. "La surprise d'Arlon, le 11 novembre 1604, par un parti hollandaise." *AIAL* 95 (1964): 5–95.
- Boutruche, Robert. "The Devastation of Rural Areas during the Hundred Years War and the Agricultural Recovery of France." In *The Recovery of France in the Fifteenth Century*, edited by Peter Shervey Lewis, 23–59, 356–62. London: Macmillan, 1971.
- Bouwer, Klaas. *Een notabel domein. De geschiedenis van het Nederrijkswald*. Utrecht: Matrijs, 2003.
- Bradbury, Jim. *The Medieval Siege*. Woodbridge: Boydell & Brewer, 1992.
- Brady, Lisa M. *War upon the Land: Military Strategy and the Transformation of Southern Landscapes during the American Civil War*. Athens: University of Georgia Press, 2012.
- Bragard, Philippe. *Le Château des comtes de Namur. Autopsie d'une forteresse médiévale*. Namur: Les Amis de la Citadelle de Namur, 1990.
- . "Soldats et jardiniers: l'emploi de la végétation dans les forteresses, XV^e–XIX^e siècle." In *Le jardin dans les anciens Pays-Bas*, edited by Laurence Baudoux-Rousseau, 87–108. Arras: Presses universitaires Artois, 2002.
- . et al. *La termitière de l'Europe. Les souterrains de la Citadelle de Namur*. Namur: Les Amis de la Citadelle de Namur, 2002.
- . et al. *Namur et ses enceintes. Une fortification urbaine du Moyen Âge à nos jours*. Namur: Les Amis de la Citadelle de Namur, 2009.
- . *Dictionnaire biographique des ingénieurs des fortifications. Pays-Bas espagnols, principauté de Liège, Franche-Comté, 1504–1713*. Namur: Les Amis de la Citadelle de Namur, 2011.
- . et al. *Namur, la citadelle hollandaise. Une forteresse mosane de Wellington à Brialmont 1814–1878*. Namur: Les Amis de la Citadelle de Namur, 2012.
- Brand, Rien van den. "Oprichting van een Augustijns klooster (1450–1470) in Oostrum." In *Venrays verleden, 7: Cultuurhistorische bijdragen over Venray en omgeving*, 37–57. Venray: Venray Historisch Platform, 2015.
- . "Spaanse vestingbouwwerkzaamheden aan de stad Geldern voor de Pruisische verovering in 1703." In *Epitaph für Stefan Frankewitz: Ein Gedenkbuch für den Freund und Kollegen*, edited by Hermans Frans et al., 79–119. Geldern: Geldrisches Archiv, 2015.
- . and Theo Manders, *Vesting 't Gennepershuis in eeuwenlange vrijheidssrijd*. Venray: Historie Peel–Maas–Niersgebied, 2002.
- Brandes, Dietmar. "Flora und Vegetation von Stadtmauern." *Tuexenia* 12 (1992): 315–39.
- . "Burgruinen als Habitatsinseln. Ihre Flora und Vegetation sowie die Bedeutung für Sukzessionsforschung und Naturschutz dargestellt unter besonderer Berücksichtigung der Burgruinen des Harzgebietes." *Braunschweiger Naturkundliche Schriften* 5, no. 1 (1996): 125–63.
- Braudel, Fernand. *La Méditerranée et le monde méditerranéen à l'époque de Philippe II*. Paris: Colin, 1949.
- Brauer, Jürgen. *War and Nature. The Environmental Consequences of War in a Globalized World*. Lanham: AltaMira, 2009; 2011.
- Breton, L. *Du rôle des forêts en temps de guerre*. Paris, 1894.
- Breuer, Helmut. *Die Maas als Schiffahrtsweg*. Wiesbaden: Steiner, 1969.
- Breuer, J. "Matériaux pour l'histoire du corps de génie dans les Pays-Bas autrichiens de 1717 à 1756." *Revue Internationale d'Histoire Militaire* 24 (1965): 337–54.

- Briggs, Robin. *The Witches of Lorraine*. Oxford: Oxford University Press, 2007.
- Brion, R. "L'armée et la conquête d'une dixième province par le défrichement des bruyères (1835–1856)." *Revue Belge d'Histoire Militaire* 25, no. 8 (1984): 667–76.
- Brokamp, Bertus. "Landweren in Nederland." 2 vols. Master's thesis, University of Utrecht, 2007.
- Brouette, Emile. "Notes sur l'économie rurale du Namurois au siècle de malheur (1500–1648)." *RN* 32, nos. 126–127 (1950): 105–18.
- . "La sorcellerie dans le comté de Namur au début de l'époque moderne (1509–1646)." *ASAN* 47 (1953–54): 359–420.
- Brouillet, Pascal. "La maréchaussée des origines à 1720." In *De la maréchaussée à la gendarmerie. Histoire et patrimoine*, edited by Pascal Brouillet, 13–26. Maisons-Alfort: Service historique de la gendarmerie nationale, 2004.
- Brouwers, Dieudonné. "A propos des recrutements au pays de Liège." *BLAL* 1, no. 8 (1906): 67–69.
- . "La reconstruction de Dinant à la fin du XV^e siècle." In *Mélanges Godefroid Kurth. vol. 1: Mémoires historiques*, 213–21. Liège: Faculté de Philosophie et Lettres, 1908.
- . "Les gués de la Meuse namuroise en 1568." *Namurcum* 7 (1930): 33–40.
- . "Indemnités pour dommages de guerre au pays de Namur, en 1432." *ASAN* 40 (1932): 87–105.
- Brouwers, Jozef. "Soldatenwerving in de vrije rijksbaronnie Pietersheim." *Limburg* 49, no. 4 (1970): 180–94.
- Bruggeman, Henk. *Bestedingen Dienst der Fortificatiën in de vesting 's-Hertogenbosch*. 's-Hertogenbosch, 1993.
- Bruijn, Enny de. *De hoeve en het hart. Een boerenfamilie in de Gouden Eeuw*. Amsterdam: Prometheus, 2019.
- Bruijn, Jaap R. *Varend verleden. De Nederlandse oorlogsvloot in de 17de en 18de eeuw*. Amsterdam: Balans, 1998.
- Brun, Jean-François. "Le cheval dans la Grande Armée." *Revue Historique des Armées* 249 (2007): 38–74.
- Bruneel, Claude. "L'épidémie de dysenterie de 1779 dans les Pays-Bas." *BCRH* 145 (1979): 191–395.
- Brunel, Sarah. *Les missions militaires au service de la biodiversité*. Les Ulis: EDP sciences, 2012.
- Buchin Eugène. "Erard de La Marck et la restauration des forteresses Liégeoises." *Leodium* 21 (1928): 66–81.
- Buis, Jaap. *Historia Forestis: Nederlandse bosgeschiedenis*. 2 vols. Utrecht: HES, 1985.
- Buisman, Jan. *Duizend jaar weer, wind en water in de Lage Landen, 2: 1300–1450*. Franeker: Van Wijnen, 1996.
- Bur, Michel. "Recherches sur la frontière dans la région mosane aux XII^e et XIII^e siècles." In *Principautés et territoires et études d'histoire Lorraine*, 143–60. Paris: Bibliothèque Nationale, 1979.
- Burger, Daniel. "Wasserversorgung auf Festungen." In *Kasernen—Lazarette—Magazine. Gebäude hinter den Wällen*, edited by Kettlitz Eberhardt et al., 219–34. Regensburg: Schnell & Steiner, 2012.
- Burgers, Jan. "De steden van Holland in oorlog (1506–1515)." *Holland* 41 (2009): 273–90.
- . and Mario Damen. "Feudal Obligation or Paid Service?" The Recruitment of Princely Armies in the Late Medieval Low Countries." *English Historical Review* 133, no. 563 (2018): 777–805.
- Burggraaff, Peter and Bernward Selter. "Waldgeschichte Euroregio Rhein-Waal: Deutscher Teil." In *Bosgeschiedenis Euregio Rijn-Waal / Waldgeschichte Euregio Rhein-Waal*, 291–450. Wageningen: Probos, 2012.

- Buridant, Jérôme. "Le rôle des forêts dans la défense de la Champagne durant la Guerre de Trente ans et ses prolongements (1635–1659)." In *Se défendre en Champagne-Ardenne*, edited by Patrick Demouy, 229–40. Langres: Guéniot, 2012.
- Burschel, Peter. *Söldner im Nordwestdeutschland des 16. und 17. Jahrhunderts*. Göttingen: Vandenhoeck & Ruprecht, 1994.
- Buti, Gilbert. "Un arsenal méditerranéen et ses aspects forestiers: Toulon au XVIII^e siècle." In *Forêt et marine*, edited by Andrée Corvol, 487–504. Paris: Harmattan, 1999.
- Butzeck, Steffen, Michael Stubbe, and Rudolf Piechocki. "Beiträge zur Geschichte der Säugetierfauna der DDR. Teil 3: Der Wolf." *Hercynia* 25, no. 3 (1988): 278–317.
- Caffiaux, Henri. *Essai sur le régime économique financier et industriel du Hainaut après son incorporation à la France*. Valenciennes, 1873.
- Caminada-Voorham, A. M. G. *Loevestein, een fort aan de grens van Holland*. Zutphen: Walburg, 1989.
- Campbell, Bruce M. S. "Nature as Historical Protagonist: Environment and Society in Pre-Industrial England." *Economic History Review* 63, no. 2 (2010): 281–314.
- Capelle, Torsten. "Landwehrbau." In *Landwehren. Zu Funktion, Erscheinungsbild und Verbreitung spätmittelalterlicher Wehranlagen*, edited by Cornelia Knepe, 25–34. Münster: Aschendorff, 2014.
- Cardoza, Thomas. *Intrepid Women. Cantinières and Vivandières of the French Army*. Bloomington: Indiana University Press, 2010.
- Carolus-Barré, Louis. "Benoît XII et la mission charitable de Bertrand Carit dans les pays dévastés du nord de la France (Cambrésis, Vermandois, Thiérache)." *Mélanges d'Archéologie et d'Histoire* 62 (1950): 165–232.
- Cauchies, Jean-Marie. "La désertion dans les armées bourguignonnes de 1465 à 1476." *Revue Belge d'Histoire Militaire* 22, no. 2 (1977): 132–48.
- . *La législation princière pour le comté de Hainaut. Ducs de Bourgogne et premiers Habsbourgs (1427–1506)*. Brussels: Facultés universitaires Saint-Louis, 1982.
- Caulaert, Jean-François van. "Passées les guerres du Pays de Liège (1430), témoignages de tentatives de remise en valeur du domaine de Golzennes." *ASAN* 74 (2000): 5–22.
- Cauwer, Peter De. *Tranen van bloed. Het beleg van 's-Hertogenbosch en de oorlog in de Nederlanden, 1629*. Amsterdam: Amsterdam University Press, 2008.
- Cayron, Jean R. *La véritable histoire de Jacques Pastur dit Jaco. Brigadier de cavalerie et de dragons au service de l'Espagne*. Brussels: Collection d'Histoire Militaire Belge, 1953.
- Ceyssens, J. "Les premières hostilités entre les Liégeois et les ducs de Bourgogne en 1465. La destruction de Dalhem." *Leodium* 15 (1922): 84–94.
- Chagniot, Jean. *Paris et l'armée au XVIII^e siècle. Etude politique et sociale*. Paris: Economica, 1985.
- . "Les camps de 1727 en Lorraine sous le comte de Belle-Isle." *Bulletin de la Société Historique de Compiègne* 36 (1999): 61–70.
- Chapman, J. L. and M. J. Reiss. *Ecology: Principles and Applications*. Cambridge: Cambridge University Press, 1999; 2003.
- Charney, Michael W. *Southeast Asian Warfare, 1300–1900*. Leiden: Brill, 2004.
- Charruadas, Paulo, and Chloé Deligne. "Cities Hiding the Forests: Wood Supply, Hinterlands and Urban Agency in the Southern Low Countries, Thirteenth to Eighteenth Centuries." In *Urbanizing Nature. Actors and Agency (Dis)Connecting Cities and Nature Since 1500*, edited by Tim Soens et al., 112–34. New York: Routledge, 2019.
- Chauvelays, Jules de la. "Les armées des trois premiers ducs de Bourgogne de la maison de Valois." *Mémoires de l'Académie (Dijon)* 6 (1880): 19–335.

- Chevalier, Agnès. "Les 'attres' fortifiés du rivage liégeois de la Sambre et leur destruction en 1408–1410." In *La forteresse à l'épreuve du temps*, edited by Gilles Blieck et al., 29–41. Paris: Comité des travaux historiques et scientifiques, 2007.
- Childs, John. *The Military Use of Land. A History of the Defence Estate*. Bern: Lang, 1998.
- Chouquer, Gérard. *Traité d'archéogéographie. La crise des récits géohistoriques*. Paris: Errance, 2008.
- Cirillo Vincent J. "'Winged Sponges': Houseflies as Carriers of Typhoid Fever in 19th- and Early 20th-Century Military Camps." *Perspectives in Biology and Medicine* 49, no. 1 (2006): 52–63.
- Claassen, A. *Van mottoren tot kasteel*. Tongeren: Gallo-Romeins Museum, 1970.
- Clercq, Carlo de. "Jean-Baptiste De Bouge et sa carte des opérations militaires dans la région mosane belge en 1790." *ASAN* 50 (1961): 205–68.
- Closset-Kopp, Déborah and Guillaume Decocq. "Remnant Artificial Habitats as Biodiversity Islets into Forest Oceans." *Ecosystems* 18 (2015): 507–19.
- Closmann, Charles E., ed. *War and the Environment. Military Destruction in the Modern Age*. College Station: Texas A&M University Press, 2009.
- Coates, Peter et. al. "Defending Nation, Defending Nature? Militarized Landscapes and Military Environmentalism in Britain, France and the United States." *Environmental History* 16 (2011): 465–91.
- Coenegrachts, Tom and Rik van de Konijnenburg. "De kasteelsite van Oud-Rekem (Lanaken)." In "'t is maar de kwestie ze te vinden...': Van 300.000 jaar geleden tot WOII Archeologie in Zuid-Oost-Limburg, edited by Tim Vanderbeken, 61–72. Riemst: Zolad+: 2010.
- Coenen, Fedor. "Een kasteel in de wildernis." In *Montfort. Een kasteel en zijn landschap*, edited by Fedor Coenen and Arjan Ovaa, 50–71. Lomm: Het Limburgs Landschap, 2006.
- . "Kasteel Montfort domineert zijn landschap." In *Montfort. Een kasteel en zijn landschap*, edited by Fedor Coenen and Arjan Ovaa, 72–91. Lomm: Het Limburgs Landschap, 2006.
- . "Het keerpunt." In *Montfort. Een kasteel en zijn landschap*, edited by Fedor Coenen and Arjan Ovaa, 92–113. Lomm: Het Limburgs Landschap, 2006.
- Collin, Hubert. "L'administration seigneuriale des villages lorrains et le système fiscal de l'assise au début du XIV^e siècle." *Bulletin philologique et historique (jusqu'à 1610)* (1965): 393–411.
- . "Le travail d'organisation de la guerre. Le prévôt de Longwy, pourvoyeur des chevaux-chées de 1318 autour de Verdun." In *L'Effort de guerre. Approvisionnement, mobilisation matérielle et armement (XIV^e–XX^e siècles)*, edited by Jean-Paul Rothiot, 17–29. Paris: CTHS, 2004.
- Collins, John M. *Military Geography for Professionals and the Public*. Dulles: Potomac, 1998; 2006.
- Combeau, Yves. *Le comte d'Argenson, 1696–1764: Ministre de Louis XV*. Paris: Ecole nationale des chartes, 1999.
- Contamine, Philippe. *Guerre, état et société à la fin du Moyen Âge. Etudes sur les armées des rois de France 1337–1494*. Paris: Ecole Pratique des Hautes Etudes, 1972.
- . *La guerre au Moyen Âge*. Paris: Presses Universitaires de France, 1980; 1994.
- . "Scènes de chasse en Barrois: le loup à la fin du Moyen Âge." In *Milieus naturels, espaces sociaux. Etudes offertes à Robert Delort*, edited by Elisabeth Mornet and Franco Moren-zoni, 279–86. Paris: Editions de la Sorbonne, 1997.
- . "Le cheval 'noble' aux XIV^e–XV^e siècles: une approche européenne." *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 152, no. 4 (2008): 1695–1726.

- Coomans, Janna. "In Pursuit of a Healthy City. Sanitation and the Common Good in the Late Medieval Low Countries." PhD diss., University of Amsterdam, 2018.
- . "The King of Dirt: Public Health and Sanitation in Late Medieval Ghent" *Urban History* 46, no. 1 (2019): 82–105.
- Corvisier, André, *L'Armée française de la fin du XVII^e siècle au ministère de Choiseul: Le soldat*. 2 vols. Paris: Université de Paris, 1964.
- Coulson, Charles, *Castles in Medieval Society. Fortresses in England, France, and Ireland in the Central Middle Ages*. Oxford: Oxford University Press, 2003; 2005.
- Coun, Theo, *Geschiedenis van de bewoning in Neerharen tot in het midden van de 19de eeuw*. Lanaken: Koninklijke Geschied- en Oudheidkundige Studiekkring Sint-Ursula, 1998.
- Creemers, Guido and Alain Vanderhoeven. "Archeologische Kroniek van Limburg 2003." *Limburg—Het Oude Land van Loon* 85 (2006): 289–321.
- Cremers, Jos. "Beredeneerde voorloopige lijst der in Limburg in 't wild voorkomende zoogdieren I.a. Canis lupus L. de wolf." *Natuurhistorisch Maandblad* 17, no. 11 (1928): 156–59.
- Creighton, Olivier H. "Castle Studies and the European Medieval Landscape: Traditions, Trends and Future Research Directions." *Landscape History* 30, no. 2 (2009): 5–20.
- . *Designs Upon the Land. Elite Landscapes of the Middle Ages*. Woodbridge: Boydell, 2009; 2013.
- . and Robert Higham. *Medieval Town Walls: An Archaeology and Social History of Urban Defence*. Stroud: Tempus, 2005.
- . and Duncan Wright. *The Anarchy: War and Status in 12th-Century Landscapes of Conflict*. Liverpool: Liverpool University Press, 2016.
- Cremers, Elisabeth, Fred Kaaij, and Clemens M. Steenberg. *Bolwerken als stadsparken. Nederlandse stadswandelingen in de 19^e en 20^e eeuw*. Delft: Delftse Universitaire Pers, 1981.
- Cressy, David, *Saltpeter. The Mother of Gunpowder*. Oxford: Oxford University Press, 2013.
- Cronon, William. "The Trouble with Wilderness; or, Getting Back to the Wrong Nature." In *Uncommon Ground: Rethinking the Human Place in Nature*, edited by William Cronon, 69–90. New York: Norton, 1995.
- Crouch, David, *Tournament*. London: Hambledon / Continuum, 2005; 2006.
- Cuppens, Everd. "Opoeteren en de 80-jarige oorlog (1568–1648)" *Limburg—Het Oude Land van Loon* 96, no. 3 (2017): 297–332; and 97, no. 1 (2018): 75–96.
- Cummins, John G. *The Hound and the Hawk. The Art of Medieval Hunting*. London: Weidenfeld and Nicholson, 1988.
- Curry, Anne. "The Military Ordinances of Henry V: Texts and Contents." In *War, Government and Aristocracy in the British Isles, c. 1150–1500. Essays in Honour of Michael Prestwich*, edited by Chris Given-Wilson, 214–49. Woodbridge: Boydell, 2008.
- Daenen, Julien. "Bijgelovig volk en ziek vee." In *Limburg in 't geweer. Oorlogsleed in het Land van Loon van Alva tot Napoleon*, edited by Julien Daenen and Jozef Mertens, 217–20. Bilzen: Landcommanderij Alden Biezen, 2008.
- Dahm, Helmut. "Verluste der jülich-bergischen Landmiliz im Dreissigjährigen Krieg." *Düsseldorfer Jahrbuch* 45 (1951): 280–88.
- Dalché, Patrick Gautier. "Les usages militaires de la carte, des premiers projets de croisade à Machiavel." *Revue Historique* 673, no. 1 (2015): 45–80.
- Damen, Mario. *De staat van dienst. De gewestelijke ambtenaren van Holland en Zeeland in de Bourgondische periode (1425–1482)*. Hilversum: Verloren, 2000.
- . *Prelaten, edelen en steden. De samenstelling van de Staten van Brabant in de vijftiende eeuw*. Brussels: Académie Royale de Belgique/Koninklijke Academie van België, 2018.
- Dandy, J. E., ed. *The Sloane Herbarium*. London: British Museum, 1958.

- Dardart, G  rald. "Evolution d'un paysage urbain. La rue    Sedan (1700–1878)." PhD diss., Universit   Paris–IV Sorbonne, 2001.
- Darquenne, Roger. *La conscription dans le d  partement de Jemappes (1798–1813). Bilan d  mographique et m  dico-social*. Mons: Annales de Mons, 1970.
- Dauphant, L  onard. *Le Royaume des quatre rivi  res. l'espace politique fran  ais (1380–1515)*. Seyssel: Champ Vallon, 2012.
- Davis, R. H. C. *The Medieval Warhorse: Origin, Development and Redevelopment*. London: Thames and Hudson, 1989.
- Debrabant, Bernard. "Le Quesnoy. R  gularisation du trac   et mise en eau." In *Vauban entre Sambre et Meuse, 1707–2007*, edited by Philippe Bragard, 73–78. Namur: Les Amis de la Citadelle de Namur, 2007.
- Decourt Philippe. "Du r  le du paludisme en Italie sur l'  volution politique de l'Allemagne." *Archives Internationales Claude Bernard* 2 (1972): 119–44.
- Decuyper, Pieter. "De Bourgondische artillerie onder Karel de Stoute (1465–1477)." Master's thesis, University of Ghent, 2007.
- Degroot, Dagomar. "'Never Such Weather Known in These Seas': Climatic Fluctuations and the Anglo-Dutch Wars of the Seventeenth Century, 1652–1674." *Environment and History* 20 (2014): 239–73.
- . *The Frigid Golden Age: Climate Change, the Little Ice Age, and the Dutch Republic, 1560–1720*. Cambridge: Cambridge University Press, 2018.
- Dejongh, Guy and Erik Thoen. "Arable Productivity in Flanders and the Former Territory of Belgium in a Long-Term Perspective (from the Middle Ages to the End of the Ancien R  gime)." In *Land Productivity and Agro-Systems in the North Sea Area*, edited by Erik Thoen and Bas van Bavel, 30–64. Turnhout: Brepols, 1999.
- Dekker, Rudolf and Lotte van de Pol. *Vrouwen in mannenkleren. De geschiedenis van een tegendraadse traditie Europa 1500–1800*. Amsterdam: Wereldbibliotheek, 1989; 1991.
- Delameillieure, P. "Het kamp van Beverlo vanaf zijn ontstaan in 1835 tot op heden." In *Kamp van Beverlo. Inhuldiging van het museum*, 43–116. Leopoldsburg: Museum Kamp van Beverlo, 1972.
- Delcourte Debarre, Marie. "Espaces forestiers et soci  t  s en Avesnois (XIV  –d  but du XVIII   si  cle):   tude du paysage." PhD diss., Universit   de Valenciennes et du Hainaut-Cambr  sis, 2016.
- Delguste-van der Kaa, Marie-H  l  ne. *Histoire des loups dans les deux Luxembourg*. Rossignol: Histoire Collective, 2003.
- Deligne, Chlo  . "Carp in the City: Fish-Farming, Ponds, and Urban Dynamics in Brabant and Hainaut, c. 1100–1500." In *Beyond the Catch: Fisheries of the North Atlantic, the North Sea and the Baltic, 900–1850*, edited by Louis Sicking, 283–308. Leiden: Brill, 2009.
- Denessen, Henny. "Twee havenuitdiepingsprojecten in vijftiende-eeuws Dordrecht." *Tijdschrift voor Zeegeschiedenis* 25 (2006): 10–23.
- Denis, Marceline. "Frameries/Frameries: vestiges de campements militaires (fin 16  –d  but 17   et 18   si  cle)." *Chronique de l'Arch  ologie Wallonne* 21 (2014): 130–32.
- Denys, Catherine. *Police et s  curit   au XVIII   si  cle dans les villes de la fronti  re franco-belge*. Paris: Harmattan, 2002.
- . "Les sergents de ville en France du Nord et aux Pays-Bas au XVIII   si  cle:   volution d'un m  tier et d'une pratique sociale." In *Entre Justice et justiciables: les auxiliaires de la justice du Moyen   ge au XX   si  cle*, edited by Claire Dolan, 85–100. Qu  bec: Les Presses de l'Universit   Laval, 2005.

- Depreter, Michael, *De Gavre à Nancy (1453–1477). L'artillerie bourguignonne sur la voie de la "modernité"*. Turnhout: Brepols, 2011.
- Deprez, René. "La politique castrale dans la principauté épiscopale de Liège du X^e au XIV^e siècle." *Le Moyen Âge* 65 (1959): 501–38.
- Dereu, Pierre. "Les armées à Givet sous l'Empire." *Revue Historique Ardennaise* 11 (1976) 53–66; 12 (1977) 79–100.
- Desbrière, Michel. *Champagne septentrionale. Cartes et mémoires à l'usage des militaires 1544–1659*. Charleville-Mézières: Société d'études ardennaises, 1995.
- . *Chronique critique des lignes de défense de la Champagne septentrionale 1644–1748*. Charleville-Mézières: Terres Ardennaises, 2003.
- . "Le bois: un matériau stratégique. Ses multiples emplois en Champagne septentrionale pendant les guerres de la fin du XVII^e siècle et du début du XVIII^e siècle." In *Se défendre en Champagne-Ardenne*, edited by Patrick Demouy, 241–58. Langres: Guéniot, 2012.
- Deschard, Bernard, *L'Armée et la Révolution. Du service du Roi au service de la Nation*. Paris: Desjonquières, 1989.
- Despy, Georges. "Les opérations des artilleurs de Ferraris dans le Comté de Namur en 1772–1773." *ASAN* 49 (1959): 281–96.
- Devillers, Léopold. "Notice historique sur la milice communale et les compagnies militaires de Mons." *ACAM* 3 (1862): 169–285, 345–46.
- Devos, Isabelle. "Malaria in Vlaanderen tijdens de 18de en 19de eeuw." In *Orbis in Orbem. Liber Amicorum John Everaert*, edited by Jan Parmentier and Sander Spanoghe, 197–234. Ghent: Academia Press, 2001.
- DeVries, Kelly. "Teenagers at War during the Middle Ages." In *The Premodern Teenager: Youth in Society, 1150–1650*, edited by Konrad Eisenbichler, 207–24. Toronto: Centre for Reformation and Renaissance Studies, 2002.
- . "Medieval Mercenaries: Methodology, Definitions and Problems." In *Mercenaries and Paid Men: The Mercenary Identity in the Middle Ages*, edited by John France, 43–60. Leiden: Brill, 2008.
- . "Facing the New Military Technology: Non-Trace Italiane Anti-Gunpowder Weaponry Defenses, 1350–1550." In *Heirs to Archimedes: Science and the Art of War through the Age of Enlightenment*, edited by Brett Steele and Tamara Dorland, 37–71. Cambridge, MA: MIT Press, 2005.
- Dijk, H. F. G. van, B. G. Graatsma, and J. N. M. van Rooy. *Droge stroomdalgraslanden langs de Maas*. Hoogwoud: Koninklijke Nederlandse Natuurhistorische Vereniging, 1984.
- Dijkman, W. "Archeologische testimonia van de belegering van 1673." In *D'Artagnan, gevalen voor Maastricht*, edited by Odile Bordaz et al., 257–64. Maastricht: Historische Reeks Maastricht, 2003.
- Dirkse, G. M., S. M. H. Hochstenbach, and A. I. Reijerse. *Flora van Nijmegen en Kleef 1800–2006. Catalogus van soorten met historische vindplaatsen en recente verspreiding / Flora von Nimwegen und Kleve 1800–2006. Arteninventar, historische Fundorte und heutige Verbreitung*. Mook: Het Zevendal, 2007.
- Ditrich, Hans. "The Transmission of the Black Death to Western Europe: A Critical Review of the Existing Evidence." *The Mediterranean Historical Review* 32, no. 1 (2017): 25–39.
- Domken, Alexandre. "Histoire de la seigneurie et de la paroisse d'Othée." *BSAHD* 19 (1910): 47–259.
- Don, Peter, *Voorne-Putten*. Zeist: Rijksdienst voor de monumentenzorg, 1992.
- Dooven, Pierre den. "Les émoluments des chatelains de Franchimont." *BIAL* 67 (1949–1950): 97–102.

- . "Wat leren ons de in de steengroeven bewaarde sporen over de ontginningstechnieken in het verleden?" In *3de Vlaams-Nederlandse Natuursteendag, 14–15 mei 2009, Gent: vergane glorie of glorieus verdergaan*, edited by P. Jacobs, 101–16. Brussels: Geological Survey of Belgium, 2009.
- Doperé, Frans and William Ubregts. *De donjon in Vlaanderen. Architectuur en wooncultuur*. Leuven: Gemeentekrediet, 1991.
- Dorreboom, Marten Lodewijk. "'Gelijk hij gecondemneert word mits deezen'. Militaire strafrechtspleging bij het krijgsvolk te lande, 1700–1795." PhD diss., University of Amsterdam, 2000.
- Douglas Smith, Robert, and Kelly DeVries, *The Artillery of the Dukes of Burgundy, 1363–1477*. Woodbridge: Boydell, 2005.
- Dreiskämper, Petra. "Thonis Ongewassen en Johan Copper: leven op Blitterswijk. Onderzoek naar het personeel en de werkzaamheden op een Limburgs kasteel aan het eind van de 16e eeuw." *Castellogica* 1/2 (1996): 179–92.
- Driessen, Raymond. "De paarden van Grevenbroek (1695)." *Limburg—Het Oude Land van Loon* 79 (2000): 27–37.
- . *Emundt van Oeteren canonick tot Thorn (ca. 1580–1634). Leven langs de Maas in de zestiende en zeventiende eeuw, een tijdsbeeld*. Peer, 2009.
- Drunen, A. H. van. "De stelling of positie van 's-Hertogenbosch." In *Atlas van historische vestingwerken in Nederland. Noord-Brabant*, edited by J. Sneepe, J. P. C. M. van Hoof, G. J. L. Koolhof, and S. H. Poppema, 167–88. Utrecht: Walburg, 1996.
- Dubois, Jean-Jacques. "Les forêts de frontière du nord de la France: destructions et reconstructions." In *Forêt et guerre*, edited by Andrée Corvol and Jean-Paul Amat, 165–82. Paris: Harmattan, 1994.
- . and Jean-Pierre Renard. "Forêts et frontières: quelques réflexions pour une étude causale et évolutive." In "Limites et frontières." Special issue, *Espace, populations, sociétés* 1 (1984): 25–42.
- Duceppe-Lamarre, François, *Chasse et pâturage dans les forêts du Nord de la France. Pour une archéologie du paysage sylvestre (XI^e-XVI^e siècles)*. Paris: Harmattan, 2006.
- Duffy, Rosaleen. "Waging a War to Save Biodiversity: The Rise of Militarized Conservation." *International Affairs* 90, no. 4 (2014): 819–34.
- Duvigneaud, Jacques and René Mathot. "Description des anciens jardins de Chimay d'après les Albums de Croy et la 'Description' de 1606." In *Villes et villages de la Belgique espagnole (1596–1612)*, edited by Renaud Gahide, 407–17. Brussels: Crédit communal de Belgique, 1996.
- Eberhardt, Jürgen. *Die Zitadelle von Jülich: Wehranlagen, Residenzschloss und Schlosskapelle. Forschungen zur Planungs- und Baugeschichte*. Jülich: Förderverein Festung Zitadelle Jülich, 1993.
- Eeckenrode, Marie Van and Véronique Flammang. "Le jardin de Hainaut: essai de typologie et clés d'interprétation (XIV^e-XVIII^e siècles). Mises en scène d'un comté lors des inaugurations princières en Hainaut." *BCRH* 177 (2011): 45–80.
- Elden, Stuart. "Land, Terrain, Territory." *Progress in Human Geography* 34, no. 6 (2010): 799–817.
- . "How Should We Do the History of Territory?" *Territory, Politics, Governance* 1, no. 1 (2013): 5–20.
- Ellis, Steven G. *Defending English Ground. War and Peace in Meath and Northumberland, 1460–1542*. Oxford: Oxford University Press, 2015.

- Emsley, Clive. "The Military and Popular Disorder in England 1790–1801." *Journal of the Society of Army Historical Research* 61 (1983): 10–21, 96–112.
- . *Gendarmes and the State in Nineteenth-Century Europe*. Oxford: Oxford University Press, 1999; 2002.
- Engelen, Leon. "Stokkem in de grote Europese oorlogen (1672–1763)." *Limburg—Het Oude Land van Loon* 81, no. 4 (2002): 359–380; 82, no. 1 (2003): 43–86; 82, no. 2 (2003): 155–89; and 82, no. 3 (2003): 227–70.
- . "Financiële en fiscale repercussies in de gemeenten: Een onderzoek voor de periode 1670–1785." In *Limburg in 't geweer. Oorlogsleed in het Land van Loon van Alva tot Napoleon*, edited by Julien Daenen and Jozef Mertens, 145–54. Bilzen: Landcommanderij Alden Biezen, 2008.
- Engels, Wilhelm. "Die Instandsetzung und Ergänzung der Landwehren im Herzogtum Jülich zur Zeit des Spanisch-Niederländischen Krieges (1596)." *ZAG* 60 (1939): 189–99.
- Englmann, Felicia. *Der Zauber der Macht. Politik und Geheimwissenschaft in Konrad Kyesers Bellifortis*. Neuried: Ars Una, 2001.
- Ervynck, Anton. "Medieval Castles as Top-Predators of the Feudal System: An Archaeozoological Approach." *Château Gaillard. Etudes de Castellologie médiévale*, 15 (1992): 151–59.
- . "In memoriam: De bruine beer der Benelux." *Zoogdier* 4, no. 3 (1993): 4–11.
- . and James Woollett. "Top-Predator or Survivor? The Castle of Sugny as Seen through its Animal Remains." In *Mélanges d'archéologie médiévale: Liber amicorum en hommage à André Matthys*, edited by Johnny De Meulemeester, 78–89. Liège: Mardaga, 2006.
- Ewald, Jörg. "The Calcareous Riddle: Why Are There so Many Calciphilous Species in the Central European Flora?" *Folia Geobotanica* 38 (2003): 357–66.
- Eynde, M. van den. "La fonction militaire de Mariembourg et de Philippeville." *ASAN* 44 (1943–44): 271–92.
- Fanchamps, Marie-Louise. "Transport et commerce du bois sur la Meuse au Moyen Âge." *Le Moyen Âge* 72 (1966): 59–81.
- Febvre, Lucien. "Frontière: le mot et la notion." *Revue de Synthèse Historique* 45 (1928): 31–44.
- Feller, Jules. "Toponymie de la commune de Jalhay." In *Bulletin de la Société verviétoise d'Archéologie et d'Histoire* 38 (1934–35): 5–224; and 39 (1935–36): 225–454.
- Felsenhart, J. "Etudes historiques sur le duché de Luxembourg et comté de Chiny. L'invasion française dans le Luxembourg en 1542–1544." *AIAL* 29 (1883): 283–383.
- Filarski, R. *Kanalen van de koning-koopman. Goederenvervoer, binnenscheepvaart en kanalenbouw in Nederland en België in de eerste helft van de negentiende eeuw*. Amsterdam: NEHA, 1995.
- Fink, Gonthier-Louis. "The Fairy Tales of the Grimms' Sergeant of Dragoons J. F. Krause as Reflecting the Needs and Wishes of the Common People." In *The Brothers Grimm and Folk-tale*, edited by James M. MacGlashery, 146–63. Urbana: University of Illinois Press, 1988.
- Förster, Frank et al. "Towards Mutual Understanding within Interdisciplinary Palaeoenvironmental Research: An Exemplary Analysis of the Term 'Landscape.'" *Quaternary International* 312 (2013): 4–11.
- Francis, Robert A. "Wall Ecology: A Frontier for Urban Biodiversity and Ecological Engineering." *Progress in Physical Geography* 35, no. 1 (2010): 43–63.
- Frésou, Jules. "Prise du château de Huy en 1595." *BIAL* 23 (1892): 63–113.
- Frieder, Braden. *Chivalry and the Perfect Prince: Tournaments, Art, and Armor at the Spanish Habsburg Court*. Kirksville: Truman State University Press, 2015.

- Friskhnecht, Friedrich. "The History of Biological Warfare." In *Decontamination of Warfare Agents: Enzymatic Methods for the Removal of B/C Weapons*, edited by André Richardt and Marc-Michael Blum, 1–10. Weinheim: Wiley, 2008.
- Fritze, Konrad, and Günter Krause. *Seekriege der Hanse*. Berlin: Militärverlag der DDR, 1989.
- Froidcourt, Georges de. "La garnison du château de Dinant en 1567–1568." *Namurcum* 16 (1939): 7–14.
- Gaber, Stéphane. *Les fortifications de Carignan du XVI^{ème} siècle à nos jours*. Carignan: Cercle Historique et Artistique Yvoisien, 1991.
- . "Marville et l'espace frontalier des XVI^e et XVII^e siècles. L'espace Meuse–Moselle du XVI^e au XVII^e siècles." In *Marville ville frontière*, edited by Jean Lanher and Noëlle Cazin, 51–66. Bar-le-Duc: Société des Lettres, Sciences et Arts de Bar-le-Duc, 2001.
- Gabriel, Richard A. and Karen S. Metz. *A History of Military Medicine*. 2 vols. New York: Greenwood, 1992.
- Gagné, John. "Counting the Dead: Traditions of Enumeration and the Italian Wars." *Renaissance Quarterly* 67 (2014): 791–840.
- Gaier, Claude. "Le problème de l'origine de l'industrie armurière liégeoise au Moyen Âge." *Chronique Archéologique du Pays de Liège* 51 (1960): 22–75.
- . "La fonction strategico-defensive du plat-pays au Moyen Âge." *Le Moyen Âge* 69 (1963): 753–71.
- . "L'approvisionnement et le régime alimentaire des troupes dans le duché de Limbourg et les terres d'Outre-Meuse vers 1400." *Le Moyen-Âge* 74 (1968): 551–75.
- . *Art et organisation militaires dans la principauté de Liège et dans le comté de Looz au Moyen Âge*. Brussels: Académie Royale de Belgique, 1968.
- . "Aux origines de l'industrie houillère liégeoise: la renommée militaire des mineurs de Liège." *Annales de la Fédération Archéologique et Historique de Belgique* 1 (1969): 131–40.
- . *L'Industrie et le commerce des armes dans les anciennes principautés belges du XIII^{ème} à la fin du XV^{ème} siècle*. Paris: Belles Lettres, 1973.
- . "Pauvreté et armement individuel en Europe occidentale au Moyen Âge." In *Armes et combats dans l'univers médiéval, II*, edited by Claude Gaier, 149–66. Brussels: Boeck, 2004.
- Gaier-Lhoest, Josianne. *L'évolution topographique de la ville de Dinant au Moyen Âge*. Brussels: Pro Civitate, 1964.
- Garcin, Nicole. *De Longwy et Vauban*. Lille, 1972.
- Garnier, Emmanuel. "Le peau de l'ours. La chasse aux ursides dans les montagnes françaises, XVI^e–XIX^e siècle." In *Forêt et chasse X^e–XX^e siècle*, edited by Andrée Corvol, 255–70. Paris: Harmattan, 2004.
- . "Les ressources naturelles: enjeu urbain et stratégique. Les conflits entre Strasbourg et l'armée royal sous l'Ancien Régime." In *L'Armée et la ville dans l'Europe du Nord et du Nord-Ouest. Du XV^e siècle à nos jours*, edited by Philippe Bragard et al., 353–66. Louvain-la-Neuve: Bruylant–Academia, 2006.
- Garrison, Fielding H. *Notes on the History of Military Medicine*. Washington: Association of Military Surgeons, 1922.
- Gautier, Achilles, Patrick Hoffsummer, and Marie Vanguetstaine. "Faune médiévale et post-médiévale du château de Franchimont (Theux)." *Vie Archéologique* 64 (2005): 73–90.
- Gautier, Achilles and Evelyn Fiers. "Restes animaux des occupations de l'Âge du Fer, gallo-romaine et médiévale au site castral de Montaigle. Namur." *Vie Archéologique* 68 (2009): 85–100.
- Geerlings, Frans G. J. and Arthur Schrijnemakers. "Wolvenplaag in het Maas- en Swalmdal in de Franse tijd (1794–1814)." *Jaarboek Maas- en Swalmdal* (1999): 108–45.

- Geltner, Guy. *The Medieval Prison. A Social History*. Princeton: Princeton University Press, 2008.
- . "Public Health and the Pre-Modern City: A Research Agenda." *History Compass* 10, no. 3 (2012): 231–45.
- . *Flogging Others. Corporal Punishment and Cultural Identity from Antiquity to the Present*. Amsterdam: Amsterdam University Press, 2014.
- . "In the Camp and on the March: Military Manuals as Sources for Studying Premodern Public Health." *Medical History* 63, no. 1 (2019): 44–60.
- Genicot, Léopold. *L'économie rurale namuroise au Bas Moyen Âge*. 4 vols. Louvain-la-Neuve: Université de Louvain, 1943–95.
- . *La crise agricole du Bas Moyen Âge dans le Namurois*. Louvain-La-Neuve: Centre belge d'histoire rurale, 1970.
- . "Ligne et zone: la frontière des principautés médiévales." *Académie royale de Belgique. Bulletin de la Classe des Lettres et des Sciences morales et politiques* 56 (1970): 29–42.
- Genicot, Luc Francis. *Architecture et Société*, vol. 1 of *Les églises mosanes du XI^e siècle*. Louvain-La-Neuve: Publications Universitaires de Louvain, 1972.
- . "Les fermes en carré de Wallonie: defense ou économie?" *Parcs nationaux* 43 (1988): 4–21.
- . ed. *Les tours d'habitation seigneuriales du Moyen Âge en Wallonie. Analyse archéologique d'une typologie*. Namur: Ministère de la Région wallonne, 2002.
- Gentenaar, Meta and Wim Hupperetz. "Personeel en werkzaamheden op kasteel Montfort in 1342/1343 en 1397–1399." In *Dagelijks leven op Limburgse kastelen (1350–1600): verwantschap, begrafenisrituelen, personeel en werkzaamheden*, 171–218. Venlo: Limburgs Museum, 1995.
- Gilbert, André. *Le siège de Stenay en 1654*. Bar-le-Duc, 1893.
- Gillard, Alphonse. *L'Industrie du fer dans les localités du comté de Namur et de l'Entre-Sambre-et-Meuse de 1345 à 1600*. Brussels: Pro Civitate, 1971.
- Gilissen, Niels. *Missie Natuur. Natuur en landschap op defensieterreinen*. Zeist: KNNV, 2013.
- Girard d'Albissin, Nelly. *Genèse de la frontière franco-belge. Les variations des limites septentrionales de la France de 1659 à 1789*. Paris: Picard, 1970.
- Girardot, Alain. "Les forteresses paysannes dans le duché de Bar aux XIV^e et XV^e siècles." *Annales de l'Est* 38, no. 1 (1986): 3–56.
- . *Le droit et la terre. Le Verdunois à la fin du Moyen Âge*. 2 vols. Nancy: Presses Universitaires de Nancy, 1992.
- . "La guerre au XIV^e siècle: la devastation, ses modes et ses degrés." *BSHAM* 30–31 (1994–95): 1–32.
- Glaudemans, Corien. *Om die wrake wille. Eigenrichting, veten en verzoening in laat-middeleeuws Holland en Zeeland*. Hilversum: Verloren, 2004.
- Gleditsch, Nils Petter. "Armed Conflict and the Environment: A Critique of the Literature." *Journal of Peace Research* 35, no. 3 (1998): 381–400.
- Gleue, Axel W. *Ohne Wasser Keine Burg. Die Versorgung der Höhenburgen und der Bau der Tiefen Brunnen*. Regensburg: Schnell & Steiner, 2014.
- Goblet d'Alviella, *Histoire des bois et forêts de Belgique. Des origines à la fin du régime autrichien*. 4 vols. Paris, 1927–30.
- Gold John R., and George Revill. "Landscapes of Defence." *Landscape Research* 24, no. 3 (1999): 229–39.
- Golley, Frank Benjamin. *A History of the Ecosystem Concept in Ecology: More than the Sum of the Parts*. New Haven: Yale University Press, 1996.

- Goorts, Roeland. *War, State and Society in Liège. How a Small State of the Holy Roman Empire Survived the Nine Years' War (1688–1697)*. Leuven: Leuven University Press, 2019.
- Goossens, Jan. *De geografie van de Limburgse successieoorlog bij Jan van Heelu*. Hasselt: Mededelingen van de Vereniging voor Limburgse Dialect- en Naamkunde, 1989.
- Gordon, Stewart. "War, the Military, and the Environment: Central India, 1560–1820." In *Natural Enemy, Natural Ally. Toward an Environmental History of Warfare*, edited by Richard P. Tucker and Edmund Russell, 42–64. Corvallis: Oregon State University Press, 2004; 2012.
- Gorissen Pieter. "De karweien der Brabantsche kloosterhoeven in de XIVe eeuw." *BCRH* 110 (1945): 1–50.
- Gosseries, Alphonse. "Souvenirs militaires de Mons. Grandes manoeuvres au XVIII^e siècle" *ACAM* 29 (1899–1900): 239–47.
- Gottschalk, M. K. Elisabeth. *Stormvloed en rivieroverstromingen in Nederland*. 3 vols. Assen: Van Gorcum, 1971–77.
- Gouguenheim, Sylvain. "Les frontières de l'an Mil. Esquisse de synthèse historiographique." In *L'Ardenne. Des frontières en l'an Mil*, edited by Cédric Moulis, 51–70. Nancy: Presses Universitaires de Nancy, 2015.
- Govaerts, Sander. "'Mannen van wapenen.' The Baesweiler Campaign and the Military Labour Market of the County of Loon in the Fourteenth Century." *Viator: Medieval and Renaissance Studies* 47, no. 3 (2016): 297–342.
- . "'Fire-Eaters'. Professional Soldiers and the Introduction of Conscription in the Dutch-Speaking Part of the Prince-Bishopric of Liège, 1756–1815." *War in History* 27, no. 1 (2020): 4–32.
- . "From Knight Errants to Disloyal Soldiers? The Criminalization of Foreign Military Service in the Late Medieval Meuse and Rhine Regions, 1250–1550." In *Constructing and Representing Territory in Late Medieval and Early Modern Europe*, edited by Mario Damen and Kim Overlaet, forthcoming. Amsterdam: Amsterdam University Press.
- Graaf, Douwe Th. de and Peggy Rompen. "*Mosasaurus Hoffmanni*, naam en toenaam." *Natuurhistorisch Maandblad* 84 (1995): 27–35.
- Graaf, Ronald de. *Oorlog, mijn arme schapen. Een andere kijk op de Tachtigjarige Oorlog, 1565–1648*. Franeker: Van Wijnen, 2004.
- Graatsma, B. G. "Limburg 1802–1807. Landschap en vegetatie in kaart gebracht. De Tranchotkaart als historische informatiebron." *Natuurhistorisch Maandblad* 82, no. 6 (1993): 118–64.
- Gresser, Pierre, *La gruerie du comté de Bourgogne aux XIV^e et XV^e siècles*. Turnhout: Brepols, 2004.
- Groebner, Valentin, *Der Schein der Person. Steckbrief, Ausweis und Kontrolle im Mittelalter*. München: Beck, 2004.
- Groof, Bart De. "De wolf (Canis Lupus). Angst en vervolging in de Nederlanden." *De Brabantse Folklore en Geschiedenis* 282 (1994): 125–46.
- Groussard, Jean-Claude. "Vauban et l'eau dans la défense de Verdun." *Archeologia* 76 (1974): 34–45.
- Gudde, C. J. *Vier eeuwen geschiedenis van het garnizoen 's-Hertogenbosch*. 's-Hertogenbosch, 1958.
- Guénoun, Jean-Lucien. "Deux édifices connexes de la forteresse." In "Charlemont." Special issue, *Ardenne Wallonne* (1993): 79–85.
- Guillaume, *Histoire des bandes d'ordonnance des Pays-Bas*. Brussels, 1873.
- Gunn, Steven. "Archery Practice in Early Tudor England." *Past and Present* 209 (2010): 53–81.
- Gutmann, Myron P. *War and Rural Life in the Early Modern Low Countries*. Assen: Van Gorcum, 1980.
- G. W. "Verpachting der buitenste gracht te Wijk-Maastricht in 1480." *De Maasgouw* 39 (1919): 67.

- Haanen. "Het eerste stadspark van Maastricht." *Natuurhistorisch Maandblad* 54 (1965): 11–12.
- Haaster, Henk van. *Archeobotanica uit 's-Hertogenbosch: milieuomstandigheden, bewoninggeschiedenis en economische ontwikkelingen in en rond een (post) middeleeuwse groeistad*. Eelde: Barkhuis, 2008.
- Habets, Joseph. "Over den wijnbouw in Nederlandsch en Belgisch Limburg gedurende vroegere eeuwen." *Publications de la Société Historique et Archéologique dans le Limbourg* 3 (1866): 380–94.
- . *Houthem-Sint-Gerlach en het adelijk vrouwenstift aldaar: eene bijdrage tot de geschiedenis van het voormalig land van Valkenberg*. Maastricht, 1869.
- Hacker, Barton C. "Women and Military Institutions in Early Modern Europe: Reconnaissance." *Signs* 6, no. 4 (1981): 643–71.
- Hagen, J. W. Van. "*Crouwaetz gewelt*" tot "*Fransche brandt*." *Nederlandse gegevens betreffende Lommel in de periode 1648–1688*. Lommel: Museum Kempenland, 1991.
- Haldon, John. "Introduction. Why Model Logistical Systems?" In *General Issues in the Study of Medieval Logistics. Sources, Problems and Methodologies*, edited by John F. Haldon, 1–35. Leiden: Brill, 2006.
- Hale, John. "Warfare and Cartography, ca. 1450 to ca. 1640." In vol. 3 of *The History of Cartography*, edited by David Woodward, 719–37. Chicago: University of Chicago Press, 2007.
- Halkin, Joseph. "Etude historique sur la culture de la vigne en Belgique." *BSAHDL* 9 (1895): 1–146.
- Hall, Bert S. "The Changing Face of Siege Warfare: Technology and Tactics in Transition." In *The Medieval City Under Siege*, edited by Ivy A. Corfis and Michael Wolfe, 257–75. Woodbridge: Boydell, 1995.
- . *Weapons and Warfare in Renaissance Europe*. Baltimore: Johns Hopkins University Press, 1997.
- Hallavant, Charlotte and Marie-Pierre Ruas. "The First Archaeobotanical Evidence of *Spinacia Oleracea* L. (Spinach) in Late 12th–Mid 13th Century A.D. France." *Vegetation History and Archaeobotany* 23 (2014): 153–65.
- Haneveld, Gerhard T. and Paul C. van Royen. *Vrij van zichtbare gebreken. De medische zorg bij de Nederlandse zeemacht in de negentiende eeuw*. Amsterdam: De Bataafsche Leeuw, 2001.
- Hanson, Victor Davis. *Warfare and Agriculture in Classical Greece*. Berkeley: University of California Press, 1981; 1998.
- Hansotte, Georges. "L'industrie métallurgique dans la vallée de la Vesdre aux temps modernes." *BIAL* 75 (1962): 165–220.
- Harari, Yuval Noah. "Strategy and Supply in Fourteenth-Century Western European Invasion Campaigns." *The Journal of Military History* 64, no. 2 (2000): 297–333.
- . *Special Operations in the Age of Chivalry, 1100–1550*. Woodbridge: Boydell, 2007; 2009.
- Harbusch, C., E. Engel, and J. B. Pir. *Die Fledermäuse Luxemburgs. Mammalia: Chiroptera*. Luxembourg: Musée national d'histoire naturelle, 2002.
- Hargreaves, Reginald. "The Long Road to Military Hygiene." *The Practioner* 196 (1966): 439–47.
- Harrison, Peter. *Castles of God: Fortified Religious Buildings of the World*. Woodbridge: Boydell, 2004.
- Harrison, Simon. *Dark Trophies. Hunting and the Enemy Body in Modern War*. Oxford: Berg-hahn, 2012.
- Harsin, Paul. "Etudes sur l'histoire économique de la principauté de Liège particulièrement au XVII^e siècle." *BIAL* 62 (1927): 60–162.

- . "Les projets de jonction de l'Escaut, de la Meuse et du Rhin du XVI^e au XIX^e siècle." *Annales de la Société Scientifique de Bruxelles. Série D, Sciences économiques et techniques* 51 (1931): 135–57.
- . *Politique extérieure et défense nationale au XVI^e siècle (1538–1610)*. Liège: Sciences et Lettres, 1959.
- Hart, Marjolein 't. *The Dutch Wars of Independence: Warfare and Commerce in the Netherlands 1570–1680*. New York: Routledge, 2014.
- Hart, Pieter 't. "Zeehondenjacht in Nederland 1591–1962." PhD diss., Vrije Universiteit Amsterdam, 2007.
- Hasquin, Hervé. *Une mutation, le "Pays de Charleroi" aux XVII^e et XVIII^e siècles. Aux origines de la Révolution industrielle en Belgique*. Brussels: Université Libre de Bruxelles, 1971.
- Havlick, David G. "Disarming Nature: Converting Military Lands to Wildlife Refuges." *The Geographical Review* 101, no. 2 (2011): 183–200.
- Heim, Jean. "Wellin/Lomprez: L'environnement paléobotanique à proximité de la douve protégeant l'enceinte fortifiée sur la façade nord." *Chronique de l'Archéologie Wallonne* 2 (1994): 124–28.
- Heiningen, H. van. *Tussen Maas en Waal. 650 jaar geschiedenis van mensen en water*. Zutphen: Walburg, 1972.
- Heizmann, Charles L. "Military Sanitation in the Sixteenth, Seventeenth and Eighteenth Centuries." *Annals of Medical History* 1 (1917–18): 281–300.
- Helfferich, Tryntje. "A Levy in Liège for Mazarin's Army: Practical and Strategic Difficulties in Raising and Supporting Troops in the Thirty Years War." *Journal of Early Modern History* 11, no. 6 (2007): 475–500.
- Hélin, Etienne. "Les Liégeois au service des puissances étrangères." In *Fastes militaires du pays de Liège*, edited by Francis Balace et al., 17–23. Liège: Musée de l'Art Wallon, 1970.
- Helsen, J. *De woorden wolf en hond in plaatsnamen*. Leuven: Instituut voor Naamkunde, 1961.
- Henaux, F. "Note sur le pont des Arches de Liège." *BIAL* 3 (1857): 351–65.
- Henk, Dan. "Biodiversity and the Military in Botswana." *Armed Forces and Society* 32, no. 2 (2006): 273–91.
- Hevia, James L. *Animal Labor and Colonial Warfare*. Chicago: University of Chicago Press, 2018.
- Heuvel, Charles van den. *Papiere Bolwercken: De introductie van de Italiaanse stede- en vestingbouw in de Nederlanden (1540–1609) en het gebruik van tekeningen*. Alphen aan de Rijn: Canaletto, 1991.
- Hickey, Kieran. *Wolves in Ireland. A Natural and Cultural History*. Dublin: Open Air, 2011; 2013.
- Higounet, Charles. "Les grandes haies forestières de l'Europe médiévale." In *Actes des congrès de la Société des historiens médiévistes de l'enseignement supérieur public. Le paysage rural: réalités et représentations*, 213–17. Lille, 1979.
- Hill, Paul and Julie Wileman. *Landscapes of War. The Archaeology of Aggression and Defence*. Stroud: History, 2002; 2010.
- Hirsch, August. *Geographical and Historical Pathology*. Translated by Charles Creighton. 2 vols. London, 1883–85.
- Hoffmann, Richard C. "Warfare, Weather, and a Rural Economy: The Duchy of Wroclaw in the Mid-Fifteenth Century." *Viator* 4 (1973): 273–302.
- . "Environmental Change and the Culture of Common Carp in Medieval Europe." *Guelph Ichthyology Reviews* 3 (1995): 57–85.
- . *An Environmental History of Medieval Europe*. Cambridge: Cambridge University Press, 2014.

- Hoof, J. P. C. M. van. "De kustverdediging in de Staatse en de Bataafs-Franse tijd." In *Kustverdediging*, edited by P. J. J. van Dijk et al., 25–37. Zutphen: Walburg, 1992.
- . and E. P. M. Ramakers. "De militair-strategische betekenis van Maastricht; een verkenning." In L. J. Moreau, *Bolwerk der Nederlanden. De vestingwerken van Maastricht sedert het begin van de 13e eeuw*, xv–xliv. Assen: Van Gorcum, 1979.
- . and H. Roozenbeek, *Grave als militaire stad*. Den Haag: Sectie Militaire Geschiedenis, 1998.
- Hopkin, David M. *Soldier and Peasant in French Popular Culture, 1766–1870*. Woodbridge: Boydell, 2003.
- Hoppenbrouwers, P. C. M. "Een middeleeuwse samenleving. Het Land van Heusden (ca. 1360–ca. 1515)." PhD diss., University of Wageningen, 1992.
- . "Territorialiteit en landsheerlijkheid. Aspecten van de wisselwerking tussen uitbreiding van bewoning en staatsvorming in het bovenland van Heusden en de westelijke Langstraat in de veertiende eeuw." *Noordbrabants Historisch Jaarboek* 10 (1993): 8–59.
- . "Town and Country in Holland, 1300–1550." In *Town and Country in Europe, 1300–1800*, edited by S.R. Epstein, 54–79. Cambridge: Cambridge University Press, 2001.
- Hosler, John. *John of Salisbury: Military Authority of the Twelfth-Century Renaissance*. Leiden: Brill, 2013.
- Houlding, J. A. *Fit for Service. The Training of the British Army, 1715–1795*. Oxford: Clarendon Press, 1981.
- Houtte, Hubert van. *Les occupations étrangères en Belgique sous l'ancien régime*. 2 vols. Ghent, 1930.
- Howard, Martin. *Napoleon's Doctors. The Medical Services of the Grande Armée*. Stroud: Spellmount, 2006.
- Hubert, Jean-Baptiste. *Histoire de Charleville. Depuis son origine jusqu'en 1854*. Charleville, 1854.
- Hughes, Donald J. *Environmental Problems of the Greeks and Romans. Ecology in the Ancient Mediterranean*. Baltimore: Johns Hopkins University Press, 1994; 2014.
- Hupy, Joseph. "The Environmental Footprint of War." *Environment and History* 14 (2008): 405–21.
- Huyskens, Albert. "Stadtbefestigung, Landgraben und Warten der ehemaligen Reichsstadt Aachen." *ZAG* 61 (1940): 167–200.
- Ingegnoli, Vittorio. *Landscape Bionomics. Biological-Integrated Landscape Ecology*. Heidelberg: Springer, 2015.
- Isaac, Steven Wayne. "Le loup et le mercenaire: une métaphore d'exculsion au XII^e siècle." *Cahiers de civilisation médiévale, X^e–XII^e siècles* 59 (2016): 143–58.
- Istasse, Cédric. "Un mois sous l'autorité provisoire de l'armée russe: le département de Sambre-et-Meuse en janvier–février 1814." In *Namur de la conquête française à Waterloo (1792–1815): Années, société, ordre public et urbanisme*, 179–90. Namur: Société Royale Sambre et Meuse; Amis de la Citadelle de Namur, 2015.
- Iung, Jean-Eric. "L'organisation du service de vivres aux armées de 1550 à 1650." *Bibliothèque de l'Ecole des Chartes* 14, no. 2 (1983): 269–306.
- . "La maréchaussée de Lorraine et Barrois, de 1698 à 1729." *Lotharingia* 5 (1993): 333–408.
- Jacob, Henri. *Bruyères, bêtes et gens d'Ardenne (XV^e–XVIII^e siècle)*. Brussels: Crédit Communal, 1988.
- Jacobs, Beatrix Christina Maria. *Justitie en politie in 's-Hertogenbosch voor 1629. De bestuursorganisatie van een Brabantse stad*. Assen: Van Gorcum, 1986.

- Jacoby, Karl. *Crimes against Nature. Squatters, Poachers, Thieves and the Hidden History of American Conservation*. Berkeley: University of California Press, 2001; 2003.
- Jacquet-Ladrier, Françoise. "Les mésaventures d'un jeune officier Namurois, Henri de Villenfagne et la crise du Juliers (1610)." *Le Guetteur Wallon* 76, no. 3 (2000): 85–92.
- . "Les épidémies de peste aux XVI^e–XVII^e siècles. L'exemple de Namur." *Le Guetteur Wallon* 83, no. 14 (2007): 122–41.
- . and Philippe Jacquet-Ladrier. "Vivre à Namur en temps de guerre." In *Assiégeants et assiégés au coeur de l'Europe Namur 1688–1697*, edited by Françoise Jacquet-Ladrier and Philippe Jacquet-Ladrier, 162–93. Brussels: Crédit Communal, 1992.
- Jamar, H. "Prinsesoldaten als jagers op bedelaars en landlopers te Kwaadmechelen (1720–1738)." *Limburg* 46 (1967): 285–89.
- Janeczek, Andrzej. "Frontiers and Borderlands in Medieval Europe. Introductory Remarks." *Quaestiones Medii Aevi Novae* 16 (2011): 5–14.
- Janse, Antheun. *Grenzen aan de macht. De Friese oorlog van de graven van Holland omstreeks 1400*. The Hague: Hollandse Historische Reeks, 1993.
- . "Toernooicultuur en adelscultuur in middeleeuws Holland." *Holland* 34 (2002): 150–66.
- Jansen, Hubertus Petrus Henricus and Peter C. M. Hoppenbrouwers. "Heervvaart in Holland." *Bydragen en Mededelingen Betreffende de Geschiedenis der Nederlanden* 94 (1979): 1–26.
- Jansen, J. C. G. M. *Landbouw en economische golfbeweging in Zuid-Limburg 1250–1800. Een analyse van de opbrengst van de tienden*. Assen: Van Gorcum, 1979.
- Janssen, J. A. M. M. *Op weg naar Breda. De opleiding van officieren voor het Nederlandse leger tot aan de oprichting van de Koninklijke Militaire Academie in 1828*. The Hague: Sectie Militaire Geschiedenis, 1989.
- Jappe Alberts, W. "De eerste Bourgondische bezetting van Gelre (1473/1477)." In *Nederrijnse Studiën XIIIe–XVe eeuw*, edited by W. Jappe Alberts and F. Ketner, 49–82. Groningen: Wolters, 1954.
- . *Overzicht van de geschiedenis van de Nederrijnse territoria tussen Maas en Rijn 800–1288*. Assen: Van Gorcum, 1979.
- Jenniges, Hubert. *Plünderungen, Verwüstungen, Mord und Totschlag. Das Land zwischen Venn und Schneifel in den Turbulenzen des Dreissigjährigen Krieges*. St. Vith: Geschichts- & Museumsverein "Zwischen Venn und Schneifel," 1999.
- Jones, Michael. "The Elusive Reality of Landscape. Concepts and Approaches in Landscape Research." *Norsk Geografisk Tidsskrift* 45 (1991): 229–44.
- Jong, Michiel de. "Staat van oorlog." *Wapenbedrijf en militaire hervorming in de Republiek der Verenigde Nederlanden, 1585–1621*. Hilversum: Verloren, 2005.
- Jong, Theo de. "Huisdieren, jachtwild, vissen en weekdieren: een weerspiegeling van gevarieerde maaltijden." In *Het Kasteel van Eindhoven: archeologie, ecologie en geschiedenis van een heerlijke woning, 1420–1676*, edited by Nico Arts, 214–36. Eindhoven: Museum Kempenland, 1992.
- Jordan, Klaus. "Grün in Festungen. Eine Literaturrecherche 1527 bis 1914." In *Leben in und mit Festungen* edited by Klaus T. Weber, 99–125. Regensburg: Schnell & Steiner, 2010.
- Jouanna, Jacques. *Greek Medicine from Hippocrates to Galen: Selected Papers*. Leiden: Brill, 2012.
- Jurickova, Lucie and Tomas Kucera. "Ruins of Medieval Castles as Refuges for Endangered Species of Molluscs." *Journal of Molluscan Studies* 71 (2005): 233–46.
- Kaisin, J. *Annales historiques de la commune de Chatelineau*. Farcennes, 1871.
- Kappelhof, A. C. M. "De heren en drossaarden van Valkenburg (1365–1672)." *Jaarboek Stichting Historische en Heemkundige Studies in en rond het Geuldal* 1 (1991): 7–76.

- . "Les dépenses pour la défense dans les cités frontières de la République des Provinces-Unies entre 1680 et 1750. Bilan provisoire des conséquences économiques." In *L'Armée et la ville dans l'Europe du Nord et du Nord-Ouest. Du XV^e siècle à nos jours*, edited by Philippe Bragard et al., 291–303. Louvain-la-Neuve: Bruylant-Academia, 2006.
- Kappen, O. van. *Geschiedenis der zigeuners in Nederland. De ontwikkeling van de rechtspositie der heidens of egyptenaren in de Noordelijke Nederlanden (1420–1750)*. Assen: Van Gorcum, 1965.
- Karelse, J. J. H. G. Désiré. "Eendenkooi en kooibedrijf. Traditioneel ambacht met eigentijdse perspectieven." In *Beter één vogel in de hand...: Vogelvangst, valkerij en eieren zoeken in ambacht, cultuurhistorie, natuurbescherming en wetenschap*, edited by J. T. Lumeij, D. A. Jonkers, and J. J. H. G. D. Karelse, 81–96. Zeist: KNNV, 2008.
- Kayser, Edouard M. "Le phénomène épidémique dans le duché de Luxembourg." *Medizinhistorisches Journal* 24 (1989): 65–78.
- Kerkhoff, Antoon Hubert Marie. "Over de geneeskundige verzorging in het Staatse leger." PhD diss., University of Nijmegen, 1976.
- Kinser, Samuel. "Annaliste Paradigm? The Geohistorical Structuralism of Fernand Braudel." *American Historical Review* 86, no. 1 (1981): 63–105.
- Klaversma, T. *Weert tussen 1062 en 1602. Een kroniek uit burgemeestersrekeningen*. Weert: Historisch Onderzoek Weert, 2008.
- Kleinschmidt, Harald. *Tyrocinium Militare. Militärische Körperhaltungen und- bewegungen im Wandel zwischen dem 14. und dem 18. Jahrhundert*. Stuttgart: Autoren, 1989.
- Kling, Alexander. "War-Time, Wolf-Time. Material-Semiotic Knots in the Chronicles of the Thirty Years' War." In *A Fairytale in Question. Historical Interactions Between Humans and Wolves*, edited by Patrick Masius and Jana Sprenger, 19–38. Cambridge, MA: White Horse, 2015.
- Klinkenberg, J. Th. "Dye quade siecte. De pest in Maastricht in de zestiende en zeventiende eeuw." *Tijdschrift voor Sociale Geschiedenis* 16 (1990): 267–86.
- Knoors, J. A. "Maasvaart en maaishandel. De opkomst, de bloei en het verval van de Maas als handels- en verkeersader in de Nederlanden." *Maaslandse Sprokkelingen* 6 (1978): 1–32.
- Kolodziej, Cyrille. "La louterie et la destruction des animaux nuisibles. Théorie et pratique en Lorraine et Barrois au XVIII^e siècle." PhD diss., Université de Nancy, 2010.
- Kort, Albert L. *Bromsnor in Zeeland. Een geschiedenis van de gemeenteveldwacht 1795–1943*. Vlissingen: ADZ, 2010.
- Kort, Jan-Willem and Yannick Raczynski-Henk. "The Fossa Corbulonis Between the Rhine and Meuse Estuaries in the Western Netherlands." *Water History* 6 (2014): 51–71.
- Kraemer, Charles. "Arme et refuge: le château médiéval et la guerre dans la Woëvre verdunoise." In *Meuse en guerres*, edited by Philippe Martin and Noëlle Cazin, 25–58. Bar-le-Duc: Société des Lettres, Sciences et Arts, 2010.
- Kraemer, Charles. "Une carte chorographique de 1535 du cours de la Meuse au service de la castellologie médiévale." In "René II. Lieutenant et Duc de Bar (1473–1508)," edited by Jean-Christophe Blanchard and Hélène Schneider. Special issue, *Annales de l'Est* (2014): 211–42.
- Krayenhoff van de Leur, A. R. *Militair-historische schetsen over de noodzakelijkheid van de kennis der krijgsgeschiedenis: Land- en zeemacht in de 18e eeuw*. The Hague, 1890.
- Krieger, Karl-Friedrich. "Obligatory Military Service and the Use of Mercenaries with Reference to Imperial Campaigns during the Staufien Period." In *England and Germany in the High Middle Ages*, edited by Alfred Haverkamp and Hanna Vollrath, 151–68. London: German Historical Institute, 1996.

- Krings, Wilfried, *Wertung und Umwertung von Allmenden im Rhein-Maas-Gebiet vom Spätmittelalter bis zur mitte des 19. Jahrhunderts. Eine historisch-sozialgeographische Studie*. Assen: Van Gorcum, 1976.
- Kroener, Bernhard R. *Les Routes et les Etapes. Die Versorgung der französischen Armeen in Nordostfrankreich (1635–1661). Ein Beitrag zur Verwaltungsgeschichte des Ancien Régime*. Münster: Aschendorff, 1980.
- . “‘Der Krieg hat ein Loch.’ Überlegungen zum Schicksal demobilisierter Söldner nach dem Dreissigjährigen Krieg.” *Historische Zeitschrift. Beihefte* 26 (1998): 599–630.
- . “Antichrist, Archenemy, Disturber of the Peace: Forms and Means of Violent Conflict in the Early Modern Ages.” In *Kriegerische Gewalt und militärische Präsenz in der Neuzeit*, 189–214. Paderborn: Schöningh, 2008.
- Krug, Ilana. “The Wounded Soldier: Honey and Late Medieval Military Medicine.” In *Wounds and Wound Repair in Medieval Culture*, edited by Larissa Tracy, 194–214. Leiden: Brill, 2015.
- Kunisch, Johannes. *Fürst—Gesellschaft—Krieg. Studien zur bellizistischen Disposition des absoluten Fürstenstaates*. Cologne: Böhlau, 1992.
- Lacour, Pierre-Yves. *La République naturaliste: Collections d’histoire naturelle Révolution française (1789–1804)*. Paris: Muséum National d’Histoire Naturelle, 2014.
- Laere, Marijn Van. “Montmédy, een versterkte garnizoenstad ten dienste van de Nederlandse overhead (1559–1572): een financiële, socio-politieke analyse.” Master’s thesis, University of Ghent, 2008.
- Lahaye, L. “Poilvache.” *ASAN* 21 (1895): 127–76.
- Lake-Giguère, Danny. “The Impacts of Warfare on Woodland Exploitation in Late Medieval Normandy (1364–1380): Royal Forests as Military Assets During the Hundred Years War.” *Journal of Medieval Military History* 16 (2018): 79–98.
- Lambert, Jacques. “Des témoins: les acquits de comptes.” In *Assiégés et assiégés au coeur de l’Europe Namur 1688–1697*, edited by Françoise Jacquet-Ladrier and Philippe Jacquet-Ladrier, 194–201. Brussels: Crédit Communal, 1992.
- Lange, Jochen. “Raus aus den Kartoffeln. Möglichkeiten der politischen Gegenwehr.” In *Natur ohne Frieden. Die Umweltsünden der Bundeswehr: Militär kontra Natur*, edited by Olaf Achilles, 207–34. München: Knauer, 1988.
- Langins, Janis. *Conserving the Enlightenment: French Military Engineering from Vauban to the Revolution*. Cambridge, MA: MIT Press, 2004.
- Laperche-Fournel, Marie-José. *La Population du duché de Lorraine de 1580 à 1720*. Nancy: Presses universitaires de Nancy, 1985.
- Larosse, Louis. “Le siege de Namur en 1746: La demolition des bâtiments des faubourgs.” *Namurcum* 41 (1969): 51–59.
- Latham, Andrew. “Warfare Transformed: A Braudelian Perspective on the ‘Revolution in Military Affairs.’” *European Journal of International Relations* 8, no. 2 (2002): 231–66.
- Laurent, Henri and Fritz Quicke. *L’Accession de la Maison de Bourgogne aux duchés de Brabant et de Limbourg (1383–1407) Première partie: jusqu’à l’acquisition du duché de Limbourg et des terres d’Outre-Meuse (1383–1396)*. Brussels: Palais des Académies, 1939.
- Lauwerier, Roel C. G. M. and Jorn T. Zeiler. “Wishful Thinking and the Introduction of the Rabbit in the Low Countries.” *Environmental Archaeology* 6 (2001): 87–90.
- Lawrence, Henry W. *City Trees. A Historical Geography from the Renaissance through the Nineteenth Century*. Charlottesville: University of Virginia Press, 2006.
- Leboutte, René. “D’Austerlitz à Liège, mourir dans les armées de Bonaparte.” *Tijdschrift voor Geschiedenis* 91 (1978): 429–46.

- Leconte, Louis. "Notes sur les régiments liégeois de Vierset et de Horion au service de Louis XV (1757–1762)," *Carnets de la Fourragère* 3, no. 2 (1931): 109–76.
- . "Le Corps des Guides Forestiers dans le Luxembourg, 1831." *AIAL* 62 (1932): 53–77.
- . *La Révolution brabançonne dans le duché de Limbourg et les volontaires limbourgeois auxiliaires des troupes autrichiennes en 1790 et de 1792 à 1794*. Brussels, 1938.
- Leestmans, Charles-J. A. *Soldats de l'armée des Flandres 1621–1715*. Brussels, 2013.
- Leeuwen, A. van. *Geschiedenis der paardenfokkerij in Nederland*. Maastricht, 1922.
- Lefebvre, Louis. "Bastogne, cité militaire du XVII^e siècle." *AIAL* 85 (1954): 275–381.
- Lefèvre, André. "Les finances de la Champagne aux XIII^e et XIV^e siècles." *Bibliothèque de l'école des chartes* 19 (1858): 409–47; and 20 (1859): 40–80.
- Lejeune, Jean. *La formation du capitalisme dans la principauté de Liège au XVI^e siècle*. Liège: Faculté de Philosophie et Lettres, 1939.
- . *Les Van Eyck: peintres de Liège et de sa cathédrale*. Liège, 1956.
- Lejeune, Rita. "L'Ardenne dans la littérature médiévale." *Anciens Pays et Assemblées d'Etats: études* 28 (1963): 41–78.
- Lelièvre, X. "De la juridiction militaire au comté de Namur." *ASAN* 1 (1861–62): 130–43.
- Lemoine, Caroline. "L'enceinte de Liège au XIII^e s." *Annuaire d'Histoire Liégeoise* 36 (2006): 1–99.
- Lemoine-Isabeau, Claire. "La carte de Ferraris, les écoles militaires aux Pays-Bas et l'Ecole d'Hydraulique de Bruxelles." *Revue Belge d'Histoire Militaire* 18 (1969–70): 73–93.
- . *Les militaires et la cartographie des Pays-Bas méridionaux et de la Principauté de Liège à la fin du XVII^e et au XVIII^e siècle*. Brussels: Musée Royal de l'Armée, 1984.
- . *La cartographie du territoire belge de 1780 à 1830 entre Ferraris et le Dépôt de la Guerre de Belgique*. Brussels: Musée Royal de l'Armée, 1997.
- . and Etienne Helin, *Cartes inédites du pays de Liège au XVIII^e siècle*. Brussels: Crédit Communal de Belgique, 1980.
- Léonard, Emile G. *L'Armée et ses problèmes au XVIII^e siècle*. Paris: Plon, 1958.
- Lenihan, Pádraig. *Fluxes, Fevers and Fighting Men. War and Disease in Ancien Régime Europe 1648–1789*. Warwick: Helion, 2019.
- Leuftink, Arnold E. *Harde heelmeesters. Zeelieden en hun dokters in de 18de eeuw*. Zutphen: Walburg, 1991.
- Lhoist-Colmon, Berthe and Georges Gabriel. "La colline de la citadelle du Moyen Âge à la Période Hollandaise. Essai historique." In *De Bavière à la citadelle*, edited by Claude Gaier et al., 19–85. Liège, 1980.
- Liddiard, Robert. *Castles in Context. Power, Symbolism and Landscape, 1066 to 1500*. Oxford: Windgather, 2005; 2012.
- Lieberman, Max, *The Medieval March of Wales. The Creation and Perception of a Frontier, 1066–1283*. Cambridge: Cambridge University Press, 2010; 2013.
- Lienard, Jacques. "Le fort de la Chartreuse, création hollandaise (1818–1823)." In *Liège et le Royaume des Pays-Bas: une place forte dans un ensemble défensif 1815–1830*, 99–120. Liège: Centre liégeois d'Histoire et d'Archéologie Militaires, 1982.
- Liddle, M. J. and Chitty, L. D. "The Nutrient-Budget of Horse Tracks on an English Lowland Heath." *Journal of Applied Ecology* 18, no. 3 (1981): 841–48.
- Lind, Gunner. "Genesis of the Civilian in the Western World, 1500–2000." In *Civilians at War. From the Fifteenth Century to the Present*, edited by Gunner Lind, 47–82. Copenhagen: Museum Tusculanum, 2014.
- Loicq, Jean. *Les noms de rivières de Wallonie y compris les régions germanophones. Dictionnaire analytique et historique*. Leuven: Peeters, 2014.

- Lomas, Richard. "Raids and Raiding." In vol. 1 of *The Oxford Encyclopedia of Medieval Warfare and Military Technology*, edited by Clifford J. Rogers, 152–53. Oxford: Oxford University Press, 2010.
- Loonen, Anne and Willem-Simon Graaf van de. *Het massapaardengraf van Borgharen*. Archeorapport 558. Maastricht: Archeodienst, 2013.
- Lorgnier, Jacques. *Maréchaussée, histoire d'une révolution judiciaire et administrative*. 2 vols. Paris: Harmattan, 1994.
- Lucassen, Jan. "The International Maritime Labour Market (Sixteenth–Nineteenth Centuries)." In *"Those Emblems of Hell"? European Sailors and the Maritime Labour Market, 1570–1870*, edited by Paul C. van Royen, Jaap R. Bruijn and Jan Lucassen, 11–24. St. John's: International Maritime Economic History Association, 1997.
- Luce, Siméon. *Jeanne d'Arc à Domrémy: recherches critiques sur les origines de la mission de la Pucelle, accompagnées de pièces justificatives*. Paris, 1886.
- Luijten, Hannie. "Zaden en vruchten, overblijfselen van het plantaardige voedsel en de begroeiing van de grachten." In *Het Kasteel van Eindhoven: archeologie, ecologie en geschiedenis van een heerlijke woning, 1420–1676*, edited by Nico Arts, 237–44. Eindhoven: Museum Kempenland, 1992.
- Lund, Erik A. *War for the Every Day. Generals, Knowledge, and Warfare in Early Modern Europe, 1680–1740*. Westport: Greenwood, 1999.
- Lunstrum, Elizabeth. "Green Militarization: Anti-Poaching Efforts and the Spatial Contours of Kruger National Park." *Annals of the Association of American Geographers* 104, no. 4 (2014): 816–32.
- Luys, W. "Schansen, eens vluchtplaatsen voor de plattelandsbewoners tijdens de Tachtigjarige Oorlog (1568–1648)." *Jaarboek Maas- en Swalmdal* (1985): 108–32.
- Luyts, Gie. *Met vryaerts en resoelen. Het verdwijnen van de wolf in Vlaanderen*. Mechelen: Natuurpunt, 2002.
- Lynn, John A. *The Bayonets of the Republic. Motivation and Tactics in the Army of Revolutionary France, 1791–1794*, 2nd ed. Boulder: Westview, 1984; 1996.
- . "The Evolution of Army Style in the Modern West, 800–2000." *The International History Review* 18, no. 3 (1996): 505–45.
- . *Giant of the Grand Siècle. The French Army 1610–1715*. Cambridge: Cambridge University Press, 1997.
- Maarseveen, Michel P. van et al. "Catalogus." In *Beelden van een strijd. Oorlog en kunst voor de Vrede van Munster 1621–1648*, edited by Michel P. van Maarseveen, Jos W. L. Hilkhuijsen and Jacques Dane, 252–363. Zwolle: Waanders, 1998.
- Maassen, Jan and Henk Vennix. *De groene vestingmuren van 's-Hertogenbosch. Korstmossen onder de loep*. 's-Hertogenbosch: Heinen, 2007.
- Machlis, Gary E. and Thor Hanson. "Warfare Ecology." *BioScience* 58, no. 8 (2008): 729–36.
- MacLean, Simon. "Shadow Kingdom: Lotharingia and the Frankish World, c.850–c.1050." *History Compass* 11 (2013): 443–57.
- Maes, S. F. *De geschiedenis van Bree: De Gemeente van de Oudste tijden tot aan de Franse Revolutie*. Bree, 1952; 1984.
- Maguin, Martine. "Economie, politique et viticulture en Lorraine central aux XIV^e et XV^e siècles." *Annales de l'Est* 37, no. 3 (1985): 193–208.
- Majewski, André. "Pêches contrariées à Montigny-sur-Meuse et à Givet." *Ardenne Wallonne* 70 (1997): 21–23.
- Manning, Roger Burrow. *Hunters and Poachers: A Social and Cultural History of Unlawful Hunting in England, 1485–1640*. Oxford: Clarendon Press, 1993.

- Marchal, Jules. "Description de la ville et forteresse de La Mothe 1634–1745–1884." *Revue de Champagne et de Brie* 20 (1885): 124–36; and 21 (1886): 418–33.
- Martin, Hervé and Marc Russon, *Vivre sous la tente au Moyen Âge (V^e–XV^e siècle)*. Rennes: Ouest-France, 2010.
- Martens, P. J. M. *De zalmvisseren van de Biesbosch. Een onderzoek naar de visserij op het Bergse Veld 1421–1869*. Tilburg: Zuidelijk Historisch Contact, 1992.
- Martin, Marijke. "Tussen traditie en vernieuwing. Ruimtelijke transformaties van Maastricht 1650–1905." PhD diss., University of Groningen, 1997.
- Martin, Philippe, *Une guerre de Trente Ans en Lorraine 1631–1661*. Nancy: Serpenoise, 2002.
- Martinetz, Dieter. *Vom Giftpfel zum Chemiewaffenverbot: Zur Geschichte der Chemischen Kampfmittel*. Frankfurt am Main: Deutsch Harri, 1996.
- Marwede, Hans-Joachim. *Die Befestigung der Stadt Geldern 1386–1425*. Würzburg, 1934.
- Masson-Loodts, Isabelle. *Paysages en bataille. Les séquelles environnementales de la Grande Guerre*. Brussels: Nevicata, 2014.
- Mastrigt, C. van. *Willemstad Prinsheerlijk. Een vestingstad in roerige en minder roerige tijden*. Willemstad: Heemkundekring De Willemstad, 2009.
- Matthieu, Ernest. "Construction d'un fort avancé à Hyon." *ACAM* 29 (1900): 425.
- Mayer, Holly A. *Belonging to the Army. Camp Followers and Community During the American Revolution*. Columbia: University of South Carolina Press, 1996.
- Mayor, Adrienne. *Greek Fire, Poison Arrows, and Scorpion Bombs: Biological and Chemical Warfare in the Ancient World*. New York: Overlook, 2003.
- McCord, Carey P. "Scurvy as an Occupational Disease, 4. Scurvy and the Nations' Men-of-War." *Journal of Occupational Medicine* 13, no. 9 (1971): 441–47.
- . "Scurvy as an Occupational Disease, 7. Scurvy in the World's Armies." *Journal of Occupational Medicine* 13, no. 12 (1971): 586–92.
- McGready, Blake. "Contested Grounds: An Environmental History of the 1777 Philadelphia Campaign." *Pennsylvania History* 85, no. 1 (2018): 32–57.
- McNeill, William H. *The Pursuit of Power: Technology, Armed Force and Society since A.D. 1000*. Chicago, 1982; 1984.
- McNeill, J. R. "Woods and Warfare in World History." *Environmental History* 9, no. 3 (2004): 388–410.
- . *Mosquito Empires. Ecology and War in the Greater Caribbean, 1620–1914*. Cambridge: Cambridge University Press, 2010.
- . and Corinna R. Unger, eds. *Environmental Histories of the Cold War*. Cambridge: Cambridge University Press, 2010; 2013.
- McVaugh, Michael R., ed. *Arnaldi de Villanova, Opera Medica Omnia, X.2: Regimen Almarie (Regimen Castra Sequentium)*. Barcelona: Seminarium Historiae Scientiae Cantabricense, 1998.
- Meerbeek, Lucienne van. "Le service sanitaire de l'armée espagnole des Pays-Bas à la fin du XVI^{me} et au XVII^{me} siècle." *Revue Internationale d'Histoire Militaire* 20 (1959): 479–93.
- Mehl, Jean-Michel. *Les jeux au royaume de France du XIII^e au début du XVI^e siècle*. Paris: Fayard, 1990.
- Meisen, Alois. "Brabant, Limburg und die Übermaasländer: Eine Studie zur territorialen Finanzgeschichte bis zum Ende des 14. Jahrhunderts." PhD diss., Rheinisch-Westfälische Technische Hochschule Aachen, 2003.
- Meller, Harald, ed. *Schlachtfeldarchäologie Battlefield Archaeology*. Halle: Landesmuseum für Vorgeschichte Halle, 2009.

- Mertens, Jozef. "De vier dorpen van de Bank van Pelt (16de–17de eeuw). Bijdrage tot kennis van de Loonse Kempen en van de teutenhandel." *OLL* 39 (1984): 5–144.
- . "Kempense buurtschappen op de vlucht in hun heide. Ontstaan en betekenis van schansen tijdens de oorlogen van de Nieuwe Tijd." In *Tesi samanuga vvas unde scona. Liber amicorum Theo Coun*, edited by J. Maenen, R. Driessen and B. Indekeu, 153–73. Hasselt: Limburg—Het Oude Land van Loon, 2005.
- . "Oorlog, epidemie en emigratie: stagnatie van het Loonse platteland." In *Limburg in 't geweer. Oorlogsleed in het Land van Loon van Alva tot Napoleon*, edited by Julien Daenen and Jozef Mertens, 127–37. Bilzen: Landcommanderij Alden Biezen, 2008.
- Meyerson, Harvey. *Nature's Army. When Soldiers Fought for Yosemite*. Lawrence: University Press of Kansas, 2001.
- Miart, Jacques. "La population de la prévôté et châtellenie de Stenay du XIV^e à la fin de la guerre de Trente Ans: aspects démographiques et sociaux." *BSHAM* 23 (1987): 81–194.
- Miller, Andrew George. "'Tails of Masculinity': Knights, Clerics and the Mutilation of Horses in Medieval England." *Speculum* 88 (2013): 958–95.
- Milot, Jean. "Les garnisons dans les petites villes du Nord à la fin de l'Ancien Régime." *RN* 70 (1988): 717–40.
- Mitchell, Piers D. *Medicine in the Crusades. Warfare, Wounds and the Medieval Surgeon*. Cambridge: Cambridge University Press, 2004; 2007.
- . Eliezer Stern, and Yotam Tepper. "Dysentery in the Crusader Kingdom of Jerusalem: An ELISA Analysis of Two Medieval Latrines in the City of Acre (Israel)." *Journal of Archaeological Science* 35 (2008): 1849–53.
- . "Retrospective Diagnosis and the Use of Historical Texts for Investigating Disease in the Past." *International Journal of Paleopathology* 1 (2011): 81–88.
- Miwa, Nancy. "The Hortus Conclusus: Marian Iconography in the Late Middle Ages." PhD diss., Drew University, 2011.
- Moigne, Yves Le. "Le rôle économique des garnisons évêchoises au XVIII^e siècle d'après les exemples de Metz, Sarrelouis et Verdun." In *Beiträge zur Geschichte der frühneuzeitlichen Garnisons- und Festungsstadt*, edited by Hans-Walter Herrmann and Franz Irsigler, 199–220. Saarbrücken: Minerva, 1983.
- Molemans, Jos. "De Luikse Revolutie." *OLL* 46 (1991): 3–128.
- . "De politieke en rechterlijke instellingen van het graafschap Loon (1031–1794)." *OLL* 50, no. 2 (1996): 3–256.
- Molinier, Alain and Nicole Molinier-Meyer. "Environnement et histoire: les loups et l'homme en France." *Revue d'Histoire Moderne et Contemporaine* 28 (1981): 225–45.
- Mommers, A. R. M. "De gezondheidstoestand te 's-Hertogenbosch na de verovering door de Fransen in October 1794." *Brabantia* 4 (1955): 73–80.
- Moore-Colyer, R. J. "Horse Supply and the British Cavalry: A Review, 1066–1900." *Journal for the Society of Army Historical Research* 70 (1992): 245–60.
- Mora-Dieu, Guillaume. "Les corporations et la défense d'une ville: l'exemple de Liège." *Médiévales* 73 (2017): 193–212.
- Moranvillé, Henri. "Un incident de frontière dans le Verdunois (1387–1389)." *Bibliothèque de l'école des chartes* 54 (1893): 344–57.
- Moreau, L. J. *Bolwerk der Nederlanden. De vestingwerken van Maastricht sedert het begin van de 13e eeuw*. Assen: Van Gorcum, 1979.
- Moriceau, Jean-Marc. *Histoire du méchant loup: 3000 attaques sur l'homme en France XV^e–XX^e siècle*. Paris: Fayard, 2007; 2011.
- . *L'Homme contre le loup. Une guerre de deux mille ans*. Paris: Fayard, 2011.

- Moseley, Alexander. *A Philosophy of War*. New York: Algora, 2002.
- Mougeot, Jean-Daniel. "De la périphérie à la frontière? Les prévôtés septentrionales du duché de Bar face au Luxembourg 1470/1473–1508." In "René II. Lieutenant et Duc de Bar (1473–1508)," edited by Jean-Christophe Blanchard and Hélène Schneider. Special issue, *Annales de l'Est* (2014) 147–74.
- Mounier-Kuhn, Alain. *Chirurgie de guerre. Le cas du Moyen Âge*. Paris: Economica, 2006.
- Mourik, Freek van. Hans van Teijlingen, and Paul Vertegaal. *De natuur onder vuur: milieu-effecten van militaire activiteiten*. Utrecht: Ekologie, 1985.
- Mourroux, Jean. "Stenay, ville militaire, à la fin du XVII^e siècle." *BSHAM* 4 (1967): 37–58.
- . "Stenay, ville du Clermontois, sous les princes de Condé (1661–1791) 3^e partie." *BSHAM* 12 (1975): 147–204.
- Muchembled, Robert. *A History of Violence. From the End of the Middle Ages to the Present*. Cambridge: Polity, 2012.
- Muller, Josy. "Plans anciens du génie militaire français. Les gués de la Meuse en aval de Dinant (1695)." *Le Vieux Liège* 107, no. 4 (1954) 409–13.
- . "Histoire militaire des Ardennes." *Revue Historique des Armées* 2 (1955): 21–40.
- . "Plans anciens du génie militaire français. Arlon, Bastogne, Laroche, Marche 1681–1696." *AIAL* 85 (1954): 261–74.
- . "Plans inédits de Bouillon." *AIAL* 88 (1957): 3–80.
- Müller-Kehlen, Helga. *Die Ardennen im Frühmittelalter. Untersuchungen zum Königsgut in einem karolingischen Kernland*. Göttingen: Vandenhoeck & Ruprecht, 1973.
- Mulliez, Jacques. *Les chevaux du royaume. Histoire de l'élevage du cheval et de la création des haras*. Paris: Montalba, 1983.
- Munckhof, P. van den. "Jeneverbessen: levende herinneringen aan armoede en ellende (deel 2)." *Natuurhistorisch Maandblad* 80, no. 10 (1991): 191–95.
- Murk, Karl. "Rekrutierung und Ausbildung der Forstbeamten in der Landgrafschaft Hessen-Kassel und im Kurfürstentum Hessen." In "*Weil das Holz eine köstliche Ware*"—*Wald und Forst zwischen Mittelalter und Moderne*, edited by Andreas Hedwig, 105–22. Marburg: Schmidt, 2006.
- Muscolino, Micah S. *The Ecology of War in China. Henan Province, the Yellow River, and Beyond, 1938–1950*. Cambridge: Cambridge University Press, 2015; 2016.
- Nagels, S., F. Kerklaan, and B. van Kaam. *Kasteel van Breda. Archeozoologisch en Archeo-ichthyologisch onderzoek*. Breda: Gemeente Breda, 2014.
- Napran, Laura. "Mercenaries and Paid Men in Gilbert of Mons." In *Mercenaries and Paid Men. The Mercenary Identity in the Middle Ages*, edited by John France, 287–99. Leiden: Brill, 2008.
- Naulet, Frédéric. *L'Artillerie française (1665–1765). Naissance d'une arme*. Paris: Economica, 2002.
- Neirinckx, Pieter. "'Je ne suis pas en état d'estimer le dommage': A Letter on the Passage of the Allied Troops through Genk on the Eve of the Battle of Lauffeld, 1747." *Journal of the Society for Army Historical Research* 93 (2015): 7–12.
- Netz, Reviel. *Barbed Wire: An Ecology of Modernity*. Middletown: Wesleyan University Press, 2004; 2009.
- Neumann, Hartwig. *Zitadelle Jülich. Grosser Kunst- und Bauführer*. Jülich: Fischer, 1986.
- . *Das Ende einer Festung. Belagerungsübung, Schiessversuche und erste Schleifungsmassnahmen in Jülich im September 1860*. Jülich: Fischer, 1987.
- . *Festungsbaukunst und Festungsbautechnik. Deutsche Wehrbauarchitektur vom XV. bis XX. Jahrhundert*. Koblenz: Bernard & Graefe, 1988.

- Neumeyer, Martina. *Vom Kriegshandwerk zum Ritterlichen Theater. Das Turnier im mittelalterlichen Frankreich*. Bonn: Romanistischer, 1998.
- Newfield, Timothy P. "Early Medieval Epizootics and Landscapes of Disease: The Origins and Triggers of European Livestock Pestilences, 400–1000 CE." In *Landscapes and Societies in Medieval Europe East of the Elbe. Interactions Between Environmental Settings and Cultural Transformations*, edited by Sunhild Kleingärtner et al., 73–113. Toronto: Pontifical Institute of Mediaeval Studies, 2013.
- . "Malaria and Malaria-Like Disease in the Early Middle Ages." *Early Medieval Europe* 25, no. 3 (2017): 251–300.
- Nienhuis, Piet H. *Environmental History of the Rhine–Meuse Delta. An Ecological Story on Evolving Human–Environmental Relations Coping with Climate Change and Sea-Level Rise*. Heidelberg: Springer, 2008.
- Nijhof, Eddie and Bram Steketee. "Sluis op het fort Crèvecoeur." *Bosssche Bladen* 3 (1996): 99–101.
- Nijssen, Rombout, Tim Vanderbeken, and Werner Wouters, *Loonse ridders of Spaanse soldaten? Archeologisch-historische studie van de site van Jonkholt 1200–2014*. Riemst: Zolad+, 2013.
- Nijsten, Gerard. *In the Shadow of Burgundy: The Court of Guelders in the Late Middle Ages*. Translated by Tanis Guest. Cambridge: Cambridge University Press, 2004.
- Nimwegen, Olaf van. *De subsistentie van het leger. Logistiek en strategie van het Geallieerde en met name het Staatse leger tijdens de Spaanse Successieoorlog in de Nederlanden en het Heilig Roomse Rijk (1701–1712)*. Amsterdam: De Bataafsche Leeuw, 1995.
- . *De Republiek der Verenigde Nederlanden als grote mogendheid. Buitenlandse politiek en oorlogvoering in de eerste helft van de achttiende eeuw en in het bijzonder tijdens de Oostenrijkse Successieoorlog (1740–1748)*. Amsterdam: De Bataafsche Leeuw, 2002.
- Nispen, C. A. I. L. van. *De Vesting Willemstad, Deel 1: Willemstad in de Tachtigjarige Oorlog*. Wouw: Archivariaat Nassau–Brabant, 1983.
- Noël, René. *Quatre siècles de vie rurale entre la Semois et la Chiens (1050–1470), Livre 1: Connaissance des hommes et des choses*. Louvain: Centre belge d'histoire rurale, 1977.
- Noordzij, Aart. *Gelre Dynastie, land en identiteit in de late middeleeuwen*. Hilversum: Verloren, 2009.
- Notermans, Jos. *Fort Sint Pieter Vestingwerk en ontspanningsoord*. Maastricht: Historische Reeks Maastricht, 2007.
- Nusteling, H. "Strijd om de binnenvaart." In *Geschiedenis van Dordrecht 1572–1813*, edited by W. Frijhoff, H. Nusteling, and M. Spies, 149–69. Hilversum: Verloren, 1998.
- Nyrén, Ulf. "Riksjägmästarambetet-militär institution i civil förklädad." In *Sammanflätat. Civil och militärt i det tidigmoderna Sverige*, edited by Maria Sjöberg, 101–15. Uppsala: Historiska Institutionen, 2009.
- Olson, Vibeke. "The Whole is the Sum of its Parts: Standardizing Medieval Stone Production." In *Working with Limestone: The Science, Technology, and Art of Medieval Limestone Monuments*, edited by Vibeke Olson, 189–208. Farnham: Ashgate, 2010.
- Ortalli, Gherardo. *Lupi genti culture. Uomo e ambiente nel medioevo*. Torino: Einaudi, 1997.
- Ott, Wilfried. *Die besiegte Wildnis. Wie Bär, Wolf, Luchs und Steinadler aus unserer Heimat verschwanden*. Leinfelden-Echterdingen: Weinbrenner, 2004.
- Otterbein, Keith F. *How War Began*. College Station: Texas A&M University Press, 2004.
- Ottersbach, Christian. "Der Garten in der Festung—Die Festung im Garten. Eine Einführung ins Thema." In *Festungen in Gärten—Gärten in Festungen*, edited by Volker Mende and Christian Ottersbach, 15–33. Regensburg: Schnell & Steiner, 2015.

- Outram, Quentin. "The Socio-Economic Relations of Warfare and the Military Mortality Crises of the Thirty Years' War." *Medical History* 45, no. 2 (2001): 151–84.
- Pagnotta, Philippe. *Les églises fortifiées de la Meuse. Au coeur de la mémoire des terroirs*. Charenton-le-Pont: Citedis, 1993; 2000.
- Palka, Joel W. "Ancient Maya Defensive Barricades, Warfare, and Site Abandonment." *Latin American Antiquity* 12, no. 4 (2001): 427–30.
- Panhuisen, G. W. A. "De politieke verhoudingen tussen Brabant en Gelre in het Maasdal gedurende de eerste helft van de dertiende eeuw." *Akademie-dagen: verslag en voordrachten* 15 (1963): 54–83.
- Paravicini, Werner. "Gab es eine einheitliche Adelskultur Europas im späten Mittelalter?" In *Europa im späten Mittelalter. Politik—Gesellschaft—Kultur*, edited by Rainer Christoph Schwinges, Christian Hesse, and Peter Moraw, 401–34. München: Wissenschaft, 2006.
- Park, Chris and Michael Allaby. *Oxford Dictionary of Environment and Conservation*. Oxford: Oxford University Press, 2007; 2013.
- Parker, Geoffrey. *The Army of Flanders and the Spanish Road, 1567–1659*. Cambridge: Cambridge University Press, 1972; 2004.
- . *The Military Revolution. Military Innovation and the Rise of the West, 1500–1800*. Cambridge: Cambridge University Press, 1988; 1996.
- . *Global Crisis. War, Climate Change and Catastrophe in the Seventeenth Century*. New Haven: Yale University Press, 2013; 2014.
- Parmentier, Isabelle. *Histoire de l'environnement en Pays de Charleroi 1730–1830. Pollution et nuisances dans un paysage en voie d'industrialisation*. Brussels: Académie royale de Belgique, 2008.
- Parrott, David. *Richelieu's Army. War, Government and Society in France, 1624–1642*. Cambridge: Cambridge University Press, 2001; 2006.
- . *The Business of War. Military Enterprise and Military Revolution in Early Modern Europe*. Cambridge: Cambridge University Press, 2012.
- Partington, J. R. A *History of Greek Fire and Gunpowder*. Cambridge: Heffer, 1961.
- Patist, C. R. *Het beleg van de stad Grave in 1674*. Nijmegen, 1975.
- Pauls, Emil. "Zur Geschichte des Weinbaus, Weinhandels und Weinverkehrs in der Aachener Gegend." *ZAG* 7 (1885): 179–280.
- . "Wirtschaftsgeschichtliches aus dem Herzogthum Jülich." *ZAG* 22 (1900): 272–328.
- Paviot, Jacques. "Les cartes et leur utilisation à la fin du Moyen Âge. L'exemple des principautés bourguignonnes et angevines." *Itineraria* 2 (2003): 201–28.
- . "La destruction des enceintes urbaines dans les anciens Pays-Bas (XIV^e–XV^e siècle)." In *La forteresse à l'épreuve du temps*, edited by Gilles Blieck et al., 19–28. Paris: Comité des travaux historiques et scientifiques, 2007.
- Pearson, Chris. "Researching Militarized Landscapes: A Literature Review on War and the Militarization of the Environment." *Landscape Research* 37, no. 1 (2012): 115–33.
- . *Mobilizing Nature. The Environmental History of War and Militarization in Modern France*. Manchester: Manchester University Press, 2012.
- Peeters, Edwin T. H. M. et al. *Sloten. Ecologisch functioneren en beheer*. Zeist: KNNV, 2014.
- Pelzer, W. and H. Kerz. *Der Jülicher Brückenkopf. Geschichte Tier- und Pflanzenwelt*. Jülich: Vereinigung zur Förderung des Jülicher Brückenkopfs, 1962.
- Pelzers, E., J. H. de Rijk, and J. B. M. Thissen. "Zoogdieren in Limburg voor 1850." *Natuurhistorisch Maandblad* 77, no. 10 (1988): 166–72.
- Pecry, Sarah. *Mercenaries. The History of a Norm in International Relations*. Oxford: Oxford University Press, 2007.

- Perjés, G. "Army Provisioning, Logistics and Strategy in the Second Half of the 17th Century." *Acta Historica Academiae Scientiarum Hungaricae* 16 (1970): 1–52.
- Petitot-Bellavène, M. "Verdun aux XVII^e et XVIII^e siècles. Affaires militaires." *Mémoires de la Société Philomathique de Verdun* 10 (1888): 29–103.
- Pettiau, Hérold. "Un espace frontalier avant l'an Mil: quelques remarques sur la région mosane et le sud de l'Ardenne dans les itinéraires de souverains entre le royaume franc occidental et le regnum Lotharii de 843 à 935." In *L'Ardenne. Des frontières en l'an Mil*, edited by Cédric Moulis, 71–99. Nancy: Presses Universitaires de Nancy / Editions Universitaires de Lorraine, 2015.
- Peudon, Jean-Louis. "Le droit de cloture des terres et la défense des usages communautaires en Champagne méridionale (2^e moitié du XVIII^e siècle)." In *Se défendre en Champagne-Ardenne*, edited by Patrick Demouy, 259–76. Langres: Guéniot, 2012.
- Peuter, Roger De. "Paarden, geldhandel en haute finance tijdens en na de Spaanse Successie Oorlog. De opkomst en de ondergang van de Brusselse koopman Nicolas Poullain (1678–1729)." *Revue Belge de Philologie et d'Histoire* 93, no. 2 (2015): 343–96.
- Philippart, Christian. "Conséquences socio-économiques des guerres de course dans l'hinterland namurois." In *Assiégés et assiégés au cœur de l'Europe Namur 1688–1697*, edited by Françoise Jacquet-Ladrier and Philippe Jacquet-Ladrier, 249–75. Brussels: Crédit Communal, 1992.
- . "La pêche en haute Meuse namuroise de 1507 à 1790." *Le Guetteur Wallon* 84, no. 3 (2008): 78–115.
- Picaud-Monnerat, Sandrine, *La Petite guerre au XVIII^e siècle*. Paris: Economica, 2010.
- Pickett, S. T. A. and P. S. White, *The Ecology of Natural Disturbance and Patch Dynamics*. San Diego: Academic, 1985.
- Pierrot, Alfred-Jean-Marie. *L'Arrondissement de Montmédy sous la Révolution*. Bar-le-Duc, 1904.
- Pionnier, Edmond. *Essai sur l'histoire de la révolution à Verdun (1789–1795)*. Nancy, 1906.
- Piriaux, Christine and Michel Dorban, eds. *Douane, commerce et fraude dans le sud de l'espace belge et grand-ducal du XVIII^e siècle*. Louvain-la-Neuve: Bruylant-Academia, 2003.
- Pirotte, Fernand. "L'industrie métallurgique de la terre de Durbuy de 1480 à 1625." *BIAL* 79 (1966): 145–208.
- Pistor, Rolf-Günter and Henri Smeets. *Die Fossa Eugeniana. Eine unvollendete Kanalverbindung zwischen Rhein und Maas 1626*. Mönchengladbach: Rheinland, 1979.
- Planhol, Xavier de and Paul Claval, *An Historical Geography of France*. Cambridge: Cambridge University Press, 1988; 1994.
- Pluskowski, Aleksander. *Wolves and the Wilderness in the Middle Ages*. Woodbridge: Boydell, 2006.
- . *The Archaeology of the Prussian Crusade. Holy War and Colonisation*. New York: Routledge, 2013.
- Poncelet, Edouard. "La guerre dite 'de la vache de Ciney.'" *BCRH* 5, no. 3 (1893): 275–395.
- . "Le combat du faubourg Saint-Léonard à Liège, 27 octobre 1468." *Annuaire d'Histoire Liégeoise* 2 (1938–41): 268–95.
- Poswick, Eugène. *Histoire des troupes liégeoises pendant le XVIII^e siècle*. Liège, 1893.
- Poulsen, Bo. *Dutch Herring. An Environmental History, c. 1600–1860*. Amsterdam: Aksant, 2008.
- Pounds, Norman J. G. "Population and Settlement in the Low Countries and Northern France in the Later Middle Ages." *Revue Belge de Philologie et d'Histoire (Histoire depuis l'Antiquité)* 49, no. 2 (1971): 369–402.

- Preston, Christopher D., David A. Pearman, and Allan R. Hall. "Archaeophytes in Britain." *Botanical Journal of the Linnean Society* 145 (2004): 257–94.
- Prinzinger, Friedrich. *Epidemics Resulting from Wars*. Oxford: Clarendon Press, 1916.
- Purton, Peter. *The Medieval Military Engineer. From the Roman Empire to the Sixteenth Century*. Woodbridge: Boydell, 2018.
- Radkau, Joachim. *Natur und Macht. Eine Weltgeschichte der Umwelt*. München: Beck, 2000; 2012.
- Raffaelli, David G. and Christopher L. J. Frid. "The Evolution of Ecosystem Ecology." In *Ecosystem Ecology: A New Synthesis*, edited by David G. Raffaelli and Christopher L. J. Frid, 1–18. Cambridge: Cambridge University Press, 2010.
- Rankin, K. J. and R. Schofield. *The Troubled Historiography of Classical Boundary Terminology. Mapping Frontiers, Plotting Pathways* Ancillary Paper 2. Dublin: Institute for British-Irish Studies, University College Dublin, 2004.
- Raynaud, Christiane. "Défenses annexes et fortifications de campagne dans les enluminures des XIV^e et XV^e siècles. Première approche." In *Krieg im Mittelalter*, edited by Hans-Henning Kortüm, 197–250. Berlin: Akademie, 2001.
- . *A la Hache! Histoire et symbolique de la hache dans la France médiévale XIII^e–XV^e siècles*. Paris: Léopard d'Or, 2002.
- Redlich, Fritz. "Der Marktender." *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 41 (1954): 227–52.
- Regteren Altena, C. O. van. "Achtttiende-eeuwse verzamelaars van fossielen te Maastricht en het lot hunner collecties." *Publicaties van het Natuurhistorisch Genootschap in Limburg* 9 (1956): 83–112.
- Regteren Altena, C. O. van. "Nieuwe gegevens over achttiende-eeuwse verzamelaars van fossielen te Maastricht." *Natuurhistorisch Maandblad* 52, no. 2 (1963): 28–31.
- Reiche, Alwin. *Vom bewaffneten Hausmann zum Polizisten: Ein neuer Beruf entsteht*. Jülich: Jülicher Geschichtsverein, 1997.
- Reichert, Winfried. *Landesherrschaft zwischen Reich und Frankreich. Verfassung, Wirtschaft und Territorialpolitik in der Grafschaft Luxemburg von der Mitte des 13. Bis zur Mitte des 14. Jahrhunderts*. 2 vols. Trier: Trierer Historische Forschungen, 1993.
- Reitel, François. "Le rôle de l'armée dans la conservation des forêts en France." *Bulletin de l'Association de géographes français* 61 (1984): 143–54.
- Renard, Edgard. *Toponymie de Vottem et de Rocour-lez-Liège*. Liège: Commission Royale de Toponymie et de Dialectologie, 1934.
- Renes, Lucia and Lucie Wessels. "Loen ende Werck. Op zoek naar het personeel op de burcht ter Horst in de vijftiende eeuw." In *Dagelijks leven op Limburgse kastelen (1350–1600): verwantschap, begrafenisrituelen, personeel en werkzaamheden*, 101–50. Venlo: Limburgs Museum, 1995.
- Reyerson, Kathryn. "Medieval Walled Space: Urban Development vs. Defense." In *City Walls: The Urban Enceinte in Global Perspective*, edited by James D. Tracy, 88–116. Cambridge: Cambridge University Press, 2000.
- Rheinheimer, Martin. "The Belief in Werewolves and the Extermination of Real Wolves in Schleswig-Holstein." In *A Fairytale in Question. Historical Interactions Between Humans and Wolves*, edited by Patrick Masius and Jana Sprenger, 39–56. Cambridge, MA: White Horse, 2015.
- Rhoen, C. *Die Befestigungswerke der Freien Reichsstadt Aachen*. Aachen, 1894.
- Richardot, Philippe. *Végèce et la culture militaire au Moyen Âge (V^e–XV^e siècles)*. Paris: Economica, 1998.

- Richardson, Thom. *The Tower Armoury in the Fourteenth Century*. Leeds: Royal Armouries, 2016.
- Ridderbos, Maarten. *Kleine atlas van de Oude Hollandse Waterlinie*. Amsterdam, 2010.
- Rijk, Jan de. "Wolven (*canis lupus*) op de Veluwe van 1596 tot 1630." *Huid en Haar* 6, no. 3 (1987): 71–75.
- Rijk, Jan Hendrik de. "Vogels en mensen in Nederland 1500–1920." PhD diss., Vrije Universiteit Amsterdam, 2015.
- Ripple, William J. and Robert L. Beschta. "Wolves and the Ecology of Fear: Can Predation Risk Structure Ecosystems?" *BioScience* 54, no. 8 (2004): 755–66.
- Rizzo, Marie-Rose. "La prévôté de Marville à la fin du Moyen Age d'après le registre de comptes de Jean du Hautois, receveur en 1477 et 1478." In *Marville ville frontière*, edited by Jean Lanher and Noëlle Cazin, 3–36. Bar-le-Duc: Société des Lettres, Sciences et Arts de Bar-le-Duc, 2001.
- Robaulx de Soumoy, A. de. "Recherches sur l'histoire de la ville de Mariembourg et L'origine de Charlemont." *ASAN* 8 (1863–64): 159–220, 233–326.
- Robinson, Gavin. "Horse Supply and the Development of the New Model Army, 1642–1646." *War in History* 15, no. 2 (2008) 121–40.
- Roebroec, E. *Het land van Montfort. Een agrarische samenleving in een grensgebied 1647–1820*. Assen: Van Gorcum, 1967.
- Rogers, Clifford J. *Soldiers' Lives through History. The Middle Ages*. Westport: Greenwood, 2007.
- . ed. *The Military Revolution Debate. Readings on the Military Transformation of Early Modern Europe*. Boulder: Westview, 1995.
- Roland, C. G. "Les seigneurs de Morialmé avant le quinzième siècle." *ASAN* 35 (1922): 1–81.
- Rompen, Peggy. "Mosasaurus Hoffmanni: de lotgevallen van een type-exemplaar." Master's thesis, Rijksuniversiteit Limburg, 1995.
- Rooms, Etienne. *De organisatie van de troepen van de Spaans-Habsburgse monarchie in de Zuidelijke Nederlanden (1659–1700)*. Brussels: Musée Royal de l'Armée, 2003.
- Roosen, Joris. "De rurale economie in het Maasland, Haspengouw en Nederlands Zuid-Limburg tijdens de 18e eeuw." Master's thesis, University of Ghent, 2014.
- Roosens, Bernhard. "Habsburgse defensiepolitiek en vestingbouw in de Nederlanden 1520–1560." 2 vols. PhD diss., University of Leiden, 2005.
- . "De invloed van de vestingbouw op de bevolking in de Nederlanden tijdens de regeerperiode van Karel V." In *Oorlog en samenleving in de Nieuwe Tijd*, edited by R. P. Fagel and D. Onnekink, 81–109. Maastricht: Shaker, 2005.
- Rorive, Jean-Pierre. *Les misères de la guerre sous le Roi-Soleil. Les populations de Huy, de Hesbaye et du Condroz dans la tourmente du Siècle de malheur*. Liège: Editions de l'Université de Liège, 2000.
- . *La guerre de siège sous Louis XIV. Au coeur du champ de bataille de l'Europe*. Paris: Jourdan, 2015.
- Rosen, Jochai. *Soldiers at Leisure: The Guardroom Scene in Dutch Genre Paintings of the Golden Age*. Amsterdam: Amsterdam University Press, 2010.
- Rosendaal, Joost. *Tot nut van Nederland. Polarisatie en revolutie in een grensgebied, 1783–1787*. Nijmegen: Vantilt, 2012.
- Rouche, Nicolas. "Journal de l'entrée des troupes françaises le 6 juillet 1747 et ce qui s'en est passé à cet égard." *Cercle Hutois des Sciences et Beaux-Arts* 25, no. 2 (1956): 41–88.
- Rousseau, Félix. "La Meuse et le Pays Mosan en Belgique. Leur importance avant le XIII^e siècle." *ASAN* 39 (1930): 1–248.

- . "Tours domaniales et tours de chevaliers, églises et cimetières fortifiés dans le Namurois." *ASAN* 46 (1952): 233–68.
- . "A propos de la recherche de la sécurité." *Bulletin de la Classe des lettres et des sciences morales et politiques de l'Académie Royale de Belgique* 39 (1953): 686–95.
- Rowlands, Guy. "Moving Mars: The Logistical Geography of Louis XIV's France" *French History* 25, no. 4 (2011) 492–514.
- Roymans, Nico, Bart Beex, and Jan Roymans. "Some Napoleonic-Style Army Camps from the Period of the Dutch–Belgian Separation (1830–1839) in the Southern Netherlands." *Journal of Conflict Archaeology* 12, no. 2 (2017): 75–93.
- Rudd, Gillian. *Greenery. Ecocritical Readings of Late Medieval English Literature*. Manchester: Manchester University Press, 2007.
- Rudwick, Martin J. S. *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution*. Chicago: University of Chicago Press, 2005.
- Ruff, Julius R. *Violence in Early Modern Europe 1500–1800*. Cambridge: Cambridge University Press, 2001; 2004.
- Russell, Edmund. *War and Nature. Fighting Humans and Insects with Chemicals from World War I to Silent Spring*. Cambridge: Cambridge University Press, 2001; 2011.
- Ruwet, Joseph. *Soldats des régiments nationaux au XVIII^{ème} siècle*. Brussels: Commission Royale d'Histoire, 1962).
- Rycke, Jean-Pierre De. "L'architecture." In *Assiégeants et assiégés au coeur de l'Europe Namur 1688–1697*, edited by Françoise Jacquet-Ladrier and Philippe Jacquet-Ladrier, 202–8. Brussels: Crédit Communal, 1992.
- Sabo, Peter, ed. *Tanks and Thyme: Biodiversity in Former Soviet Military Areas in Central Europe*. Cambridge: International Union for Conservation of Nature, 1996.
- Sabron, Frederik Henri Alexander. *De oorlog van 1794–95 op het grondgebied van de Republiek der Vereenigde Nederlanden*. 2 vols. Breda: Koninklijke Militaire Academie, 1892–93.
- Saint-Amand, Pascal. "Poilvache et son voisinage dans les comptes de la prévôté à l'époque bourguignonne." In *Quoi de neuf à Poilvache?*, edited by Daniel Van Basten, 55–67. Bouvignes-Dinant: MPMM, 2018.
- . "Les puits de trois châteaux du comté de Namur en vallée mosane: Poilvache, Bouvignes et Montaigle." In *Quoi de neuf à Poilvache?*, edited by Daniel Van Basten, 68–75. Bouvignes-Dinant: MPMM, 2018.
- Salamagne, Alain. "Les garnisons des villes et châteaux dans le nord de la France aux XIV^e et XV^e siècles" *RN* 4, no. 342 (2001): 707–29.
- Salzmann, Jean-Pierre. "La petite guerre lorraine de Madame de Saint-Balmon." In *Stratégies irrégulières*, edited by Hervé Coutau-Bégarie, 184–201. Paris: Economica, 2010.
- Sangers, W. and A. H. Simons. *Er ligt een eiland in de Maas. Geschiedenis van Stevensweert, Ohé and Laak*. Echt, 1955.
- Sartelet, Alain. *La principauté de Sedan*. Charleville-Mézières: Terres Ardennaises, 1991.
- . *Mézières: Les fortifications et la citadelle*. Charleville-Mézières: Terres Ardennaises, 2005.
- . "Les fortifications espagnoles et le château comtal de Givet Saint-Hilaire (1555–1680)." *Ardenne Wallonne* 3, no. 132 (2013): 34–41.
- Satterfield, George. *Princes, Posts and Partisans. The Army of Louis XIV and Partisan Warfare in The Netherlands (1673–1678)*. Leiden: Brill, 2003.
- Schäfer, Christoph. "'Krygsvernftelingen.' Militäringenieur und Fortifikation in den Vereinigten Niederlanden." PhD diss., Justus-Liebig Universität Giessen, 2001.
- Schaik, D. C. van. *De Sint-Pietersberg*. Maastricht: Leiter-Nypels, 1938.

- Schepper, Karen De. "De geschiedenis van de wolvenjacht in de Zuidelijke Nederlanden (16e–18e eeuw)." Master's thesis, University of Ghent, 2010.
- Schmid, Martin. "The Environmental History of Rivers in the Early Modern Period." In *An Environmental History of the Early Modern Period. Experiments and Perspectives*, edited by Martin Knoll and Reinhold Reith, 19–26. Zürich: Lit, 2014.
- Schmitt, Michael N. "War and the Environment: Fault Lines in the Prescriptive Landscape." *Archiv des Völkerrechts* 37, no. 1 (1999): 25–67.
- Schmitz-Cliever, Egon. "Pest und pestilenzialische Krankheiten in der Geschichte der Reichsstadt Aachen." *ZAG* 66–67 (1954): 108–68.
- Schnurmann, Claudia. *Kommerz und Klüngel: der Englandhandel Kölner Kaufleute im 16. Jahrhundert*. Göttingen: Vandenhoeck & Ruprecht, 1991.
- Schoetter, M. J. "État du Duché de Luxembourg et du Comté de Chiny pendant la Guerre de Trente Ans." *Annales de l'Académie d'Archéologie de Belgique* 33 (1876): 325–459.
- Scholz, Luca. *Borders and Freedom of Movement in the Holy Roman Empire*. Oxford: Oxford University Press, 2020.
- Schreiber, Werner. "Plant Poisons in Medieval Warfare." *Medical Bulletin* 38, nos. 7–8 (1981) 23–29.
- Schroeder, F.-G. "Zur Klassifizierung der anthropochoren." *Vegetatio* 16, nos. 5–6 (1969) 225–38.
- Schulp, Anne S. *On Maastricht Mosasaurs*. Maastricht: Natuurpublicaties Limburg, 2006.
- Schulten, Cornelis Maria. *Contribution à l'étude des termes militaires français en néerlandais 1567–1625*. The Hague: Smits, 1966.
- . "De strijd bij Empel (1585). Een episode uit de Tachtigjarige Oorlog." *Armamentaria* 12 (1977): 43–46.
- Schuster, Gerd. "Täuschen und Tarnen. Eine natur-artikel und die Folgen." In *Natur ohne Frieden. Die Umweltsünden der Bundeswehr: Militär kontra Natur*, edited by Olaf Achilles, 13–28. München: Knauer, 1988.
- Segal, Samuel. "Ecological Notes on Wall Vegetation." PhD diss., University of Amsterdam, 1969.
- Seignobos, Christian. "Pre-Colonial Plant Systems of Defence." In *World Atlas of Archaeology*, edited by James Hughes, 322–23. Cambridge: Portland House, 1988.
- Servais, Victor. *Annales historiques du Barrois de 1352 à 1411 ou histoire politique, civile, militaire et ecclésiastique du Duché de Bar*. 2 vols. Bar-le-Duc, 1865–67.
- . "Annales historiques du Barrois. Règne du cardinal duc de Bar, année 1420." *Mémoires de la Société des Lettres, Sciences et Arts de Bar-le-Duc* 3 (1873): 105–20.
- Seters, W. H. van. "Het Campement bij Oosterhout anno 1732." *Jaarboek de Oranjeboom* 22 (1969): 124–47.
- Settia, Aldo Angelo. "Military Games and the Training of Infantry." *Journal of Medieval Military History* 11 (2013): 1–24.
- Shively Meier, Kathryn. *Nature's Civil War. Common Soldiers and the Environment in 1862 Virginia*. Chapel Hill: University of North Carolina Press, 2013.
- Sicking, Louis. *Zeemacht en onmacht. Maritieme politiek in de Nederlanden 1488–1558*. Amsterdam: de Bataafsche Leeuw, 1998.
- . and Adri P. van Vliet. "'Our Triumph of Holland.' War, Violence, and the Herring Fishery of the Low Countries, c. 1400–1650." In *Beyond the Catch: Fisheries of the North Atlantic, the North Sea and the Baltic, 900–1850*, edited by Louis Sicking, 337–64. Leiden: Brill, 2009.
- Siebrand, Michel and Olivier Collette. "Namur/Bouge: occupation de Hallstatt et bivouacs des Temps modernes." *Chronique de l'archéologie wallonne* 21 (2014): 274–77.

- Siemer, Stefan. "Wölfe in der Stadt. Wahrnehmungsmuster einer Tierkatastrophe am Beispiel des Journal d'un Bourgeois de Paris." In *Naturkatastrophen: Beiträge zu Ihrer Deutung, Wahrnehmung und Darstellung in Text und Bild von der Antike bis ins 20. Jahrhundert*, edited by Dieter Groh, 347–66. Tübingen: Narr, 2001.
- Sikora, Michael. "Söldner-historische Annäherung an einen Kriegertypus." *Geschichte und Gesellschaft: Zeitschrift für historische Sozialwissenschaft* 29 (2003): 210–38.
- Silvertant, Jacquo. *Valckenborgh. Geschiedenis en archeologie van de middeleeuwse vesting*. Gulpen, 2014.
- Sivery, Gérard. *Structures agraires et vie rurale dans le Hainaut à la fin du Moyen Age*. 2 vols. Lille: Presses Universitaires de Lille, 1977–80.
- Skrotzky, Nicolas. *Guerres: crimes écologiques*. Paris: Sang de la terre, 1991.
- Slavin, Philip. "Warfare and Ecological Destruction in Early Fourteenth-Century British Isles." *Environmental History* 19 (2014): 528–50.
- Sleiderink, Remco. *De stem van de meester. De hertogen van Brabant en hun rol in het literaire leven (1106–1430)*. Amsterdam: Prometheus, 2003.
- Smallman-Raynor, Matthew R. and Andrew D. Cliff. *War Epidemics. An Historical Geography of Infectious Diseases in Military Conflict and Civil Strife, 1850–2000*. Oxford: Oxford University Press, 2004; 2006.
- Smit, Pieter, ed. *Hendrik Engel's Alphabetical List of Dutch Zoological Cabinets and Menageries*. Amsterdam: Rodopi, 1986.
- Smith, Jay M. *Monsters of the Gévaudan. The Making of a Beast*. Cambridge, MA: Harvard University Press, 2011.
- Smolar-Meynard, Arlette. *La justice ducale du plat-pays, des forêts et des chasses en Brabant (XII^e–XVI^e s.), sénéchal, maître des bois, gruyer, grand veneur*. Brussels: Annales de la Société royale d'Archéologie de Bruxelles, 1991.
- Snyder James E. "Jan Van Eyck and the Madonna of Chancellor Nicolas Rolin." *Oud-Holland* 82 (1967): 163–71.
- Soetaert, Alexander. *Une espèce de déluge dans la ville. Inondations urbaines à Namur aux Temps Modernes*. Namur: Les Amis de la Citadelle de Namur, 2016.
- Sommé, Monique. "L'Artillerie et la guerre de frontière dans le Nord de la France de 1477 à 1482." In *Art de la guerre, technologie et tactique en Europe occidentale à la fin du Moyen Âge et à la Renaissance*, 57–70. Brussels: Centre européen d'études bourguignonnes, 1986.
- Sonkajärvi, Hanna. "Aperçu sur l'économie de la désertion dans les Pays-Bas autrichiens au XVIII^e siècle." *Histoire, Economie et Société* 30, no. 3 (2011): 49–57.
- Spaans, Erik. "Legerkampen op zeventiende-eeuwse schilderijen: beeld en werkelijkheid." In *Beelden van een strijd. Oorlog en kunst voor de Vrede van Munster 1621–1648*, edited by Michel P. van Maarseveen, Jos W. L. Hilkhuijsen, and Jacques Dane, 165–82. Zwolle: Waanders, 1988.
- Steege, Erwin. *Kleinhandel en stedelijke ontwikkeling. Het kramersambacht te Maastricht in de vroegmoderne tijd*. Hilversum: Verloren, 2006.
- Stercken, Martina. *Königtum und Territorialgewalten in den rhein-maasländischen Landfrieden des 14. Jahrhunderts*. Cologne: Böhlau, 1989.
- Sterckx, Geert and Geert de Blust. *Heide in de vuurlinie- Ecologische gebiedsvisie voor de Natura2000-gebieden van Kamp Beverlo, het Schietterrein van Helchteren en hun omgeving*. Brussels: Instituut voor Natuur-en Bosonderzoek, 2008.
- Stévenin, Michel. "Une fatalité: les devastations des gens de guerre dans l'Est de la France (1620–1660). L'exemple de la Champagne." In *De la guerre à l'ancienne à la guerre réglée*, edited by André Corvisier and Jean Jacquart, 161–80. Paris: CTHS, 1996.

- Storrs, Christopher. "Military Justice in Early Modern Europe." In *Tra Marte e Astrea. Giustizia e giurisprudenza militare nell'Europa della prima età moderna (secc. XVI-XVIII)*, edited by Davide Maffi, 11–42. Milan: FrancoAngeli, 2012.
- Stoutjesdijk, Ph. and J. J. Barkman, *Microclimate, Vegetation and Fauna*. Zeist: KNNV, 1987; 2014.
- Stradling, R. A. "Spain's Military Failure and the Supply of Horses 1600–1660." *History* 69, no. 226 (1984): 208–21.
- Strickland, Matthew. "Securing the North: Invasion and the Strategy of Defence in Twelfth-Century Anglo-Scottish Warfare." *Anglo-Norman Studies* 12 (1989): 177–98.
- . *War and Chivalry: The Conduct and Perception of War in England and Normandy, 1066–1217*. Cambridge: Cambridge University Press, 1996.
- Suttor, Marc. *La Navigation sur la Meuse moyenne des origines à 1650*. Louvain-la-Neuve: Centre Belge d'Histoire Rurale, 1986.
- . "L'espace fluvial, outil et agrément. Hommes d'armes et voyageurs sur la Meuse au Moyen Âge." *Perspectives médiévales* 24 (1998): 7–21.
- . "Les ressources forestières et le développement économique de la Vallée Mosane du 11^e au 17^e siècle d'après l'étude du trafic fluvial." In *Forest History*, edited by Mauro Agnoletti and Steven Anderson, 21–35. New York: CABI, 2000.
- . "Un grand exportateur de bois de marine vers les chantiers navals des Pays-Bas: la vallée mosane, du XIII^e au XVII^e siècle." *Le Moyen Âge* 106 (2000): 309–22.
- . *Vie et dynamique d'un fleuve. La Meuse de Sedan à Maastricht (des origines à 1600)*. Brussels: De Boeck, 2006.
- . "Le rôle d'un fleuve comme limite ou frontière au Moyen Âge. La Meuse, de Sedan à Maastricht." *Le Moyen Âge* 116, no. 2 (2010): 335–66.
- Swart, Erik. "From 'Landsknecht to 'Soldier': The Low German Foot Soldiers of the Low Countries in the Second Half of the Sixteenth Century." *International Review of Social History* 51 (2006): 75–92.
- . "De mythe van Maurits en de moderniteit? Militair professionalisme en adelscultuur in de Noordelijke en Zuidelijke Nederlanden, circa 1590–1625." In *Het verdeelde huis: de Nederlandse adel tussen opstand en reconciliat*, edited by Luc Duerloo and Liesbeth De Frenne, 101–18. Maastricht: Shaker, 2011.
- Tachon, Nicolas, *Enfants de troupe dans les régiments, 1788–1888*. Sceaux: Esprit du livre, 2005.
- Tallier, Pierre-Alain. "Politique forestière et construction navale dans le Royaume des Pays-Bas." In *Forêt et marine*, edited by Andrée Corvol, 173–86. Paris: Harmattan, 1999.
- TeBrake, William H. *Medieval Frontier. Culture and Ecology in Rijnland*. College Station: Texas A & M University Press, 1985.
- Theeuwes, P. J. H. M. *Pieter 't Hoen en de Post van den Neder-Rhijn*. Hilversum: Verloren, 2002.
- Theibault, John. "The Rhetoric of Death and Destruction in the Thirty Years War." *Journal of Social History* 27, no. 2 (1993): 271–90.
- Thellung, A. "Stratiobotanik." *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich* 62 (1917): 327–35.
- Thewes, Guy. *Stände, Staat und Militär. Versorgung und Finanzierung der Armee in den Österreichischen Niederlanden 1715–1795*. Vienna: Böhlau, 2012.
- Thewissen, Henk. *De gezworen schutterijen van Maastricht 1374–1579*. Maastricht: Pons Mosae, 2008.
- Thielemans, Marie-Rose. "Une source d'histoire rurale. Les comptes de confiscations des biens des sujets du prince-évêque de Liège dans les états bourguignons (1468–1477)." In *Histoire économique de la Belgique: traitement des sources et état des questions*, edited

- by Hilda Coppejans-Desmedt, 397–426. Brussels: Archives et bibliothèques de Belgique, 1973.
- Thissen Bert. “Städtischer Alltag im spätmittelalterlichen Nimwegen: Amt und Haushalt des Waldgrafen Henrick van Boutershem.” In *Herzogtum Geldern. Das Goldene Zeitalter des Herzogtums Geldern: Geschichte, Kunst und Kultur im 15. und 16. Jahrhundert*, edited by Peter van der Coelen, Robert Plötz, and H. J. Steeger, 65–82. Geldern: Historischer Verein für Geldern und Umgegend, 2001.
- Thoelen, Piet. “Damereis, domein van de Duitse Orde nabij Alden Biesen (13de–18de eeuw).” In *Miscellanea Balliviae de Juncis*, edited by Jozef Mertens, 99–122. Bilzen: Historisch Studiecentrum Alden Biesen, 1995.
- Thoen, Daniel. “La flore et la végétation du château féodal de Bouillon et ses abords.” *Parcs Nationaux* 33 (1984): 39–50.
- Thoen, Erik. “Oorlogen en platteland. Sociale en economische aspecten van militaire destructie in Vlaanderen tijdens de late middeleeuwen en de vroegmoderne tijden.” *Tijdschrift voor Geschiedenis* 91 (1978): 363–78.
- Thomas, Françoise. “Hygiène, approvisionnement en eau et gestion hydrographique à Namur au XV^e siècle.” *ASAN* 68 (1994): 235–305.
- Thompson, Kenneth J. “Chaucer’s Warrior Bowman: The Roles and Equipment of the Knight’s Yeoman.” *Chaucer Review* 40, no. 4 (2006): 386–415.
- Tillière. “Histoire de Jamoigne, 2^{nde} partie” *AIAL* 45 (1910): 1–140.
- Tilmant, Pierre-Hugues. “Namur/Namur: citadelle. Découverte fortuite au ravin de la Foliette, route des Canons.” *Chronique de l’Archéologie wallonne* 21 (2014): 265.
- Tixon, Axel. “Une garnison en ville: facteur d’ordre ou de désordres? Le cas de la ville de Namur au début du XIX^e siècle.” In *L’Armée et la ville dans l’Europe du Nord et du Nord-Ouest. Du XV^e siècle à nos jours*, edited by Philippe Bragard et al., 149–64. Louvain-la-Neuve: Bruylant-Academia, 2006.
- Tomsin, Philippe. “Examen de l’éventualité d’une relation entre l’exploitation intensive des forêts et la fréquence des crues de la Meuse durant l’Ancien Régime.” *BIAL* 115 (2010): 247–307.
- Tourelle, Valérie. *Vol et brigandage au Moyen Âge*. Paris: Presses Universitaires de France, 2006; 2007.
- . *Robert de Sarrebrück ou l’honneur d’un écorcheur (v.1400–v.1462)*. Rennes: Presses Universitaires de Rennes, 2014.
- Trautmann, Thomas R. *Elephants and Kings. An Environmental History*. Chicago: University of Chicago Press, 2015.
- Tucker, Richard P. “The Impact of Warfare on the Natural World: A Historical Survey.” In *Natural Enemy, Natural Ally. Toward an Environmental History of Warfare*, edited by Richard P. Tucker and Edmund Russell, 15–41. Corvallis: Oregon State University Press, 2004; 2012.
- Ubachs, Winifred. *Van tricolore tot driekleur Maastricht 1814–1815*. Hasselt: Mededelingen van het Centrum voor Studie van de Boerenkrijg, 1962.
- Ulrix, E. and J. Paquay. *Zuidlimburgsche plaatsnamen. Excerpten XIVE–XVIE eeuw*. Leuven, 1932.
- Ulrix, Florent. “Le rempart d’Avroy et la Tour aux Lapins à Liège.” *Bulletin de la Société royale le Vieux-Liège* 147, no. 6 (1964): 405–32.
- Vandendriessche, Joris. “Ophthalmia Crossing Borders.” *Belgisch Tijdschrift voor Nieuwste Geschiedenis* 46, no. 2 (2016): 48–71.
- Vanderbeken, Tim and Elke Wesemael. “De belegeringen van Maastricht archeologisch revisited.” In *‘t is maar de kwestie ze te vinden...: Van 300.000 jaar geleden tot WOII Archeologie in Zuid-Oost-Limburg*, edited by Tim Vanderbeken, 79–88. Riemst: Zolad+: 2010.

- Vandermarliere, Guido. *De troebele jaeren 1621–1638 in de heerlijkheid van Exel-Hechtel*. Hechtel-Eksel, 2000.
- Vandewal, Steven. "Tongeren, een voorbeeld van een stad in oorlog." In *Limburg in 't geweer. Oorlogsleed in het Land van Loon van Alva tot Napoleon*, edited by Julien Daenen and Jozef Mertens, 177–84. Bilzen: Landcommanderij Alden Biezen, 2008.
- . *Moerenpoort*. Tongeren: Stadsarchief Tongeren, 2011.
- Vangheluwe, Daniel. "Bergeijk een tweeheerlijkheid? (1289–1469)." *Limburg—Het Oude Land van Loon* 89 (2010): 289–338.
- Vanhemelryck, Fernand. *Het gevecht met de duivel. Heksen in Vlaanderen*. Leuven: Davidsfonds, 1999; 2000.
- Vannerus, Jean. "Les devastations des guerres du dix-septième siècle au pays de Bastogne, La Roche et Marche." *Bulletin de l'Institut Archéologique du Luxembourg* 26 (1950): 25–38.
- Vaughan, Richard. *Charles the Bold: The Last Valois Duke of Burgundy*. Woodbridge: Boydell, 1973; 2002.
- Venne J. M. van de. *Het beleg van Valkenburg door de Luikenaren in 1465*. Maastricht, 1926.
- . "Gabions (schanskorven) uit het Ravensbos voor de vesting Maastricht." *De Maasgouw* 81 (1962): 137–38 (cols.).
- Vera, F. W. M. *Grazing Ecology and Forest History*. New York: CABI, 2000; 2002.
- Vera, Henricus Louis Maria. "... dat men het goed van den ongeboornen niet mag verkoopen. Gemene gronden in de Meierij van Den Bosch tussen hertog en hertgang 1000–2000." PhD diss., Radboud University, 2011.
- Verbij-Schillings, Jeanne. *Beeldvorming in Holland. Heraut Beyer en de historiografie omstreeks 1400*. Amsterdam: Prometheus, 1995.
- Verbois, Raphaël. *Geschiedenis van Rekem en zijn keizerlijk graafschap*. Rekem: Gemeentebestuur, 1972.
- Verbruggen, Jan-Frans. "Flemish Urban Militias Against French Cavalry Armies in the Fourteenth and Fifteenth Centuries." *Journal of Medieval Military History* 1 (2002): 145–69.
- . "Military Service in the County of Flanders." *The Journal of Medieval Military History* 2 (2004): 17–38.
- Vereerstraeten, Julien. "Le bassin de la Meuse. Etude de géographie hydrolique." *Revue Belge de Géographie* 94, nos. 1–2–3 (1970): 5–339.
- Verhagen, Peter J. C. "Het Bossche Broek. De bijna verloren strijd om het natuurbehoud." *Dungense Historiën* 6 (2012): 41–90.
- Vermeesch, Griet. *Oorlog, steden en staatsvorming*. Amsterdam: Amsterdam University Press, 2006.
- Verreycken, Quentin. *Pour nos servir en l'armée. Le gouvernement et le pardon des gens de guerre sous Charles le Téméraire, duc de Bourgogne (1467–1477)*. Louvain-la-Neuve: Presses universitaires de Louvain, 2014.
- Verschure, Han. *Overleven buiten de Hollandse Tuin. Raamsdonk, Waspik, 's Gravenmoer, Capelle, Sprang en Besoijen tijdens de Tachtigjarige Oorlog*. Tilburg, 2004.
- Villa-Séblin, Nicole. *La sénéchaussée de La Mothe et Bourmont des origines à 1645*. Langres: Guéniot, 2002.
- Viltart, Franck. "S'alimenter dans les armées de Charles Quint d'après les comptes des commissaires aux vivres des camps (1542–1543)." In *Boire et manger en pays bourguignons (XIV^e–XVI^e siècles)*, edited by Jean-Marie Cauchies, 261–73. Neuchâtel: Centre européen d'études bourguignonnes, 2007.

- . "Le roi des ribauds à la fin du Moyen Âge Une royauté infâme?" In *Les "autres" rois. Etudes sur la royauté comme notion hiérarchique dans la société au bas Moyen Âge et au début de l'époque modern*, 80–94. München: Oldenbourg, 2010.
- Vliet, A. P. van. *Vissers en kapers. De zeevisserij vanuit het Maasmondgebied en de Duinkerker kapers (ca. 1580–1648)*. The Hague: Hollandse Historische Reeks, 1994.
- Vollmuth, Ralf. *Die sanitätsdienstliche Versorgung in den Landsknechtsheeren des ausgehenden Mittelalters und der frühen Neuzeit*. Würzburg: Königshausen & Neumann, 1991.
- Vuure, Cis van. *Retracing the Aurochs. History, Morphology and Ecology of an Extinct Wild Ox*. Sofia: Pensoft, 2005.
- Waale, Marinus Jacobus. *De Arkelse oorlog, 1401–1412: een politieke, krijgskundige en economische analyse*. Hilversum: Verloren, 1990.
- Wachter, W. H. "De mossen van Jean Lambert Franquinet." *Natuurhistorisch Maandblad* 21, no. 10 (1932) 131–41; and 21, no. 11 (1932): 138–41.
- Wadge, Richard. *Archery in Medieval England. Who Were the Bowmen of Crecy?* Stroud: History, 2012.
- Wagner, Thomas Gregor. *Die Seuchen der Kreuzzüge. Kränkheit und Krankenpflege auf den bewaffneten Pilgerfahrten ins Heilige Land*. Würzburg: Königshausen & Neumann, 2009.
- Waha, Michel de. "Château et village: le gui et le chêne?" In *Autour du "village": établissements humains, finages et communautés rurales entre Seine et Rhin (IV^e–XIII^e siècles)*, edited by Jean-Marie Yante, 401–30. Louvain-La-Neuve, 2010.
- . and Michel Revelard. "Binche." In *Les enceintes urbaines en Hainaut*, edited by Jean-Marie Cauchies, 123–34. Brussels: Crédit Communal, 1983.
- Wal, Ronald van der. *Of geweld zal worden gebruikt! Militaire bijstand bij de handhaving en het herstel van de openbare orde 1840–1920*. Hilversum: Verloren, 2003.
- Wanty, Emile. *Le Milieu militaire belge de 1831 à 1914*. Brussels: Académie Royale de Belgique, 1957.
- Ward, James P. "Security and Insecurity, Spies and Informers in Holland during the Guelders War (1506–1515)." *Journal of Medieval Military History* 10 (2012): 173–96.
- Warde, Paul. *Ecology, Economy and State Formation in Early Modern Germany*. Cambridge: Cambridge University Press, 2006; 2010.
- Wealer, Robert. "Une identité paysagère du Luxembourg?" PhD diss., Université de Nancy–2, 2010.
- Webb, N. R. "The Traditional Management of European Heathlands." *Journal of Applied Ecology* 35 (1998): 987–90.
- Weeda, Eduard J. "Over de betrouwbaarheid van oude literatuurgegevens betreffende de Nederlandse flora (1550–1850)." In vol. 1 of *Atlas van de Nederlandse flora*, edited by J. Mennema, A. J. Quené-Boterenbrood, and C. L. Plate, 26–29. Amsterdam: Kosmos, 1980.
- . "Maastricht." In *Plants and Habitats of European Cities*, edited by John G. Kelcey and Norbert Müller, 237–74. Heidelberg: Springer, 2011.
- Weerth, Karl. "Westfälische Landwehren." *Westfälische Forschungen* 1 (1938): 158–98.
- Werveke N. van. *Die Erwerbung des Luxemburger Landes durch Anton von Burgund, 1409–1415. Erster Theil, 1409–1412*. Luxembourg: Königlich Grossherzogliches Athenäum zu Luxemburg, 1890.
- Westing, Arthur H. *Warfare in a Fragile World. Military Impact on the Human Environment*. London: Taylor and Francis, 1980.
- Weuts, Sylvain. *Honderdvijftig jaar kamp van Beverlo*. Leopoldsburg, 1985.

- Wiegleb, Gerhard. "A Few Theses Regarding the Inner Structure of Ecology." In *Ecology Revisited: Reflecting on Concepts, Advancing Science*, edited by Astrid Schwarz and Kurt Jax, 97–116. Heidelberg: Springer, 2011.
- Wijn, Jan Willem, "Het krijgswezen in den tijd van prins Maurits." PhD diss., University of Utrecht, 1934.
- Wijnands, D. O. "Plants Collected by Gédéon Bonivert (1651–1703) in the Garden of Johan Stickers (1630–1701)." *Archives of Natural History* 18, no. 1 (1991): 27–29.
- Will, Chris. *Sterk water. De Hollandse Waterlinie*. Utrecht: Matrijs, 2002.
- Willis, A. J. "The Ecosystem: An Evolving Concept Viewed Historically." *Functional Ecology* 11, no. 2 (1997): 268–71.
- Wilson, Peter H. "Early Modern German Military Justice." In *Tra Marte e Astrea. Giustizia e giurisdizione militare nell'Europa della prima età moderna (secc. XVI–XVIII)*, edited by Davide Maffi, 43–86. Milan: FrancoAngeli, 2012.
- . "Foreign Military Labour in Europe's Transition to Modernity." *European Review of History* 27, nos. 1–2 (2020): 12–32.
- Winter, Anne. "'Vagrancy' as an Adaptive Strategy: The Duchy of Brabant, 1767–1776." *International Review of Social History* 49 (2004): 249–78.
- Winter, P. J. van. "De Hollandse Tuin." *Nederlands Kunsthistorisch Jaarboek* 8 (1957): 29–122.
- Winters, Harold A. *Battling the Elements. Weather and Terrain in the Conduct of War*. Baltimore: Johns Hopkins University Press, 1998.
- Wissekerke, Jan Egter van. *Van kwade droes tot erger. Gebruik en veterinaire verzorging van paarden in het leger (1762–1874)*. Rotterdam: Erasmus, 2010.
- Withers, Jeremy. "The Ecology of Late Medieval Warfare in Lydgate's *Debate of the Horse, Goose, and Sheep*." *Interdisciplinary Studies in Literature and Environment* 18, no. 1 (2011): 104–22.
- Wolf, Patrick de and Michel Fautsch. "Les sites militaires wallons, des remparts contre la perte de biodiversité." *Les Cahiers de l'Urbanisme* 65 (2007): 68–72.
- Woloch, Isser. *The French Veteran from the Revolution to the Restoration*. Chapel Hill: University of North Carolina Press, 1979.
- Woodward, Rachel. "Khaki Conservation: An Examination of Military Environmentalist Discourses in the British Army." *Journal of Rural Studies* 17, no. 2 (2001): 201–17.
- . *Military Geographies*. Malden: Blackwell, 2004.
- . "Military Landscapes: Agendas and Approaches for Future Research." *Progress in Human Geography* 38, no. 1 (2014): 40–61.
- Worster, Donald. "History as Natural History: An Essay on Theory and Method." *Pacific Historical Review* 53, no. 1 (1984): 1–19.
- Woud, Auke van der. *Het lege land: De ruimtelijke orde van Nederland 1798–1848*. Amsterdam: Meulenhoff Informatief, 1987.
- Wright, Nicholas. *Knights and Peasants. The Hundred Years War in the French Countryside*. Woodbridge: Boydell, 1998.
- Wurtzel, Ellen B. "Defense, Authority, and City Limit: The Fortifications of Lille in the Late Middle Ages." *Jaarboek voor Middeleeuwse Geschiedenis* 14 (2011): 150–82.
- Yans, Maurice. *Histoire économique du duché de Limbourg sous la Maison de Bourgogne. Les forêts et les mines*. Brussels: Académie Royale de Belgique, 1938.
- Yante, Jean-Marie. "Franchises, paysages et environnement dans le comté de Chiny au 13^e siècle." In *La recherche en histoire de l'environnement: Belgique–Luxembourg–Congo–Rwanda–Burundi*, edited by Isabelle Parmentier, 133–40. Namur: Presses Universitaires de Namur, 2010.

- Yernaux, Jean. *La métallurgie liégeoise et son expansion au XVII^e siècle*. Liège: Thone, 1939.
- Zeven, A. C. et al. *De introductie van onze cultuurplanten en hun begeleiders, van het Neolithicum tot 1500 AD*. Wageningen: Vereniging voor Landbouwgeschiedenis, 1997.
- Zhang, David D. et al. "Climatic Change, Wars and Dynastic Cycles in China over the Last Millennium." *Climatic Change* 76 (2006): 459–77.
- Zinsser, Hans. *Rats, Lice and History. The Biography of a Bacillus*. London: Papermac, 1934; 1985.
- Ziolkowski, Jan M. "A Fairy Tale from before Fairy Tales: Egbert of Liège's 'De puella a lupellis seruata' and the Medieval Background of 'Little Red Riding Hood.'" *Speculum* 67, no. 3 (1992): 549–75.
- Zunckel, Julia. *Rüstungsgeschäfte im Dreissigjährigen Krieg. Unternehmerkräfte, Militärgüter und Marktstrategien im Handel zwischen Genua, Amsterdam und Hamburg*. Berlin: Duncker & Humblot, 1997.
- Zwitser, H. L. *De militie van den staat: Het leger van de Republiek der Verenigde Nederlanden*. Amsterdam: de Bataafsche Leeuw, 1991.

Digital Sources

- Archiefcollectie Rien van den Brand: <http://www.scriptoriumempeje.nl>.
- Database Généamag, Paul and Colette Magotteaux-Monier.
- Geheugen van Nederland: www.geheugenvannederland.nl.
- Hotel des invalides, Paris: www.hoteldesinvalides.org.
- Henk Beijer's Archiefcollectie: <http://www.henkbeijersarchiefcollectie.nl>.
- Melis Stoke, *Rijmkroniek van Holland*. Edited by J. W. J. Burgers: <http://resources.huygens.knaw.nl/rijmkroniek>.
- Middelnederlandsch Woordenboek*: <http://gtb.inl.nl>.
- Nicola Todorov. "La géographie des ressources forestières et les ambitions navales de Napoléon après Trafalgar: l'exemple du bois de chêne." *Revue de Géographie Historique* 5 (2014): http://rgh.univlorraine.fr/articles/view/52/La_geographie_des_ressources_forestieres_et_les_ambitions_navales_de_Napoleon_apres_Trafalgar_l_exemple_du_bois_de_chene.
- Registers van de Hollandse Grafelijkheid, 1299–1345: www.resources.huygens.knaw.nl.
- Salvatore Ciriaco. "Dessèchements et politique agricole en France au XVII^e et XVIII^e siècles." In *Eau et développement dans l'Europe moderne*. Paris: Maison des Sciences de l'Homme, 2004: <http://books.openedition.org/editionsmsmh/1334>.

INDEX

- Aa, river: 93
Aachen, city: 15, 30, 69, 77, 91, 94–95, 110, 115, 122–23, 151, 175, 189, 195, 210, 214, 216, 223
Agimont, fortress: 77
 See also Givet
agriculture: 34, 39, 41, 43, 45, 47, 56, 61–62, 72, 101, 107, 113–15, 117, 129, 131, 136–37, 144, 148, 160, 167–69, 219, 228
 and frontiers, 34, 41, 43, 45, 47, 56,
 and horse supply: 167–69
 effects of warfare on: 39, 107, 113–15, 129, 131, 136–37
 protection of: 148
 See also garden(s), grass, hedge(s), land, livestock, wilderness
Albert of Bavaria, count of Holland: 110, 216–17.
Alden Biesen, commandery: 74, 130
alder(s): 90, 232
Altena, fortress: 122, 217
Ammerzoyen, fortress: 134
Andenne, town: 32, 47
Andrist, Michael, soldier: 152–53, 223
animal(s): 1, 7, 9, 16–18, 28, 35, 44, 46, 61, 74–76, 96–97, 99–102, 105, 107, 108, 113–17, 122–31, 144, 145, 151, 153–55, 165–70, 190, 192–93, 195–96, 198, 200, 202, 204–8, 212, 214–15, 217, 223–30
 agency: 17, 100, 126–27, 144, 193, 227–28
 bodies: 123, 190, 193, 195, 198, 200, 204–6
 bones: 44, 75, 212, 215
 extinction: 99, 117, 124, 230
 in fortifications: 74–76, 97, 100, 151, 153–55, 214
 introduction(s): 16
 knowledge about: 223–25
 nuisance animals: 75, 100, 128–29
 See also bat(s), black grouse, epizootic(s), deer, dog(s), fish, fox(es), horse(s), hunt(er)/ hunting, insects, livestock, mice, owl(s), peafowl, pigeon(s), rabbit(s), raptor(s), rat(s), seal(s), species, swan(s), wolves
Antoine, duke of Brabant: 190
Antwerp, city: 39, 143
Ardennes: 11, 27–31, 34, 36, 68, 121, 124, 127, 136–37, 169–170, 179, 205, 229–30
 geographical area: 11, 27–31, 34, 36, 68, 121, 124, 127, 136–37, 205, 229–30
 département: 179
 horses: 169–70
Argenteau, fortress: 110, 175, 198
Argonne, geographical area: 11, 30–31, 124, 127, 198, 229
Arlon, city: 117, 128
arms: 47, 64–65, 138–141, 144; 147, 170–72, 219, 228–30.
 ownership: 170–72
 production: 64–65, 138–41, 144, 228, 230
 See also artillery, bow(s), forge(s), gunpowder
army, definition of: 5–7
 See also military, soldier(s)
artillery (men): 15–16, 32, 33, 38, 40, 44, 45, 49–51, 60, 61, 63, 65, 69, 74, 77–80, 83, 84, 85, 87, 89, 90, 91, 94, 96, 110, 122, 134, 140–41, 149, 151, 155, 169, 170–172, 185, 189, 198, 199–200, 203, 207 215, 229–30, 232
gun(ner)(s): 15–16, 32, 33, 35, 40, 44, 49–51, 61, 65, 69, 74, 77, 78, 80, 84, 87, 89, 91, 94, 110, 122, 140, 141, 149, 151, 155, 170–72, 185, 189, 198, 199–200, 207, 230
trebuchet(s): 60, 91
 See also gunpowder
ash, tree: 44, 90, 112
aspen: 78, 232
Aymeries, military camp: 50

- Baesweiler: 115, 176
 battle: 176
 village: 115
- Bar: 12, 15n41, 31, 70, 85, 120, 129, 130, 135, 136, 142, 148, 151, 197, 205, 207, 212
 count of: 31
 county of: 12, 15n41, 31
 duchy of: 85, 120, 129, 130, 135, 142, 148, 197, 207
 duke of: 70, 136, 151, 205, 212
See also Henry III
- Bartholomaeus Macharii, clergyman: 129
- barrack(s): 45, 136, 154, 196, 208–9, 213, 219, 220
- bastion(s): 66, 77, 78, 215
- Bastogne, government of: 116, 128, 131
- Batenburg: fortress: 33
- bat(s): 11, 59, 97
 barbastelle: 97
 geoffroy's: 97
- battle(s): 5–6, 15, 29, 33, 47, 48, 50, 84, 117, 120, 124, 128, 144, 176, 183, 195, 198, 218
 ecological effects of: 47, 117, 120, 144, 218
- beech: 62, 71, 90
- Belgium: kingdom: 3, 15, 147, 185, 194, 196
- Bergeijk, village: 35
- Beverlo, military camp: 55–56, 188, 194
- Biercée, village: 118–19, 121
- Biesme, river: 31
- Bilzen, town: 124, 127
- Binche, city: 109
- biological warfare *see* warfare
- birch(es): 90, 111
- Bleijenbeek, castle: 201
- blokhuizen*: 37, 49n104, 65–66
- bolwerk(en)* *see* bulwark(s)
- von Bonstetten, August, captain: 152–53, 219
- Bossenoven, fortress: 43
- Bouillon: 37, 84–85, 164–65, 199
 duchy: 141, 164
 duke: 164–65
 fortress: 37, 84–85, 199
 regiment: 164–65
- boulevard(s)* *see* bulwark(s)
- bow(s): 43, 50–51, 60, 65, 91, 110, 112n26, 139–40, 147, 149, 151, 170
 crossbow(s): 43, 50–51, 60, 65, 112n26, 139–40, 147, 149, 151, 170
 English: 51, 139, 147
 production: 139–40.
- Boxmeer, village: 66
- Brabant: 66, 69, 87, 110, 120, 126, 130, 161–62, 167, 168, 175, 176, 179, 190, 192, 198, 200, 205, 212, 221
 duchy of: 87, 120, 126, 130, 161–62, 167, 176, 179
 duchess of: 168, 192, 205
 duke of: 66, 69, 110, 161–62, 166, 175, 190, 192, 198, 200, 212
See also Antoine, Jan I, Jan III, Jan IV, Johanna, Wenceslaus
- Breda: 15, 16, 50, 191
 castle: 16
 city: 50
 lordship: 15, 191
- Bree, town: 62–63
- Bretel, Jacques: *trouvère*: 47
- Breust, village: 172–73
- Brialmont: 63, 86
 Henri-Alexis, engineer: 63
 forts: 86
- bridge(s): 38, 50, 65, 68, 125
 fortified: 68
See also road(s)
- Den Briel, city: 40, 84
- Brussels, city: 48, 82, 148–49, 168–69, 185
- La Buissière, fortress: 91
- bulwark(s): 49, 64, 66, 77
- burning: 35, 56, 64, 68, 72, 83, 91, 105, 113, 114, 118–19, 121–22, 124, 151, 153, 173, 185, 198–200, 223, 228
 and extortions: 83, 115
 after execution: 173
 aromatic herbs: 223
 as a defensive measure: 91
 buildings: 64, 68, 72, 105, 107, 118–19, 121–22, 124, 185, 198–200, 228
 fire prevention: 151, 155, 214
 plants: 56, 107, 108, 110, 114
- Burtscheid, town: 195
- Caesarius of Heisterbach: 122–23
- camphor: 200
- Campine, geographical area: 11, 30, 35, 39,

- 55–56, 62, 83, 126–27, 130, 135–37,
155, 158, 165, 194, 211, 225, 229
- canal(s): 39–40, 43, 54, 56, 80–81, 93, 194,
229, 232, 234
See also Canal du Nord, Fossa Eugeniana,
Meuse, water, Zuid-Willemsvaart
- Canal du Nord: 39
- Capitulary of Quierzy: 124
- Carolingian, dynasty: 23, 28, 30–31, 124, 126
- Carselis de Eupen, forester: 110, 175
- cartography: 26–27, 35–36, 42, 43, 50,
52–53, 80, 92, 112, 141, 145, 160
- castle(s): 12, 16, 23, 38, 43, 48–49, 53,
59–60, 65–67, 71, 72, 74, 84, 97, 101,
107, 110, 122n61, 131, 139, 150, 175,
190–91, 200, 201, 212, 215, 217
See also *blokhuisen*, fortification(s),
fortress(es), siege(s)
- cattle: 116, 196, 210
- Champagne, county: 12, 15n41, 22, 31,
130, 143
- charcoal: 140–41, 218
See also wood
- Charlemagne, emperor: 28, 30–31, 126,
217
- Charlemont, fortress: 77, 86, 97–99, 213,
See also Givet
- Charleroi, city: 12, 16, 34, 39, 64, 85, 109,
121, 163, 194
- Charles I Gonzague: 92
- Charles V: emperor: 48,
- Charles VII, king of France: 31
- Charles the Bold, duke of Burgundy: 26,
32–33, 73, 124, 126, 129, 156, 159
- Charleville, city: 65, 92, 140
- Chatelineau, lordship: 39
- Chauvency, fortress: 47, 207–08
- Chiers, river: 9n33, 47
- children: 6–7, 43, 123, 153, 163, 201, 204
in armed forces: 6–7, 163, 201, 204
in fortifications: 43, 153
- Chimay: 44, 76, 176
lordship of: 76
prince of: 44, 176
- Chiny, county: 12, 141, 189
- city wall(s) *see* wall(s)
- de Chauliac, Guy: 223
- chivalric romance: 28–29, 64, 196
Heinric and Margriete van Limborch: 196
- Les Quatre Fils Aymon: 28
- Roman de Perceforest: 64
- Roman de la Rose: 64
- church(es), 12, 23, 29, 61, 64, 69, 70–71,
77, 83–84, 98, 110, 121, 126, 161, 188
as fortifications: 29, 61, 64, 70–71, 77,
83–84, 98, 121
- Claes Heynenzoon *see* herald(s)
- climate: 5, 30, 71, 99, 137–38, 185, 188,
198, 228
change(s): 99, 137–38, 188, 228
Ice Ages: 99
Little Ice Age: 99, 137–38, 188
microclimate(s): 98–99
See also weather
- coal: 11, 16, 44, 95, 140–41
See also mining
- Cologne, city: 38, 91, 168, 210
- Colombier, Jean, doctor: 204, 206, 208,
210, 222–23
- Commercy, city: 15, 33, 70, 224
- conifer(s): 112
- Conscience, Hendrik, soldier: 185, 211
- coups de main: 150–51
See also guard(s)
- Couvin, town: 23–24, 111, 168, 195–96
- crusade(s): 131, 192
- Cuijk, lordship: 32, 66, 113, 140
- Cuvier, George, zoologist: 1
- daffodils: 99–100
- dam(s): 32–33, 81, 93, 94–95, 137, 225
- Danube, river: 10, 194
- Daussois, village: 148
- deer: 44, 177, 124, 128
- defence(s): 17–18, 26–27, 34–40, 42,
59–102, 109–10, 125, 145, 147, 149,
151, 153, 159, 171, 184, 188, 194, 229
system(s): 36, 67–71, 149, 151, 159
- demography: 12, 107–08, 117, 120, 135,
164
- desertion: 88, 153–54, 157–58, 162–64,
174, 179, 206, 208
- Devos, André, botanist: 98–99, 134
- Dietrich von Heinsberg, count of Loon: 166
- Dieze, river: 9n33, 93
- dike(s): 16n47, 41, 81, 83, 95, 99, 132–35,
185n12, 186–87, 225
breaching: 132–35, 185n12

- Dinant, city: 32–33, 35, 38, 51, 82, 84, 85, 93, 95, 99, 120, 143, 168–69, 170–71, 207
- Dirk van Valkenburg, knight banneret: 166n93
- disease: 5, 7, 9, 18, 116, 120, 184–226
 prevention: 9, 18, 213–26
 venereal: 193
See also epidemic(s), epizootic(s), hygiene, miasma(s), pharmacist(s), physician(s), quarantine, surgeon(s), waste
- disturbance, definition of: 105–7
See also battle(s), burning, foraging, hunt(er)/hunting, siege(s), tree(s), vine(s), water, wood
- ditch(es): 23, 38, 51, 54, 62, 65, 71–74, 80, 82, 91, 97–98, 105, 111, 197, 217–19, 227–28, 234–36
 animals and plants in: 51, 72, 97, 98, 234–36
 drainage: 54, 217–18
 as a defensive measure: 38, 62, 65, 80, 82, 227
 maintenance: 70–74, 105, 228
 as a security risk: 54, 91
- dog(s): 75, 89, 116n43, 124, 126, 127, 154, 190–91
- Dommel: river: 93–94
- Dordrecht, city: 40, 112, 135, 139, 143, 151, 175, 188, 190–92, 214, 224–25
- drift sands: 55–57, 68, 188
- Dudelange, fortress: 212
- Dumoulin, L. J. G.: pharmacist: 96–99, 232–37
- Durbuy, fortress: 60
- Dutch Republic *see* Netherlands
- Dyck, fortress: 210, 216
- ecosystem, definition of: 7–9
- Edward III, king of England: 166
- Egbert of Liège: 124
- Eifel, geographical area: 11, 30, 68
- elder: 76
- elm(s), field: 44, 78, 80, 90, 95
- Eindhoven, city: 16, 55, 61, 72, 120, 192
- Emond de Dynter, chronicler: 190–91, 198, 221–22
- Engelbert of Nassau, count: 191–92
- engineer(s): 25, 27, 32–33, 36, 41–44, 49, 63, 74, 77, 78, 80–83, 87–89, 93, 96, 99, 112, 153, 176, 185, 200, 208, 214, 229, 230
See also Brialmont, de Ferraris, Specklin, Vauban
- epidemic(s): 120, 156, 183–98, 211–14, 218, 219, 221, 222, 226, 230
 dysentery: 193, 196, 198, 211, 222
 malaria: 193–94
 plague: 193, 195n49, 196, 214, 218, scurvy: 212–13
 trachoma: 193, 195
 typhoid: 193, 212
 typhus: 193–96
See also disease, miasma(s), hygiene
- epizootic(s): 192, 193, 196
- Eustache Deschamps, poet: 30, 185, 205
- falcon(s) *see* raptor(s)
- farrier(s): 189, 224–25, 226
See also horse(s), livestock
- Fauquemont *see* Valkenburg
- fear: 124, 127, 128, 130–31, 190, 193, 197, 198, 211
 ecology of: 128
- Ferdinand of Bavaria, Bishop of Liège: 84
- de Ferraris, engineer: 27, 35, 52–53, 112, 141
- fire *see* burning
- Fish(ing): 42–44, 73, 74, 88, 89, 94, 107, 116–17, 126, 129–30, 138, 143, 144, 151, 153–55, 173, 175, 199, 210, 212, 214, 224, 225, 228
 as food: 210, 212
 by soldiers: 44, 89, 94, 107, 116–17, 154, 173, 175, 225
 cod: 210, 212
 domesticated carp: 210, 214, 228
 herring: 138, 210, 212, 228
 in fortifications: 43, 73, 74, 76, 88, 151, 153–55, 214
 poisoning: 199
 salmon: 210, 214
See also dike(s), fortification(s), ponds, water
- Flanders, county: 10, 15, 139, 159
 army of: 24, 25–26, 87, 93, 110, 116, 132–33, 134, 163, 168, 185, 195, 220

- count of: 51, 161, 212
- fodder: 113, 200, 237
- food: 29, 32, 56, 107, 114–16, 134, 162, 167, 184, 193, 197, 199, 210–13, 218, 219, 221, 225, 230
 - and social status: 116, 167, 212–13
 - supply: 29, 32, 56, 107, 114–5, 134, 197, 199, 210–13, 225
- forage/foraging: 45, 50, 113–15, 131, 134, 221–22, 225, 230
 - and health preservation: 221–22, 225
 - and plant introductions: 131, 134
 - as military training: 50, 222
 - ecological effects: 45, 113–15
 - See also* fodder, grass, horse(s)
- Forebeuvillers, village: 131
- Foreign Legion, French: 165, 174
- forest(s) *see* wood
- forester(s): 38, 39, 47, 129, 146–48, 172, 175–76, 178–80
 - See also* Carselis de Eupen, Hendrick van Boutershem, Waultrin de Fillers
- Forêt de Mormal, woodlands: 38, 41, 148
- forge(s): 64–65, 107, 137, 140–41
 - and deforestation: 137, 140–41
 - destruction of: 107, 140
 - fortified: 64–65
- fortification(s): 6–7, 11, 15–18, 22, 34, 35, 37, 44, 51, 54, 59–102, 105, 107, 109, 110–13, 120, 149–55, 158–59, 175, 194, 199, 207, 208, 213–15, 220, 223, 227–37
 - access to: 69–70, 87–89, 97, 149–55, 213–15, 207
 - definition: 61
 - destruction: 85–86, 95–96
 - maintenance: 70–76, 85, 86–90, 101–02, 105, 153–55, 158–59, 207, 214–15, 228
 - See also* animal(s), artillery, *blokhuizen*, bridge(s), castle(s), church(es), forge(s), fortress(es), garden(s), guard(s), hedge(s), labour, *Landwehr(en)*, limestone, mill(s), plants, sconce(s), siege(s), tree(s), wall(s), water, wood
- fortress(es): 12, 25, 31, 33–37, 40, 42–44, 47, 48, 60, 64–65, 68–72, 74–77, 80–86, 89–91, 93, 95, 97–99, 101–2, 109–110, 112, 115, 134–35, 139–41, 148–51, 154–55, 171, 175, 189, 198–200, 207, 210, 212–16, 221, 227, 229
 - See also* *blokhuizen*, castle(s), church(es), fortification(s), siege(s)
- Fossa Eugeniana, canal: 39
- Fosses, town: 110
- fox(es): 75, 100, 128
- France: 1, 3, 10–11, 15, 25, 27, 30–31, 34, 36–37, 39, 41, 45, 47, 49, 50, 60, 70, 82, 85, 91–92, 111, 124, 126–27, 134, 142–43, 161, 163, 164n86, 166n95, 167–69, 178, 183, 198–99, 230
 - French Empire: 34, 85, 126–27, 134, 169
 - French Republic: 1, 3, 50, 91, 124, 126–27, 169, 183, 198, 230
 - king of: 31, 36, 41, 60, 111, 161
 - kingdom of: 10, 15, 25, 27, 30–31, 36–37, 39, 41, 45, 47, 49, 70, 82, 85, 92, 111, 124, 126, 142–43, 163, 164n86, 166n95, 167–69, 178, 199
- Franchimont, fortress: 35, 44, 75
- Frank van Borselen, nobleman: 167
- Frisia: 68, 95, 161, 162n75, 167
- frontier(s): 4, 7, 17, 21–57, 60, 62, 70, 73, 85–86, 92, 121, 126, 130, 145, 146, 149, 161, 194, 212, 221, 227–30
 - definition: 21–22
 - health aspects: 221
 - perceptions of: 21–34,
 - management: 34–56, 85–86, 145
 - See also* cartography, garden(s), Hollandic Water Line, training, wilderness
- garden(s): 15–16, 24–26, 47, 48–49, 51–54, 56–57, 60, 64, 72, 73–74, 76, 78, 80, 85, 89, 92, 98–99, 129, 155, 174, 197, 223, 227, 229, 230, 232–37
 - and health preservation: 223
 - and military training: 47, 48–49, 51–54, 56–57
 - in or near fortifications: 51–54, 60, 72, 73–74, 76, 80, 89, 92, 98–99, 227, 232–37
 - perceptions of: 24–26, 47, 48–49, 56–57, 60, 64, 85, 129, 155, 227, 229, 230
- garrison(s): 1, 37, 41–45, 51, 54–55, 65, 77, 79, 82–91, 93, 95, 97, 99–100,

- 109, 116–17, 122, 125, 134, 147, 151, 152–55, 156–57, 168, 173, 175, 189, 194, 196, 199–200, 203, 208, 211, 212, 214–15, 219–220, 222, 223, 225, 233
 garrison services: 41–45
See also guard(s)
- Geer *see* Jeker
- Geertruidenberg, city: 34, 47, 94, 126, 191
- Geldern, city: 24–25, 62, 80, 87, 110, 140, 151, 189
- Gennep, fortress: 89
- Geul, river: 9n33, 81
- Gilles le Bouvier *see* herald(s)
- Givet, city: 11, 68, 77, 82, 83, 85, 97, 98, 130, 131, 138, 143, 189, 209, 211, 212–13
See also Agimont, Charlemont
- grass(lands): 11, 50, 105,
 as pasture: 45, 47–48, 56, 160, 167, 225
 damaging: 47–48, 107, 113–15
 in or near fortifications: 54, 60, 71, 72, 76, 78, 88, 92, 97, 134, 153, 232–37
See also forage/foraging
- Grave, city: 25, 33, 62, 64, 73, 76, 95, 112, 116, 122, 155, 170, 185, 192, 197, 198, 215, 221
- Gronsveld, village: 112
- guard(s)/guarding: 6, 37, 43, 51, 61, 70–71, 76, 79, 82, 87, 88, 89, 91, 98, 116, 123, 129, 130, 145–56, 168, 173, 174, 175–77, 179–80, 185, 189, 207, 208, 213, 214–15, 220–22, 227
 duty: 6, 37, 43, 51, 70–71, 149–55, 180, 185, 189, 207, 213, 214–15, 220
 house(s): 89, 98, 153, 173n124, 189
 natural resources: 88, 116, 129, 145–49, 151–55, 168, 179–80, 227
 systems: 82, 87, 152, 155
See also forester(s), fortification(s), garrison(s), military
- Guelders: 12, 30, 32, 33, 35, 37, 40, 42, 64, 69, 75, 87, 113, 115, 126, 134, 161, 162, 167, 185, 205, 221, 224
 count of: 113
 county of: 12, 32, 42
 duchy of: 30, 32, 33, 37, 69, 87, 115, 126, 134, 161, 167, 185, 205, 221, 224
 duke of: 30, 35, 40, 64, 75, 115, 162
see also Henry of Guelders, Geldern, Willem I
- Guillaume de Machaut, poet: 60
- gunpowder: 15, 74, 77–81, 84, 95, 141–42, 144, 170–71, 199–200, 220, 222–23, 228–31
 as medicine: 222–23
 effects on fortifications: 77–81, 84, 229
 production: 95, 141–42, 144, 228
 storage: 74, 220
 weapons: 15, 170–71, 199–200, 230–31
See also artillery, charcoal, coal, gun(s), wood
- Guy de Dampierre, count: 51, 161
- Hainaut: 12, 23, 25, 28, 38, 46, 48, 63, 64, 109, 125n76, 136–37, 148, 161
 count of: 109, 125n76, 161
 county of: 12, 23, 25, 28, 38, 46, 48, 63, 64, 136–37, 148
- Han-sur-Lesse, lordship: 141
- Haspengouw *see* Hesbaye
- Hautes Fagnes *see* Hohes Venn
- hawk(s) *see* raptor(s)
- hawthorn: 62, 79, 129
See also hedge(s), plant(s)
- hazel: 62, 90
- heathland(s): 11, 12, 35, 43, 49–50, 55–57, 83, 131, 137, 147, 227, 229
- hedge(s): 23, 24, 39, 54, 61–65, 79, 80, 84, 91, 98, 108, 111, 121, 125, 126, 129, 131, 154, 168, 197, 203, 227
 as fortifications: 24, 61–65, 79, 80, 84, 98, 125, 154, 227
 as refuge: 111, 197
 and abandoned lands: 129, 131
 cutting down: 39, 91, 108
See also hawthorn, *Landwehren*, plant(s), tree(s), wood
- Hellevoetsluis, port: 40, 221
- Helmich, Splinter, captain: 84
- Helmond, town: 120
- Henrick van Boutershem, forester: 147
- Henry of Guelders, Bishop of Liège: 42
- Henry III, count of Bar: 31
- Henry VI, king of England and France: 22, 31
- herald(s): 29, 140
 Herald Gelre: 29
 Herald Berry: 140
- herb(s): 59, 60, 71, 76, 98–99, 113, 129, 199, 210, 222, 225, 230

- as food: 113, 131, 210, 222, 225
- as medicine: 223, 230
- in or near fortifications: 59, 60, 71, 76, 98–99
- Herpen, village: 64, 116
- 's Hertogenbosch: 34, 37, 40, 44, 49, 61, 64, 77, 83, 87, 88, 93–95, 97, 120, 126, 129, 134, 147, 148, 152–53, 155, 156, 159, 161–62, 167, 172–73, 194, 197, 199–200, 212–13, 215, 223
- city: 34, 37, 40, 44, 49, 64, 77, 83, 87, 88, 93–95, 97, 120, 126, 129, 134, 148, 152–53, 155, 167, 194, 197, 199–200, 213, 215, 223
- high bailiff of: 61, 134, 147, 156, 159, 161–62, 172–73, 212
- Meijerij (district): 34, 126, 161–62
- Herzogenrath, fortress: 115, 130
- Hesbaye, geographical area: 11, 30, 64, 84, 124, 127, 202, 229
- Heure le Romain, village: 61–62
- Heusden, city: 25, 40, 83, 97, 155, 161, 194
- Hohes Venn, geographical area: 11, 12, 30, 121, 224, 229
- Hoffmann, Johann Leonhard, doctor: 1, 225
- Holland: 15, 24–25, 33, 41, 66, 112, 122n61, 126, 130, 134, 136, 139, 161, 167–68, 216, 217n155
- count: 66, 110, 112, 122n61, 134, 161, 216
- county: 15, 25, 33, 41, 126, 130, 136, 139, 161, 167–68, 217n155
- Garden of: 24–25, 41
- See also* Albert of Bavaria, Willem van Oostervant
- Hollandic Water Line: 41, 67, 86, 188, 194
- Holy Roman Empire: 10, 29, 30–32, 80, 179, 179n123
- Horne, county: 71
- horse(s): 28, 29, 30, 32, 56, 32–33, 39, 45, 47, 49, 56, 75, 88, 91, 93, 105, 113, 114, 115, 116, 123, 137, 146, 148n15, 154, 155, 156, 160, 161, 165–70n110, 173n123, 189–92, 196, 198, 200, 202–6, 210n122, 215–16, 224–25, 227, 230–31
- age and height: 202
- breeding: 56, 169–70
- draught: 32, 91, 137, 160, 165, 169–70n110
- gender: 204–6
- health: 115, 166, 189–92, 198, 200, 203, 206, 210n122, 216, 224–25
- stealing: 146, 148n15, 156, 161, 173n123
- trade: 166–70
- war: 165–68
- wooden: 173
- See also* farrier(s), forage/foraging, livestock, waste
- hospital(s): 1, 18, 89, 111, 183–85, 193, 196–97, 199, 212–13, 223
- van Hoven, F. J. J., doctor: 97
- hunt(er)/hunting: 4, 31, 44, 46–48, 75, 89, 108, 116–17, 123–25, 128–130, 137, 144, 153–55, 166, 170–73, 175, 177, 179, 199, 208, 212, 225
- as military training: 46–47
- ecological effects of: 44, 89, 116–17, 124, 128–29, 130, 172–73
- in or near fortifications: 153–55
- parks: 44, 48, 124, 137, 212
- unit(s): 46–47, 125, 179, 208
- hut(s): 56, 121, 188–89, 216
- See also* tent(s), weather
- Huy, city: 32, 38, 84, 85, 99, 122, 139, 150, 165, 197, 222
- city: 32, 38, 122, 139, 197, 222
- fortress: 84, 85, 99, 150, 165
- hydrography: 7–10, 33, 37–41, 80, 83, 141, 227, 229
- see also* Meuse, water
- hygiene: 18, 188, 190, 192–93
- and military discipline: 219–21
- in camps: 192, 215–19
- in fortifications: 93, 207, 213–15
- See also* disease, epidemic(s), latrine(s), waste
- hyssop: 98–99
- impoverishment: 43, 130, 135–37, 165, 195n49, 197
- insects: 11, 59, 97, 100, 128, 193–94, 198, 206, 208n113, 209, 216, 218
- butterflies and moths: 11, 59, 97, 100, 128
- fleas: 198, 209
- flies: 193, 216, 218
- lice: 193, 198, 206
- mosquitos: 193–94, 216
- See also* epidemic(s), worms

- Jacques de Hemricourt, nobleman: 65, 195, 202
 Jaer *see* Jeker
 Jan I, duke of Brabant: 29, 192
 Jan III, duke of Brabant: 166
 Jan IV, duke of Brabant: 175
 Jan Uten Campe, knight: 110
 Jan van Cuijk, knight banneret: 113
 Jan van Eyck, painter: 66–68
 Jan van Heelu *see* Jan van Helen
 Jan van Helen, chronicler: 29, 192
 Jean d'Haynin, nobleman: 63–64
 Jean de Stavelot, chronicler: 43, 61, 72, 199, 218
 Jean Froissart, chronicler: 30, 198
 Jeanne d'Arc: 31
 Jeker, river: 9n33, 82, 88, 93, 234
 John the Fearless: 64
 Johann von Luxemburg, king: 60
 Johanna, duchess: 161, 168, 192
 Joseph II, emperor: 85
 Jülich: 12, 30, 42–43, 59, 64, 69, 73, 76, 77, 115, 141, 151, 178–79n150
 city: 59, 77, 178
 county: 12,
 duchy: 30, 42, 69, 76, 115, 141, 151, 179n150
 duke: 30, 43, 64, 73
 justice *see* military

 Kempen *see* Campine
 knowledge, natural: 1–2, 89–90, 199, 203, 222–26, 231
 see also cartography, engineer(s)
 Köln *see* Cologne

 labour(ers): 1, 30, 38, 56, 66, 70–71, 76, 78, 87–89, 95, 112, 171, 175 201, 228, 230–31
 peasants as: 70–71, 171, 228
 soldiers as: 56, 87–88, 175
 See also fortification(s)
 Lafelt, battle: 218
 land: 10–11, 40, 16, 23, 35, 50–51, 54, 131, 136–37, 160, 228
 ownership: 11, 16, 23, 35, 50–51, 54, 131, 136–37, 160
 reclamation: 10, 40
 landscape(s): 1, 7–9, 11–12, 16, 17, 21–102
 definition: 7
 lordly or elite: 42–44, 60, 117, 131, 137
 militarized: 4, 22, 59, 227
 See also fortifications(s), frontier(s), garden(s), Meuse, wilderness
Landwehren: 24, 61–62, 69, 73, 151, 223
 See also hedge(s)
landweren see Landwehren
 de Langeron, general: 41
 Langstraat, geographical area: 126, 130
 latrine(s): 93, 209, 213, 215, 218–20
 See also hygiene, waste
 Lauffeld *see* Lafelt
 Laukhard, soldier: 198
 Liège: 12, 15–16, 23, 26, 29, 30, 32, 35, 39, 42–44, 59–60, 63–65, 68–70, 73–75, 77, 80, 84–86, 91, 93, 95, 107, 110–11, 116–18, 121–22, 128, 136, 137–38, 140–41, 146, 154–55n46, 157–58, 161, 164–65n86, 167–68, 171, 179, 189, 196, 198–99, 201–5, 207–8, 216, 219, 223, 229
 citadel: 80, 223
 city: 16, 29, 30, 32, 39, 59, 65, 68, 74–75, 77, 80, 86, 91, 110, 117–18, 122, 128, 136, 137–38, 140, 146, 155, 158, 168, 189, 199, 203, 204, 207
 Prince-Bishop: 39, 42, 69, 70, 107, 146, 157, 161, 201, 203, 205
 Prince-Bishopric: 12, 15, 23, 26, 35, 43, 44, 60, 63, 64, 73, 84–85, 93, 95, 111, 116, 121, 122, 140–41, 146, 154n46, 164n86, 165, 167, 168, 171, 179, 196, 198–99, 202, 208, 216, 219, 229
 province: 179
 See also Ferdinand of Bavaria, Henry of Guelders
 Liénard, Felix, naturalist: 97
 Lorraine, duchy: 9, 12, 28, 85, 120, 125, 130, 140, 142, 166, 167, 169
 Leopoldsburg, city: 12, 56
 see also Beverlo
 lichens: 59, 96–97, 225
 Limbourg, city: 128
 Limburg: 12, 26, 32, 35, 73, 110, 160, 168, 175
 duchy: 12, 26, 35, 73, 110, 160, 175
 duke: 168

- provinces: 32
See also Limbourg
- lime, mineral: 76
- lime tree *see* linden
- limestone: 1, 11, 68, 99
- linden: 78, 80, 95
- livestock: 35, 49, 74, 88, 93, 107–8, 111,
 114–16, 126, 144, 151, 153–55,
 173n123, 196
 decline: 116, 196
 raiding: 49, 107–8, 115–16
 in and near fortifications: 74, 88, 93,
 151, 153–55
See also cattle, epizootics, food, horse(s),
 pig(s), sheep
- Lobberich, village: 156
- Locquignol, fortress: 148
- Lomprenz, fortress: 71–72
- Longwy, city: 34, 72, 77, 83, 93, 115, 151
- Loon: 12, 32, 35, 65, 107, 129, 166, 173
 count: 35, 65, 107, 166
 county: 12, 32, 35, 65, 129, 173
See also Dietrich von Heinsberg
- lordship(s): 15, 16, 35, 42–44, 60, 69, 76,
 108, 110, 116, 137, 141, 147, 165,
 172, 212
See also castle(s), fortress(es), hunt(er)/
 hunting
- Lothair I, emperor: 31, 33
- Louis XIV, king of France: 33, 36, 110
- Luxembourg *see* Luxembourg
- Luxemburg: 12, 15, 26–27, 30, 32, 60, 71,
 76, 116, 117, 126, 130, 141, 147, 196,
 212
 city: 26–27, 76
 count: 60
 county: 12, 32, 60
 duchy: 30, 71, 116, 117, 130, 141, 196, 212
 grand duchy: 15, 126, 147
See also Johann von Luxemburg,
 Wencelaus
- Maas *see* Meuse
- Maasdiel, village: 134
- Maaseik, city: 32–33, 42, 68, 71, 76, 85,
 128, 177, 213, 215, 220
- Maastricht, city: 1–2, 11, 32–33, 38, 40, 44,
 47, 54–55, 59, 61, 65, 68–69, 72–73,
 74, 75, 76, 77, 81, 82, 83, 85, 86, 87,
 88, 90, 93, 95, 97–101, 108, 112, 114,
 122, 125, 129, 130, 136, 138, 139,
 149, 153, 156, 167, 172–73, 178, 196,
 201, 202, 204, 213, 218–19, 222–23,
 232–37
- von Mansfeld, Peter Ernst: 134
- von Mansfeld, Ernst: 196
- manure: 45, 56, 78, 93, 193, 209, 214, 219,
 230
See also waste
- Marche-en-Famenne, geographical area: 34
- Mariembourg, town: 34, 78, 85, 86, 150
- Mariemont, hunting park: 48–49
- Marquant, soldier: 198, 222
- Maubeuge, city: 81, 83, 91, 121
- Maze, admiralty: 40, 221
- Meerssen *see* Treaty of Meerssen
- Mengels, Winand: farmer: 196, 218
- Meuse, region: 3, 7–15
 geography: 8–12
- Meuse, river: 1, 3, 7–14n33, 16–17, 22–23,
 27, 29–40, 42, 45, 51, 65–66, 68, 72,
 82–83, 85, 89, 90, 92n134, 93, 95,
 96, 105, 112, 113, 126, 130, 132–34,
 137–39, 140–41, 143, 147, 154–55,
 161, 168, 171, 177, 185–88, 192, 194,
 199, 209, 212–13, 216–17, 219, 224,
 227–29, 231, 234
 as a frontier: 10, 13–14, 22–23, 30–32, 35,
 as a transportation route: 32–34, 38–40,
 65–66, 68, 112, 137, 138–39, 141,
 143, 161, 229
 fishing in the: 130, 154, 177, 199
 flooding of the: 33, 37, 68, 72, 82–83, 95,
 132–34, 141, 155, 229
 fords in the: 36–38, 229
 freezing of the: 37, 186–88
 silting up of the: 40
 swimming in the: 37, 219
 tributaries: 8–9n33
See also Aa, canal(s), Chiers, Dieze,
 Dommel, Geul, Jeker, Ourthe, Rur,
 Sambre, Semois,
- Meuse, *département*: 83, 124, 154, 179
- Mézières, city: 17, 32, 36, 83, 89, 92, 96, 163
- miasma(s): 184, 194, 200, 212, 218, 223
 theory: 184
See also disease, epidemic(s), hygiene
- mice: 76, 89, 128, 208

- Middelelaar, fortress: 140, 212
 migration: 120, 122, 131, 135, 138, 155–170, 171, 198
See also desertion, disease, passport(s), service, soldier(s)
 military: 4, 6–7, 17, 22, 45–57, 55–57, 72–73, 76–102, 151–55, 157, 160–65, 168, 170–74, 178–180, 201–9, 220–21, 230
 control over fortifications: 72–73, 76–102, 151–55
 definition: 6–7
 domain(s): 4, 17, 22, 55–57, 230
 identity: 168, 204–9
 justice: 172–74, 206–7, 220–21
 police: 157, 178–180
 recruitment: 160–65, 170–72, 201–4
 training: 45–57
See also engineer(s), fortification(s), guard(s), labour, landscape(s), service, soldier(s)
 mill(s): 64–65, 74, 93, 95, 121, 135, 163, 175, 214
 and water management: 74, 93, 95, 214
 attacks on: 64, 121
 fortified: 64–65
 mining/miners: 79–82, 83, 87, 95, 97, 100, 227, 229
See also coal, siege(s)
 minstrels: 29
 moat(s) *see* ditch(es)
 Mons, city: 72, 76, 97, 140, 218
 Montaigle, fortress: 93
 Montfort, lordship: 42–44, 76, 147, 189
 Montmédy, town: 34, 47, 89, 98, 99, 208
 mosasaur, genus: 1–3, 225, 227
 moss: 59, 89, 96, 188
 La Mothe: 95, 135, 148, 171
 city: 95, 135, 148
 district: 171
 Mouzon: 9n33, 36
 town: 36
 river: 9n33
 Namur: 12, 32–33, 35, 37–38, 44, 51–54, 59, 73–74, 77, 81, 83, 85–89, 90, 97, 99, 110–11, 114–15, 121, 123–25n76, 128, 130, 134, 136, 140–41, 143, 146, 148, 152, 154–55, 157, 160–61, 166, 173, 174, 185, 190–91, 195, 196–97, 199, 200, 205, 207–9, 212, 214–15, 217, 219–20, 222, 223, 225
 castle: 38, 54, 74, 97, 99, 134, 141, 190–91,
 city: 32–33, 51–54, 59, 73–74, 77, 81, 83, 85–89, 90, 110, 123–24, 128, 136, 143, 148, 152, 154, 157, 173, 174, 185, 195, 197, 199, 200, 207–9, 212, 214–15, 217, 219–20, 222, 225
 county: 12, 32, 35, 37, 44, 111, 114, 115, 121, 125n76, 130, 140, 141, 146, 154–55, 160, 161, 166, 196, 205, 223
 margrave: 51, 161
 Napoleon I, emperor: 34, 55, 140, 143, 169, 178–79n151, 193, 202, 211, 222
 von Natzmer, officer: 133, 188–89, 222
 Navagne, fort: 33
 Nederhemert, fortress: 40
 Netherlands: 1, 3, 10, 14–15, 26–27, 34–36, 39–41, 47–48, 55, 61, 82, 85, 95, 110, 117, 134, 137, 140, 143, 163–64n86, 167–68, 173, 176, 179n151, 188, 195–96, 199, 217, 224
 Burgundian: 15, 26–27, 95, 167–68, 217
 geographical area: 10, 27, 39, 47, 61, 117, 134, 143, 167, 224
 Habsburg: 1, 14, 35, 39, 48, 82, 85, 110, 143, 163–64n86, 168, 173, 179n151, 196, 199
 kingdom: 3, 15, 55, 85, 134, 176, 195
 republic: 14–15, 34, 36, 40, 41, 82, 85, 117, 137, 140, 168, 176, 188
 nettle(s): 76, 100, 214, 223
 Neufchâteau (Luxemburg): 30
 Neufchâteau (Lorraine): 148
 Nijmegen, city: 66, 101, 147
 oak(s): 44, 62, 71, 78, 90, 109, 112, 121, 141, 148, 173, 189
 Oosterhout, military camp: 50
 Opoeteren, village: 116, 197
 orchard(s): 60, 74, 108, 110–11
 Othée, battle: 218
 Outre-Meuse: 68, 110, 160, 168
 lands of: 110, 160, 168
 city of Liège: 68
 Ourthe, river: 9n33, 60, 141

- Paré, Ambroise, surgeon: 218
 park(s): 44, 48, 59, 74, 87, 101, 117, 124, 137, 145,
 passport(s): 149, 153, 155–57, 160, 168, 230
 Peel, geographical area: 8, 11, 30
 Petrus Treckpoel, chronicler: 124, 127, 129, 189
 pharmacist(s): 97, 184
 See also surgeon(s), physician(s)
 Philip of Swabia, king: 123
 Philip the Bold, duke: 168
 Philip the Fair, king: 31
 Philip II, king: 48
 Philippeville, town: 34, 78, 81, 85, 86, 107, 148, 163
 physician(s): 184, 208, 216, 222, 226
 See also Colombier, surgeon(s), pharmacist(s)
 Pietersheim: 16, 69
 castle: 16
 lordship: 69
 See also Rekem
 pig(s): 24–26, 86, 109, 115, 130, 210
 pigeon(s): 75–76, 171–72, 174
 plant(s): 7, 9, 15–18, 24–25, 41, 44–45, 56, 59, 61–64, 71–74, 76, 78–80, 87, 89–90, 95–99, 101–2, 107–15, 129, 131, 134, 140–42, 145, 148, 154, 174, 198, 214, 222–29, 231–37
 agency: 17, 71, 99, 228
 archaeophytes: 16, 98, 232–35
 in/as fortifications: 17–18, 24, 45, 59, 61–64, 71–74, 76, 78–80, 87, 89–90, 95–99, 101–2, 231–37
 damaging: 72, 76, 87, 96, 107–15, 140–42
 introduction(s): 16, 98, 131, 134
 knowledge about: 89–90, 96–97, 222–26
 neophytes: 16, 234–37
 protecting: 41, 44, 89, 148, 154, 174, 229
 ruderal: 101, 214
 thorns: 25, 62–64, 76, 79, 129, 228
 See also agriculture, forage, garden(s), grass, hawthorn, hedge(s), herb(s), hyssop, lichens, moss, nettle(s), species, thistle(s), tobacco, tree(s), vine(s), wilderness, wood, yew
 Poilvache, fortress: 32, 68
 poison *see* warfare: biological
 police: 7, 146, 153, 157, 175–77, 179–80
 pollution *see* water
 pond(s): 12, 42–43, 60, 71, 107, 117, 129, 131, 137, 154, 173, 214–15
 poplar(s): 78, 90, 111
 prison(s)/prisoner(s): 30, 48, 61, 64, 69, 74, 85, 150, 161, 168, 174, 176, 191–92, 207–8
 protection *see* forester(s), guard(s)
 Prussia, kingdom: 15, 179, 180
 Punishment(s) *see* military: justice
 de Puységur, marshall: 113
 quarantine: 220–21
 See also disease
 rabbit(s): 16, 74–75, 117, 131, 171, 174
 raptor(s): 46, 75, 116n43, 128
 lanner falcons: 148
 See also hunt(er)/hunting
 rat(s): 76, 104–5, 128, 208
 redoubt(s) *see* sconce(s)
 Reifferscheid, fortress: 91, 216
 Rekem, lordship: 69, 112, 172–73, 178
 resilience: 99, 105, 108–9, 111–15, 120–22, 135–37, 188, 228
 Rethel: 12, 15n41, 22, 92, 121
 county: 12, 15n41, 22, 92
 government: 121
 Reydt, fortress: 189
 Rhine, river: 10, 29, 36, 39, 83, 134, 143, 168, 192, 194
 Rhône, river: 31
 Rijckholt, lordship: 108–9, 172
 road(s): 27, 30, 37–41, 47, 55, 65, 70, 168, 175, 178, 203, 218, 234
 See also bridge(s), canal(s), transport
 Rocroi, city: 34, 37, 43, 45, 121, 209, 215
 Roer, *département*: 169, 179
 river *see* Rur
 Roermond, city: 65, 84, 122, 125, 147–48, 156, 201, 207, 222
 Rotterdam, city: 3, 40, 49, 74, 159, 163, 167, 214
 Rouen, city: 143
 Rudolf of Habsburg, emperor: 31
 Rur, river: 9 (33)
 safeguards: 148–49
 Saint-Elizabeth's flood: 135

- Saint-Mihiel, city: 36, 95
 Saint-Trond, abbey of: 216
 salpeter *see* gunpowder
 Sambre, river: 9n33, 38, 40n72, 45, 50, 64, 96, 141, 154, 166, 171, 199, 219
 Sampigny, fortress: 90–91
 Saône, river: 31
 Sautour, village: 107, 211
schans see sconce(s)
 settlement(s): 10–12, 23, 33–34, 38, 62, 69, 77, 83, 85, 90, 107, 120–21, 126, 134–35, 156, 164, 203, 213, 228–29
 abandoned: 121, 135, 228
 near frontiers: 34, 83, 120–21, 229
 Scheldt, river: 10, 31, 39, 62, 137, 166
 sconce(s): 66, 83, 116, 155, 197, 224, 229
 seal(s): 129, 212n131, 224
 hooded seal: 224
 Sedan, city: 33, 36–37, 39, 82–83, 93, 98, 143, 175, 213, 214, 219, 225
 Semois, river: 9n33, 36–37
 service: 6–7, 12, 16, 69, 82, 117, 125, 145, 147, 158–65, 161, 167, 171–72, 174–80, 189–92, 200–204, 219–20, 229
 foreign military: 160–65, 174, 177, 189, 219, 220
 military: 6–7, 12, 16, 69, 82, 125, 147, 160–65, 167, 171–72, 174–80, 190–92, 200–204, 219, 229
 rewards for: 161, 175–80
 sheep: 88, 97, 101, 107, 115, 116, 131, 148, 154, 196, 210, 228
 ship(s): 15, 16, 33, 40, 134, 139, 142–43, 158–59, 176, 183, 185, 192, 221, 228, 230
 baardse(n): 33
 building: 142–44, 176, 228
 cog(s): 33, 185
 galley(s): 158–59
 warship(s): 15, 16, 40, 134, 142–43, 185
 See also transport
 shoe(s): 39, 175, 189, 216, 225
 Sibret, village: 196
 sickness *see* disease
 siege(s): 1–2, 5–6, 18, 29, 32, 38, 50, 60–61, 64–65, 66, 77, 81, 83, 85, 90–96, 109–10, 112, 122n61, 129, 134–35, 137–38, 140, 150, 163, 165, 166, 178, 185, 189, 190–92, 195n49, 197–200, 202, 210, 212, 215–17, 219, 221–22, 226, 228, 234–35
 ecological effects: 90–96, 109–10, 112, 122, 129, 134–35, 192, 195n49, 197–200, 228, 234–35
 equipment: 32, 60–61, 83, 85, 90–91, 110, 112, 122n61, 150, 198–200
 See also artillery, coups de main, fortification(s)
 Sint-Pietersberg, hill: 1–2, 11, 114, 234–35
 Sint-Truiden *see* Saint-Trond
 sluice(s): 41, 81–82, 137
 soldier(s): 1, 2, 4, 6, 12, 17, 18, 28, 30, 34, 37, 39, 43–45, 48–51, 54, 56, 64, 70, 82–89, 94, 108–11, 113, 116–17, 122, 125, 130, 134, 137, 142, 145–65, 167–68, 170–80, 184–91, 193–215, 217–27, 229–30
 age: 201–2
 as guards: 148–55, 168, 214–15, 220–21
 as labourers: 34, 39, 43, 50, 54, 56, 82, 87–88, 108–9, 111, 142, 225
 as migrants: 28, 155–65
 background: 201, 203–4, 225
 definition: 6
 height: 201–3
 social status: 167, 175–78, 206–7, 212–13, 225
 See also guard(s), military, service
 Souilly, lordship: 117, 212
 species: 1–2, 4, 7, 11–12, 15–16, 18, 55–57, 59, 75–76, 78, 90, 96–102, 105, 117, 122, 124, 127–29, 131, 134, 138, 139, 144, 148, 184, 223–24, 227–37
 extinction of: 1–2, 117, 124, 139
 introduction of new: 15–16, 98, 131, 134
 unknown: 1–2, 223–24
 See also animal(s), plant(s)
 Specklin, Daniel, engineer: 63
 Stavelot-Malmédy, principality: 15
 Stenay, town: 36
 Stevensweert, fort: 33, 34
 Stokkem, town: 32, 34, 37, 84–86, 116, 197
 succession, ecological: 71, 228
 surgeon(s): 18, 184, 192, 199, 216, 222–23, 226
 See also Chauliac, Paré, physicians, pharmacists
 swan(s): 75, 116

- tent(s): 188, 216–18
See also hut(s), weather
- territory: 22, 24–26, 32, 34–36, 48, 69–70, 85, 113, 115, 151, 160–61
- de Terwel, Jean Ernest, lieutenant-colonel: 121, 136
- Teunisse, Jan, *schutter*: 211, 225
- Theux, village: 35
- thistle(s): 100, 129, 214
- Tilburg, town: 196
- tobacco: 16, 223
- tolls *see* Meuse
- Tongres/Tongerren, city: 70, 73, 77, 93, 95, 111, 122, 129, 160, 168, 173, 185, 194, 197, 203
- Toul, Prince-Bishopric: 12
- Toulon, city: 143
- training, military: 17, 22, 45–57, 113, 219, 222, 227–29
 camps: 49–50, 54–56, 222
 conflicts about: 47, 51, 54
 target practice: 46, 49–51, 55
 tournaments: 47–49
See also Beverlo, frontier(s), gardens, hunt(er)/hunting, wilderness
- transport: 6–7, 10–11, 16, 27, 30, 32–33, 37–40, 54, 68, 80, 90–91, 110, 112, 131, 137–41, 143, 156, 160–61, 171, 191, 195, 198, 210–11, 213, 230
 boats: 32–33, 37, 137–139, 161
 wagons: 6, 30, 32, 38, 54, 90–91, 110, 112, 160, 171, 198, 210–11, 222
- Treaty of Verdun: 31
- trebuchet(s) *see* artillery
- tree(s): 3, 12, 23, 38, 44–45, 51, 54, 56, 59, 62, 72, 76, 78–80, 87, 89–91, 95–98, 101, 106–13, 121, 129–131, 137, 139, 141–43, 148, 154, 173–74, 176, 200, 232–33
 coppicing: 45, 90, 98, 109–10, 112, 129–30, 141–2, 173, 200, 232–33
 cutting down: 12, 38, 72, 76, 87, 91, 96, 106–13, 129, 137, 141–43, 148, 154, 173–74, 176
 in and near fortification(s): 51, 59, 62, 72, 76, 78–80, 87, 89–91, 95–96, 97, 98, 101, 154
 nut: 72, 78, 90, 173
 planting: 44, 56, 78–80, 89–90, 95
- pollarding: 54, 109–10, 142
See also alder(s), ash, aspen, beech, birch(es), conifer(s), elder, elm(s), forester(s), hedge(s), linden, oak(s), orchard(s), poplar(s), plant(s), walnut, wood, yew
- Utrecht: 68, 84, 112, 167, 185
 city: 68, 84, 112, 185
 province: 68, 167
- Valkenburg, town: 44, 68, 81, 85, 93, 161, 166n93, 203
 fortress: 68, 85, 93
 lord: 161, 166n93
 lordship: 44
 town: 44, 81, 203
See also Dirk van Valkenburg
- de Vauban, Sébastien le Prestre de, engineer: 25, 36, 42, 63, 67, 77, 88–89, 185, 200, 208–9, 215
- Vaux-la-Grande, village: 70
- Vegetus, writer: 192–93, 200–203, 216
- Venlo, city: 24–25, 33, 61–62, 72, 83–84, 86, 112, 131, 149–50, 175, 215
- Verdun: 10, 12, 63, 77, 81, 82, 83, 85, 89, 90, 97–98, 115, 117, 125, 131, 135, 142, 144, 212, 216
 citadel: 97–98
 city: 10, 63, 77, 81, 82, 83, 85, 89, 90, 115, 117, 125, 142, 144, 212, 216
 Prince-Bishopric: 12, 131, 135
 Treaty of Verdun: 31
- vermin *see* worms
- vine(s): 51, 72, 105, 107–8, 110, 137–38, 228
 damaging: 105, 107–8, 110, 138
 in or near fortifications: 51, 72, 138
- Virton, village: 30, 212
- Visé, town: 33, 110, 146
- wagon(s) *see* transport
- wall(s): 12, 38, 49, 51, 54, 59, 62–64, 68–69, 71–74, 76–81, 84–89, 93, 95, 97–99, 101, 105, 110–11, 125, 149, 150, 207, 209, 213–15, 220, 227–28, 232–35

- city: 12, 38, 49, 51, 54, 62–63, 68–69, 72–74, 76–81, 84, 86–89, 93, 95, 97–98, 101, 111, 125, 149, 153–54, 207, 209, 213–15, 220, 232–33
- destruction: 64, 85, 95
- conservation: 59, 71–74, 76, 88–89, 105, 207, 228
- ecology: 98–99, 101
- walnut, common: 72, 78
- warfare: 3–6, 16–18, 21–22, 29, 45–46, 59–62, 72–74, 82, 87, 90–96, 106–38, 144, 147, 150, 160–61, 165–66, 170, 178, 183, 192, 195n49, 196–200, 206, 226, 228, 230–31
- biological: 198–200
- ecological effects of: 3–5, 72–73, 90–96, 106–38, 183, 195–97, 228, 230
- See also* battle(s), siege(s), wilderness, wolves
- Warnier de Dave, knight: 161
- warships *see* ship(s)
- waste: 72, 74–76, 78, 88, 93, 197, 213–15, 218–19
- See also* disease, hygiene, latrine(s), manure
- water(course)s: 9–10, 24, 27, 32–33, 41, 43, 39–41, 50, 56, 64–65, 71–72, 74, 78, 80–83, 87, 93–95, 97–98, 134–35, 168, 176, 185, 188, 194, 197–99, 208, 211, 214–16, 218, 222, 228–30, 234–37
- draining/diverting: 41, 43, 80, 93–95, 217–18
- drinking: 50, 211, 215–16, 222, 229
- inundations: 41, 81–82, 93–95, 188, 194
- pollution: 72, 93, 198–99, 214–15
- supply: 50, 56, 64–65, 81, 199, 229
- See also* canal(s), climate, dam(s), dike(s), ditch(es), fish(ing), fortification(s), Meuse, mill(s), pond(s), Saint-Elizabeth's flood, sluice(s), transport, warfare, weather
- Waultrin de Fillers, forester: 93
- weather: 5, 9, 30, 37, 50, 56, 64, 71, 98, 105, 114, 120, 134, 159, 185–89, 197–98, 200–201, 206, 215, 218, 228–29
- dust clouds: 185, 188
- freezing: 37, 134, 185–88, 197
- protection against: 188–89
- rain(s): 9, 30, 50, 185, 198, 206, 215, 218, 229
- storm(s): 105, 188
- wind: 56, 64, 98, 185, 200
- See also* climate, hut(s), Meuse, tent(s), water
- weeds *see* plants: ruderal
- well(s): 50, 56, 81, 93, 215, 219
- Wenceslaus, duke of Brabant: 110
- von Werth, Johann, general: 84, 196, 198
- Wijck *see* Maastricht
- wilderness: 21–30, 34, 36–38, 40–43, 47, 49, 54–57, 61–62, 111, 114, 122–35, 194, 197, 227–31
- and military training: 22, 47, 49, 54–57, 194, 227
- as defence: 26, 29–30, 34, 36–38, 40–43, 62, 227
- as refuge: 57, 61, 111, 114, 197
- perceptions of: 21–30, 34, 40–41, 64, 122, 127, 129, 229–31
- spread of: 25, 122–35, 228–29
- Willem I, duke of Guelders: 64
- Willem IV van Egmont, nobleman: 115
- Willem van Oostervant: 25, 110
- Willemstad, town: 34, 40
- willow(s): 62–63, 73, 78, 90, 95, 110, 112, 173
- Woëvre, geographical area: 11–12, 30, 166
- wolves: 4, 44, 46, 75, 105, 122–28, 130, 144, 228, 230
- attacks on humans: 122–24, 127–28
- connection to warfare: 122–128, 130, 144, 228, 230
- hunting: 44, 46, 125–27
- perceptions of: 105, 122–25, 130
- werewolves: 128
- See also* animals, hunt(er)/hunting, wilderness
- women: 7, 108–9, 154, 158–59, 163, 190, 197, 199, 201, 220, 221, 225
- and disease prevention: 220, 225
- in armed forces: 7, 108–9, 154, 158–59, 163, 190, 201, 220, 221, 225
- wood(lands): 11, 16, 23–24, 26–27, 32, 37–38, 44–47, 56, 60–62, 64–65, 70–71, 73, 79–81, 87, 90–91, 93,

- 97-98, 101-2, 108-13, 121, 125,
127-31, 136-47, 154-55, 160,
171-75, 178-80, 188, 197, 211, 225,
228, 230, 232-33
 - as construction material: 11, 16, 27, 38,
62, 65, 79-81, 87, 109-13, 121, 188,
228, 230
 - as fuel: 27, 44, 71, 108-10, 140-42, 173,
228, 230
 - coppice: 45, 90, 98, 109, 130, 141-2,
173, 232-33
 - cutting: 37, 73, 108-13, 130, 136-45,
155, 172-74, 178, 180, 211, 225
 - protection of: 41-45, 130, 137, 145,
147-49, 179-80, 227, 229
 - transporting: 11, 32, 70, 112-13, 141, 143
 - resurgence of: 71, 101, 128-31
 - See also* charcoal, forester(s), hedge(s),
plant(s), tree(s)
 - worms: 89, 207, 208n113
- yew: 139
- Yves, village: 148
- Zuid-Willemsvaart, canal: 39-40

