# Mapping Useful Trees and Shrubs under Threat in Somaliland


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# List of Abbreviations

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| CEEH | Candlelight for Environment, Education and Health |
| IUCN | International Union for Conservation of Nature |
| MoE&RD | Ministry of Environment and Rural Development |
| WHH | Welthungerhilfe |

Jamhuuriyadda Somaliland
Wasaaradda Deegaanka
& Horumarinta Reer Miyiga

Republic of Somaliland
Ministry of Environment
& Rural Development

Minister

*Mapping Trees and Shrubs under Threat in Somaliland*

The Ministry of Environment and Rural Development (MoE&RD) lauds Wilthungerhilfe (WHH) and Candlelight for Environment, Education & Health (CEEH), for commissioning this study – *Mapping Trees and Shrubs under Threat in Somaliland.* The study reveals the continuing decline of plant diversity in the wake of the ongoing environmental degradation in the country, chiefly caused by a combination of factors such as overgrazing, over-exploitation, land-use change, and climate change.

If a tree species is lost, it is not only its physical presence that is missed, but also its ecological benefits, socio-economic and rich cultural use will be gone forever. Such decline in plant diversity would have a far-reaching negative impact on ecosystem productivity and people's quality of life.

The study lists a number of important recommendations which will serve as a blueprint for action aimed at saving the threatened species from disappearance. The Ministry, therefore, gives the outcome of the study high consideration in a manner to integrate the revival of those useful trees and shrubs into its activities using its network of nurseries in the country. Besides other conservation measures, the Ministry also encourages the use of some of the listed species that are threatened in the wild to be planted in parks and within urban centers for shade, fruit and amenity.

Sincerely,

Shukri H. Ismail Mohamoud(Bandare)
Minister of Environment & Rural Development

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# Acknowledgement

I would like to thank the many individuals, community groups and institutions that made their contributions to the study. First and foremost, special thanks go to Abdikani Suleiman Mohamed from Candlelight, who accompanied me in our many trips to the different ecological zones and for capturing field data in the questionnaires. His thorough knowledge of plants in the study area was useful.

The study has also benefited significantly from the comments by Candlelight and Welthungerhilfe (WHH) staff. I would like to thank the logistics and finance departments of Candlelight for their excellent and timely arrangement of transport and resources needed for carrying out the assignment. Also, special thanks go to our driver, Abdi Haibe, for his skill, patience, and thorough knowledge of the countryside roads.

Ahmed Ibrahim Awale

# Executive Summary

Trees are vital to the health of our planet with its abundant and diverse forms of life. The holistic health of our planet would not have been possible without diverse plant communities. Among the myriad benefits they create, they give us oxygen, sequester carbon, and give life to the world's wildlife. They provide shelter for people, animals and other plants and nutrients for a variety of organisms upon decomposition. They are a source of medicine, fuel wood, charcoal and coal. They slow down and reduce runoff and help water infiltrate into the ground.

The lives of the Somali people and the existence of trees are intertwined. In addition to providing raw materials for shelter, household goods, hand tools, food, medicine and browse for livestock, trees also offer a space conducive for community meetings, namely socio-cultural and religious functions.

However, following environmental degradation and overuse, there is a growing concern among local experts and many international observers about the decline of many species in Somaliland. Major causes of decline in plant diversity include deforestation, over-grazing, land-degradation, habitat loss and fragmentation, climate change and invasive species. Limited awareness of the importance of trees and their role in supporting community livelihoods is a challenge to any restoration effort.

This study aims to investigate the trees and shrubs that have been in decline over the past several decades compared to earlier times. Special emphasis is given to some of the plants which the communities visited attach particular importance to on account of the multifarious uses they offer, but are declining in number.

The study lists 23 plants (19 trees and 4 shrubs) shortlisted for their rare occurrences in comparison to previous times. It also attempts to capture their uses, namely socioeconomic, cultural, religious, and medicinal.

The following recommendations are made in response to the findings of the study:

- Overall, there is a need to carry out a wider study on the state of the vegetation dynamics in terms of their temporal and spatial patterns of disturbance and how these situations affect biodiversity. Such a study should contain recommendations for restoration and conservation which may include plans for the restoration of vegetation using grazing reserves and territorial protected areas covering the various ecosystems and vegetation zones of the country. Establishment of protected areas should be aligned with centres for plant diversity – that areas likely to

host high number of irreplaceable plants.

- As protection from grazing and charcoal production (among other uses) leads to a short-term decline in income, alternative income measures need to be introduced to bridge the gap until protected areas are more productive. During past years, cash-for-work to erect soil and water conservation structures and beekeeping within protected sites have shown very positive results in terms of community-based protection and recovery.
- Establishment of ex situ conservation centres for threatened species. Specialized nurseries for endangered species can be housed within universities and Ministry of Environment and Rural Development (MoE&RD) nurseries.
- Establishment of botanic gardens and arboretums. These are ideal places for plant conservation as they serve as ex situ conservation sites for species threatened in the wild.
- Domestication as tool for conservation: Some of the threatened trees and shrubs can be used as amenity plants in cities and parks and in front of restaurants and shops for shade and beauty.
- Increase community awareness of the importance of tree conservation and overall environmental restorative measures.
- Develop compensatory action to support communities who are willing to take rangeland out of grazing and charcoal production and train communities in sustainable extraction measures that do not harm valuable trees and shrubs.
- Further promote control by economic use of the most dangerous invasive species such as *Prosopis juliflora* and *Parthenium hysterophorus* that are competing with endangered plants.
- Bringing the issue of endangered species to classes as extracurricular content will encourage children and youth to espouse environmentally friendly practices and support and lead conservation programmes in their settlements.
- Introducing the issue of endangered species, invasive species and feasible, economically sustainable countermeasures into curricula of universities in fields such as environmental, agricultural, land-use planning and veterinary studies.

# 1. Introduction

## 1.1. Background

The flora of the north-eastern region of Africa is renowned for its rich diversity. The region, particularly the Somali xeric eco-region, is characterized by a high degree of endemism, containing plants that are adapted to desert environments. The flora of the Somali region, apart from its proximity to the rest of Africa, also contains species linking it to that of the Arabian Peninsula and the eastern Mediterranean, and more distantly with the Canary Islands and Madagascar.[1] Of the 3,000+ vascular species recorded in Somalia, about 800 (25.5%) are endemic to the region.[2]

Since time immemorial, the socioeconomic, cultural and wellbeing of the Somali people has been intertwined with and dependant on ecosystem services. There was a time when they derived almost all their needs from the local environment - be it shelter, clothing, sustenance, traditional medicine, etc. This rich, centuries-old indigenous knowledge has enabled them to better adapt to the harsh environment and sustain their pastoral lifestyle. The vernacular names of myriad plants are encyclopaedic and indicate their structure, shape, toxicity, palatability, and their multifarious uses.

The role of trees in sustaining ecological balance and maintaining the livelihoods of communities is well documented, more so in tropical arid and semi-arid areas where pastoralism and agropastoralism is the predominant mode of livelihood. Some of the major functions of trees include soil stabilization, erosion control, and assisting water infiltration into the soil and many other ecological services such as regulating climate. Trees and shrubs are also a source of wood and other products such as tannin, fiber, dyes, and - indirectly - honey. In addition, many valuable foodstuffs such as fruits, leaves and roots are sourced from them. They also serve as a source of feed and forage for livestock and wildlife.

Trees are very important in enriching the soil in arid and semi-arid zones, which are often characterized by poor soil fertility. Rather than resorting to the application of mineral fertilizers, the problem can be solved through the systemic use of soil-improving species. This is not only cheaper, but at the same time is beneficial to the health of the soil and the ecosystems.

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[1] Bally P.R.O. & Melville, R., Report on the Vegetation of the Somali Democratic Republic with Recommendations for its Restoration and Conservation. (1972), p.9

[2] Thulin, M, (Ed.). Flora of Somalia, vol 3. Trustees of the Royal Botanic Gardens, Kew Richmond, Surrey, UK. 2006.

Somaliland communities, both in rural and urban areas, as in most other places, rely on biological resources. However, over the past several decades, there has been a marked decline in the abundance of many useful species. Limited regeneration, near absence of new recruits and over-utilization of some species could lead to their eventual disappearance, unless conservation measures are adopted.

Following many decades of environmental degradation and overuse, there is a growing concern among local experts and many international observers about the decline of many species.

The major drivers of species extinction are deforestation, land-use changes, over-exploitation, habitat loss, recurring drought, climate change, and invasive species. Limited awareness of the benefits of trees and their role in sustaining community livelihoods can also be a challenge to restoration efforts.

### 1.2. Somaliland

Somaliland, formerly a British Protectorate, gained its independence in 26 June 1960 and merged with the former Italian Somaliland on 1 July 1960 to form the Republic of Somalia. On 18 May 1991, following years of civil war and the collapse of the Central Government, Somaliland seceded from the Union, reasserting its independence. Somaliland has since been democratic, peaceful, stable, with a functioning national government, but remains unrecognized as a separate entity from Somalia in the international arena.

### 1.3. Climate

Somaliland's climate is characterized as hot and dry, with uneven high variability in rainfall, and with frequent and severe droughts. The main weather pattern is controlled by the passage of the main monsoon winds, the south-easterly (May or June until September), and the north-easterly (October until April). (Hemming, 1966). The main rainy season is the *Gu* (April-June), while the shorter rainy season is *Deyr* (Sept/Oct), separated by two dry seasons *(Hagaa and Jilaal).*

### 1.4. Topography

The maritime plains gradually rise to the Golis Range (a chain of mountains or succession of mountainous ridges rising to an altitude of over 2000m in Shimbiris running east-west. To the south of the Golis Range, the plateau slopes gently southward to the Ogaden and to the perennial rivers of Juba and Shabelle.

### 1.5. Vegetation zones

C. F. Hemming's vegetation zonation (1966) is the most commonly referred to in the distribution pattern of plant communities in Somaliland. The following is a brief

summary of the zones, each characterized by some dominant species related to each belt:

**Coastal and sub-coastal areas**

These include the maritime plains and the zone between the true coastal plains and the northern slopes of the mountain escarpment. The span of the true coastal belt widens in the west (80 km.) and tapers to as less as few hundred metres near Elayu in the east. Halophytic littoral communities include *Suaeda monoica, Pennisetum dichotomum, Zygophyllum coccineum, Limonium axillare*, *Panicum turgidum*, etc. Sandy plains are dominated by *Elusine compressa, Balanites orbicularis, Boscia minimifolia*. *Vachellia tortilis*, etc. Seasonal water course are fringed by *Zizphus hamur, Tamarix aphylla*, *Leptadenia pyrotechnica, Balanites glabra, Conocarpus lancifolius,* etc.

In the sub-coastal area, the dominant genera found in this area are *Vachelli*a and *Commiphora* species which in some areas share species similarity with the Hawd Type mixed bush zone.

***Vachellia bussei* Open Woodland[3]**

This area covers much of the plateau south of the Golis Range and the main watershed south of *Vachellia etbaica* zone. It further extends close to the Ethiopia-Somaliland border area and the gypseous zone to the south-east in Sanag and Sool regions. An apparent reduction in the abundance and prolificacy of *Vechellia bussei* compared to previous times can be attributed to the fact that it is the most preferred tree for charcoal production.[4]

This zone is interspersed with extensive treeless plains "*Banan"* which in the past teemed with wildlife and palatable grass species such *Chrysopogon aucheri*, *Dactyloctenium scindicum, Sporobolus ruspolianus*, and *S. variegatus*. In 1892, rhinoceros could be found hiding in the *Andropogon* clumps on Ban Tuyo (Hemming 1966); However, due to overgrazing, these grass species have been replaced by less palatable and smaller grasses and shrubs.

***Vachellia etbaica* Open Woodland**

*Vachellia etbaica* is the dominant species in this area. *V. etbaica* open woodland covers a strip along the northern edge of the plateau and interfaces with the evergreen scrub zone, but the area widens in the western part of Somaliland. *V. etbaica*, in comparison with *V. bussei*, has been spreading to wider areas e.g. the grassy plains of Tog Wajaale, and can be seen performing well in the *Juniperus* forest at the tops of the highest elevations in Somaliland – an example is Gacan Libaax Mountain, where sections of its grassy plain are being annexed by *V. etbaica*. It can be stated that the

[3] In this document, the genus '*Vachellia*' is used instead of 'Acacia', in line with its reclassification by the Melbourne International Botanical Congress in 2011.

[4] Hemming (1966), quoting "Statement by the Forestry Division Somaliland Protectorate" prepared for the British Commonwealth Forestry Conference 1957, by the Forestry Division - puts an estimated area of 50,000 km2 covered by *Acacia bussei* open woodland.

performance of *V. etbaica* has been striking compared to *V. bussei*. This may be attributed to - among other reasons - the quick recovery of the former from coppicing and pollarding on one hand, and the exceedingly anthropogenic pressure on the *V. bussei*, mainly for charcoal production.

Evergreen Scrub

This is an areas which fringes all sections of *Juniperus procera* forest. The dominant species are *Dodnaea viscosa, Buxus hildebrandtii, Dracaena schizantha, Euphorbia grandis, Cadia purpurea*, etc.

***Juniperus* Forest**

The highest section of the Golis Range, this was estimated in 1957[5] to cover an area of only 1100 km$^2$. The main areas are Daalo/Cal Madow in Sanaag; Wagar, Fadhiweyn, Marso and Gacan Libaax, in the middle section of Golis; and Libaaxley Mountain in Awdal. Other than *Juniperus procera,* the vegetation includes *Sideroxylon buxifolium, Olea africana, Pistacia lentiscus, Euphorbia grandis, Cadia purpurea*, etc. An important feature, particularly in Daalo Mountain, is the presence of *Usnea articulata* hanging from *Juniperus* trees.

**Hawd-Type Mixed Bush**

This area lies in south of the *Vachellia bussei* open woodland extending to the Ogaden and extending to the north-eastern province of Kenya. Other than *Acacia-commiphora* woodland, the area contains *Delonix elata, Albizzia anitihelmintica*, *Gyrocarpus hababensis,* sadly all declining in numbers, and *Grewia* species.

**Gypseous Areas**

This area lies in much of the southern areas of Sanaag and the Nugaal (Nogal) valley covered by anhydrite deposits. The area is characterized by extensive plains e.g. Saraar, Ban-cadde and Xadeed. The sparse vegetation is dominated by C*adaba heterotricha, Vachellia tortilis,* occassional *Ficus sp., Zygophyllum sp.*, and other halophytic species such as *Salvadora persica,* etc.

## 1.6. Purpose of the Study

The study is aimed at surveying and documenting the occurrence, abundance, and evidence of regeneration of threatened trees and shrubs valued for their usefulness.

The study will also document the sociocultural importance and uses (past and present) of the species presented in this report - including their perceived nutritional, medicinal, and fodder use. It will attempt to explore the factors that threaten their survival and finally propose recommendations for their recovery.

The study is a component of a livelihoods development project funded by Welthungerhilfe (WHH) and implemented in Somaliland, in collaboration with Candlelight for Environment, Education and Health (CEEH). The project aims to create sustainable incomes through gender-sensitive value chains, sustainable water,

[5] British Commonwealth Forestry Conference, 1957)

sanitation and hygiene and food systems and climate resilience education in Somaliland.

### 1.7. Study Area

Sample areas from the vegetation zones of Somaliland as described in Hemming's report (1966) have been visited by the consultant. Field visits have covered three areas representing different vegetation zones e.g. Guban, the Golis Range and Haud Plateau with particular emphasis on areas where Candlelight, in collaboration with WHH, shall have programme interventions. Telephone interviews have been used to cover more remote areas i.e. Sanaag and Sool.

### 1.8. Target groups

Target groups were pastoralists and agropastoralists, villagers, nursery operators, village elders, and women's groups. Consultation was also made with officials in the Ministry of Environment and Rural Development (MoE&RD).

### 1.9. Methodology

The study used questionnaires for focus groups and individuals as well. Community members of senior age (men and women) as key informants and as repositories of indigenous knowledge will comprise the majority (85%) and the remaining 15% will range between 25-40 years of age. Involving older community members was considered to be a crucial step in the process of data collection – owing to their knowledge of plants and the fact that they can do comparisons in vegetation dynamics for an extended period of time.

Data will be collected from all the sites visited using the following methods of data collection:

- Key informant interviews
- Semi-structured questionnaires and focus group discussions (FDGs)
- Field observation
- An intuitive controlled survey (focused) in areas that have the highest potential for supporting rare plant populations. This means the consultant possessed a prior knowledge of areas of interest to seek information on the species under investigation. The visits to the areas selected were also intended to confirm, but also to get as much input as possible from the respondents.

# 2. Findings

## 2.1. Significance of trees

Trees are vital to the health of our planet with its abundant and diverse forms of life. The holistic health of our planet would not be possible without diverse plant communities. Among the myriad of benefits they create, they give us oxygen, sequester carbon, and give life to the world's wildlife. They provide shelter for people, animals and other plants; nutrients for a variety of organisms upon decomposition. They are a source of medicine, fuel wood, charcoal and coal. They slow down runoff and help water infiltrate the ground, thus reducing surface runoff. The lives of Somali people and the lives of trees are intertwined - be it through raw materials for shelter, household goods, hand tools, food and medicine, browse for livestock, or providing conducive space for community meetings, namely sociocultural and religious functions.

However, following many decades of environmental degradation and overuse, there is a growing concern among local experts and many international observers about the decline of many species.

## 2.2. Causes of trees decline and their extinction

There is a correlation between the high economic importance of a species and its utilization which may have a bearing on its continuity. The more uses a plant has, the more it is subject to over-exploitation - unless it can withstand intense use. This also depends on an individual's prolificacy rate. For example, *Vachellia bussei ('Galool'),* regarded by many as one of the most useful trees in the Somali region, is declining faster than it can regenerate itself and hence, denuded from vast areas in the rangelands where it used to thrive. *V. bussei* is the main source of charcoal in Somaliland. Moreover, all the parts of the plant have different uses - namely, leaves as fodder, fibre and tannin from bark, building material from trunk and lateral roots for use in Somali hut building. Even the fresh bulged thorns are a delicacy when soft.

Other than climatic considerations, the primary causes of species decline and extinction can be directly attributed to anthropogenic factors. Erosion and overgrazing exacerbate runoff, allowing little chance for water to descend to feed lateral roots and further infiltrate into the ground to replenish the water table. Declining precipitation levels contribute to water stress and the ultimate death of trees. The dying of *Juniperus* trees that occur in Gacan Libaax and Libaaxley mountains can be attributed to climate-driven factors such as declining mist and

rainfall, but also to soil erosion and goats eating juvenile juniper plants as well. The same is true for many other species.

Debarking for fiber and food, over-tapping for gum or resin, ring barking, removal of fleshy and woody roots for medicinal use, excessive branch lopping for use as animal feed, firewood and charcoal production, all have their different levels of damage on the various species. For example, one can hardly come across *Terminalia brownii* or a mature *Vachellia bussei* tree that does not show savage debarking marks for medicinal use. The roots of some *Vachellia* trees are removed by women and formed into half-circles for use in the *Aqal* – the Somali traditional collapsible hut. Fires at the end of dry season can also be detrimental to trees and shrubs.

Competition from introduced non-native species wreaks havoc upon areas of pre-existed ecosystems. *Prosopis juliflora* is a good example of an invasive displacing many local species. Higher frequencies of unpalatable species are common in almost all overgrazed areas.

In most of the woodlands and areas where remnant forests still predominate, there is an apparent decline of understory species composition, mainly due to heavy goat browsing (Fig. 4). This is more conspicuous in the Hawd mixed bush areas north of the Ethiopia-Somaliland border. Over-browsing leads to soil erosion and prevents plant regeneration. Palatable unarmed saplings of woody plants are the most preferred by browsers. This alludes to the fact that *Delonix elata ('lebi') (Fig.8)* and *Albizia anthelmintica ('Raydab') (Fig.11)* have been extirpated from the Hawd mixed bush areas south of the Golis Range. If this trend continues, other remaining species will suffer the same fate, thus leading to serious vegetation loss.

During the study, the consultant observed that most of the threatened species that showed slowness in natural regeneration are those having seeds with very hard seed coats. Even the small percentage that germinates may not escape goat browsing. Overall, this can be translated into the assumption that seed dormancy may not be broken by the prevailing below normal and erratic rains.

The increase in the use of pesticides in agriculture, use of dipping tanks in pesticide treatment from livestock and the irresponsible disposal of chemicals may have led to a decrease in pollinators. This also led to lower plant productivity and success. Besides, excessive pressure on a plant will weaken it, leaving it vulnerable to borers, diseases and pest attack.

# 3. Threatened useful trees and shrubs

The listing and reporting of the following species, marked as 'threatened', is in line with local concerns and community observations on their decline due to over-exploitation. Additionally, it is important to highlight that the number of species that may qualify for this status could be more than what is listed below. The following

list only enumerates some of those species often talked about by communities because of their discernible decline. Also, some of the species listed here might be categorized as Least Concern (LC) on the International Union for the Conservation of Nature (IUCN) *Red List* due to their wide distribution elsewhere.

Rather than conducting a physical search of the threatened, endangered and sensitive plants, the purpose of the study was to compile information, sourced from the communities visited, on some of the 'useful' trees that have been declining in number or are in a very critical stage. This was fully intentional as this study was designed less as an academic account, but more as a means of displaying perceptions of farmers and pastoralists: Only endangered plants that are missed by locals will be protected by locals.

A physical search would require specimen collection and proper identification which will take a longer period of time than afforded by the timeframe of this study. However, the findings may pave way for a future follow-up intervention that may encompass these activities as well as seed collection for propagation.

| Threatened useful trees and shrubs | | | | | | |
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| **#** | **Plant (species/family** | **Vernacular name** | **Description** | **Uses** | **Habitat** | **Propagation** |
| 1 | ***Sterculia africana*** [family STERCULIACEAE] | *Qarari; Qararo* | A deciduous tree, up to 10 m tall or more, with a thick trunk; bark surface whitish grey or liver-coloured, peeling in papery flakes. | Leaves serve as an excellent animal feed. The bark fibre is strong, pleasant to taste and is used for making ropes, twine and mats. The leaves are supposedly edible. Its gum is used as laxative. Its wood is a source of many durable household items and work tools. Elsewhere, the bark and leaves are boiled and steam is inhaled for the treatment of influenza and fever. | Rock areas and escarpments in the Golis Range. | Seedlings, cuttings |
| 2 | ***Ficus ingens (Miq.)*** [family: MORACEAE] | Lafo | An evergreen tree, about 13m tall or more. It has milky or water latex. Its new leaves appear bronze colour in spring. | Fruits are edible, but leaves are toxic to animals, particularly during the dry season. This is the same with *Ficus salicifolia ('Dhicir'*). Maceration of the leaves is used in the management of malaria.<br>Its red wood is hard and ideal for making wooden bowel (Xeedho), camel bells (Koor) and salt-lick troughs (Qabaal). | Rocky outcrops, cliff faces, and along banks of seasonal watercourses originating from mountains. | Seeds and cuttings |
| 3 | ***Vachellia stuhlmannii*** [family LEGUMINOSAE-MIMOSOIDEAE] | *Qaydar* | A small deciduous leguminous tree up to 6m high, that grows in the | Foliage, flowers and pods are important livestock browse. During the dry season, pastoralists lop trees to feed | Golis Mountains, specifically areas below the escarpment facing the Gulf of Aden. | Seed |

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| | | | range of 100-750m above sea level. | goats. | | |
| 4 | ***Olea somaliensis***<br>Related name: *Olea europea var. africana*<br>[family OLEACEAE ] | *Weger; Ajarse* | An evergreen tree, 5-8m high; with grey-green to shiny dark leaves. In Africa, it is commonly known as wild olive. | It has a wide range of medicinal uses. The leaves are used for eye infection; fresh leaves to relieve abdominal troubles. The different parts of the plants (roots, bark, leaves and fruits) are used in different forms, alone or sometimes in combination. A small handheld wooden implement known as *Weger,* often carried by pregnant women, is believed to have hidden powers in warding off evil spirits. The tree bark is used in bone-setting, headache and bladder infections.<br>Clubs made from the tree are highly valued for their weight and colour. It also provides durable building materials. Apparently, it is declining in number. All the individuals seen during the study are old, showing de-barked trunks. The fruits are popular with people and animals. Leaves are browed by camels. Pastoralists also lop the branches for goats and cattle. | Golis Mountains | Seed, cuttings (preferably treated with rooting hormone) |
| 5 | ***Berchemia dicolor***<br>[family RHAMNACEAE] | Dheen | A semi-deciduous tree up to 20m tall. | It has sweet, date-like edible fruits. Its wood is red in colour | Most of the plants seen are found along seasonal | The seed has a strong seed coat. |

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| | | | | and one of the hardest in the region. The leaves are browsed by animals. Because of its dense rounded crown, its shade is a good venue for open meetings and community functions. The wood is known for high quality axe-handles and camel bells - known for their hollow and strong sound. | water courses in Golis Mountains, as its roots are not aggressive. | Scarifying and/or boiling seeds can help germination process. |
| 6 | ***Delonix elata*** [family LEGUMINOSAE ] | *Lebi* | A deciduous tree 2.5–15 m high, with rounded-spreading crown and drooping branches; bark rather smooth, buff or grey. | Its wood is easily worked and good camel bells are carved from its wood. It wood is strong and heavy which gives camel bells their distinct hollow sound. Many household and work tools are carved from its wood. Its flowers *(kaambuli)* are much liked by camels.<br>It is an ideal tree for cultivation in gardens, streets and parks. | Golis Mountain Range and Hawd mixed bush area south of the border. | • Seeds need to be soaked in water as it has hard seed coats.<br>• Air layering |
| 7 | ***Albizia anthelmintica*** [family FABACEAE ] | *Raydab* | A tree growing 8m in height, deciduous; smooth bark, grey to brown; young branchlets mostly glabrous. | A decoction of roots or bark used as a vermifuge or against gonorrhoea. | Golis Mountain Range and Hawd mixed bush area south of the border.<br>External range:<br>Somalia, Egypt south to eastern Dem. Rep. Congo and Tanzania, east to Arabia and India | Seeds require no pre-treatment. High success rate (90%) and quick germination (3-4 days) |

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| 8 | ***Mimusops angel*** [family SAPOTACEAE] | *Canjeel* | An evergreen tree, up to 20m tall. | Its fruits are eaten fresh or dry. As forage, leaves are not very palatable, but eaten by goats during the dry season and also hand-collected from trees to feed cattle during hard times. *Mimusops angel* is recorded in the *Flora of Somalia* as only known in Puntland region of Somalia as its native range. However, during a botanical survey conducted by a team from Somaliland Biodiversity Foundation in 2020, a specimen of *Mimusops angel* was collected from Awdal region. Now it can be added to the list of species known from Somaliland.[6] The tree is threatened by habitat loss. Its germination rate is low. The few trees seen during the assessment were very old, dry from their tops, and with damaged barks. It has potential for domestication for its fruits and other socioeconomic uses. | Found along seasonal watercourses, and in open stands. Drought resistant and can grow in low rainfall areas. Range outside Somaliland and Puntland: Not known elsewhere. | The almond-shaped seeds are hard to germinate.[7] |
| 9 | ***Terminalia brownii*** | *Woob* | A deciduous tree, | Both leaves and bark are used | In the mountainous | From seeds but |

[6] Somaliland Biodiversity Foundation Newsletter, Issue 8, February 2021. P.5.

[7] In a trial carried out in Israel in 1987 in Negev Desert in Israel by the Institutes of Applied Research, Ben-Gurion University, Israel, 19 seeds sourced from N. Somalia in 1982, 10 of them boiled in hot water and 9 of them treated with concentrated sulphuric acid but there was no sign of germination (Source: New Subtropical Fruit and Nut Crops for arid Lands, 1986-87; by A. Nerd, J.A. Aronson, J. Martin and Y. Mizrahi; submitted to USAID, 10.19.87)

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| | [family COMBRETACEAE ] | | 10-15m tall, and an important drought tolerant plant | medicinally to treat jaundice, urino-genital problems and as an anthelmintic. Therefore, it is not uncommon to see bark of the tree carrying scars on its trunk. Other uses include lopping branches for livestock feed (leaves), firewood, charcoal, and utensils. It is good for use as windbreak and for shade. Range outside Somaliland: Tropical Africa - Nigeria, Cameroon, Central African Republic, northern DR Congo, Uganda, Tanzania, Kenya, and north to Eritrea, Ethiopia Somalia, and Yemen. | Golis Range areas. | with poor germination record and also from wildings. To expedite seed germination, wings have to be removed and the soaked in cold water overnight. Nipping carefully the distal end with V-shape, while taking care not to damage the seed, is an effective technique in facilitating quick growth. |
| 10 | ***Acacia albida* (*Faidherbia albida*)** [family LEGUMINOSAE ] | *Garbi* | A large deciduous legume tree, 30m high. An unusual characteristic is that it is leafless throughout the rainy season and comes into leaf during the dry period when most of the trees shed their leaves. It is nitrogen-fixing | It is an economically important tree. The pods containing seeds and leaves are relished by livestock, which may also disperse the seeds. It is an important source of protein for livestock during the dry season. It enriches the soil, particularly with nitrogen and calcium. In times of shortage, seeds and pods are eaten by people. Its timber is good for wood carving, while its expansive shade | Found in and around valley bottoms where alluvial soils predominate. Range outside Somaliland: Semi-arid areas of tropical Africa – Senegal to Egypt, Ethiopia, Somalia, south to Zambia. | Seeds germinate best after soaking in water and a bit of scarification. Seeds must be removed from pods as soon as possible since pests invade with the passage of time. Vegetative propagation is also possible. Under natural conditions, |

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| | | | and an important agroforestry tree. The fact that it is bare of leaves during rainy season makes it an ideal agroforestry tree as this minimizes competition for sunlight with other plants. In Somaliland, this species is confined to Dilla valley in Awdal area. | affords a space conducive for meetings. | | root suckers also grow into trees. |
| 11 | ***Vachellia seyal*** [family LEGUMINOSAE-MIMOSOIDEAE] | *Waadhi* | An evergreen tree that grows to 10-15m. high. The rusty-coloured, powdered bark is a characteristic feature of the tree. This is where its Somali name Waadhi (cream-coloured) originates from. It is not as common or as widespread as other species in the Vachellia | The gum from the bark is edible. The inner bark fibre has a sweet taste and chewed for making ropes. The gum is used in the treatment of colds and diarrhoea. It has good firewood with pleasant smell. It has also been an important item of export together with Acacia Senegal (Arabic Gum). | It is confined to the woodlands to the south of Hargeisa and area in Awdal near the Ethiopia-Somaliland border. These are like to be a spill-over from the adjacent areas in eastern Ethiopia where V. seyal is more common. | Seeds or semi-ripe cuttings of lateral shoots. |

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| | | | family. The few trees seen during the assessment were found in a location not far from Gumar village to the south of Hargeisa, a lone and young tree near Kalabaydh to the west of Gebilay town. | | | |
| 12 | ***Pappaea capensis*** [Family SAPINDACEAE] | Adadag | A long-lived, hard and evergreen tree with a dense spreading crown, 12m tall; long-lived, hard and evergreen. | It has tasty fruit. Bark is pound into powder and prepared with soap to treat constipation. Leaves are palatable for goats, camels and cattle. | Golis Mountain Range, mainly along the banks of seasonal watercourses. External distribution: Ethiopian, Eritrea and through East Africa to South Africa and across the Arabia in Oman and Yemen. | Seed |
| 13 | ***Celtis africana*** [family CELTIDACEAE] | *Dhebi-boodaar* | A deciduous tree about 12 m tall with a spreading crown | It is a source of timber. The best wooden clubs, in terms of durability and strength, are made from its branches. It is used in traditional medicine: Bark is used to treat headache. The leaves are highly palatable for cattle, goats and camels. | Habitat: Golis Mountain Range.<br><br>External range: Africa - mainly in the east, but extending from Liberia to Somalia and Arabia, south to Angola and S. Africa. | Seeds have good germination rate and can be hastened by soaking in water |

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| 14 | ***Erythrina melanacantha*** [family LEGUMINOSAE-PAPILIONOIDEAE] | *Yooco* | Tree, 4–20 m tall; trunk with corky bosses; branches bearing curved prickles. | Literature available on *Erythrina* describes it as "a producer of forage, green manure, medicine and wood for handicrafts; a support tree for valuable climbing crops a 'shade' tree for coffee, cacao or other crops; a living fencepost; and a spectacular ornamental."[8] It improves soil structure and water infiltration. Its leaves are also an important livestock feed.<br><br>Elsewhere in sub-Saharan Africa, bark of *Erythrina* species is used traditionally as a protective against stress conditions.[9] | Habitat: Nogal valley<br><br>External range: Tanzania, Kenya, Ethiopia & Somalia | Natural regeneration, cuttings, seedlings, direct seeding. |
| 15 | ***Cadaba heterotricha*** [family CAPPARACEAE] | *Higlo* | A slender evergreen shrub or small tree up to 5–6 m tall, with smooth greyish bark; young twigs covered with | Other uses include sand dune stabilization. It also protects soil from wind and water erosion.[10] External range: Ethiopia, Kenya, Somalia, Arabia and Pakistan. | | Seed |

[8] Human Development Library for Sustainable Development and Basic Human Needs. http://www.nzdl.org/cgi-bin/library/ (accessed on 07 July 2021)
[9] National Library of Medicine, National Center for Biotechnology Information. https://pubmed.ncbi.nlm.nih.gov/30793315/ (accessed on 07 July 2021).
[10] Tropical Plants Database, Ken Fern. tropical.theferns.info. 2021-07-06. <tropical.theferns.info/viewtropical.php?id=Cadaba+farinosa> (accessed on 07 July 2021)

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| | | | stellate scales. | | | |
| 16 | ***Boscia minimifolia*** [family CAPPARACEAE ] | *Maygaag* | Twiggy shrub up to 4 m tall with smooth, ash-grey bark and branches often swollen at the base; young twigs purplish-brown, puberulous or glabrous. | Best tree for disinfecting and waterproofing fibre milk containers. Fruits are also reported as edible. It is evergreen and its leaves are palatable. | Used to have been widespread in all vegetation zones. | Seed |
| 17 | ***Commiphora gileadensis*** [family BURSERACEAE ] | *Qadhoon-Madow; Dhaseyno (different from Dhasayno in the Guban areas)* | Shrub or a tree, 5m tall, unarmed, sometimes with long drooping branches. | Its brown reddish gum 'Balsam of Gilead' is used in incense and perfumery and for tanning. Young shoots are used as deodorant by rubbing on body and underarms. The taste of its gum is slightly bitter, and suggestive of turpentine Elsewhere, in the Middle East it is used to treat various ailments. | Hawd, Nugaal and the Golis Range.<br><br>External range: Djibouti, Somalia, Eritrea, Eastern Ethiopia, NE Kenya, E Sudan, Egypt and Arabia. | Seed, vegetative propagation. |
| 18 | ***Ximenia Americana*** *[family OLACACEAE]* | *Malluug; Mandaruuk, Murcid* | Small tree or shrub up to 7 m high, generally with axillary spines. | Its acid-sweet, almond-like fruits are edible. The fruits are also used as a purgative. It is good for use for hedges and as an ornamental tree. | Golis Range areas.<br>External range:<br>Djibouti<br>Eritrea<br>Ethiopia | Seed. |
| 19 | ***Vepris nobilis*** (family: RUTACEAE) | *Barrow; Barrow-Madow* | An evergreen shrub or - more commonly - a tree, usually growing from 2-12m tall. In | It is a versatile plant with multiple uses. It has edible fruits. Its poles are good for construction, utensil production such as spoons (*fandhaal*), spear | Thickets on rocky hills and mountains in the Golis Range. | Seed. Germination rate is low. |

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| | | | Somaliland, it is found in elevations from 1100 – 1600. In times of shortage of grass, cattle herders used to defoliate its leaves and hand carry them for cows kept for milk. Cattle herders believed that it caused increased milk production. | shafts, clubs, walking sticks, bows and arrows and for charcoal production. Its roots and twigs are also used as toothbrushes. Its sticks are used for disinfecting and waterproofing fibre milk containers. It is reported to have efficacy against snakebite. Because of over-exploitation, it has become rare to find. Nectar from this tree makes honey bitter and not sticky. The plant has a good potential as an ornamental plant in urban areas. | | |
| 20 | ***Mytenus undata*** [family CELASTRACEAE] | *Uloyar; Soolo; Soolaha, Soodhe, Dhegwein, Sarad* | It is very rare to come across this plant. It used to be found in mountain forests among rocks and boulders. There is a lone tree in Laas Geel Rock Art Site (55 km outside Hargeisa) that has taken refuge in a rock crevice. | A concoction from its root is believed to have healing properties such as managing stomach troubles. It is also used as forage and animal feed, particularly during dry season. Its red wood is heavy and used for making spoons *(fandhaal)* and wooden combs *(sagaf/fidhin)*. It also makes excellent firewood. Elsewhere, for example in South Africa and many other tropical countries, it has been domesticated for use as an | Rocky hillsides and in the crevices of boulders. | It can be propagated from seeds and cuttings. Seeds are contained in capsules that often burst. Therefore, seeds can be collected from ground. |

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| | | | | ornamental plant and for use as live fence. | | |
| 21 | ***Grewia pencilliata*** [family TILIACEAE] | *Hohob* | Shrub up to 2m tall. | Ethno-botanical use: Ripe fruits are eaten raw or pounded and mixed with milk. The leaves are highly palatable and are regarded as important livestock feed. | Rocky ground and dry bushland areas.<br><br>External range: Somalia, Ethiopia and Kenya. | Seeds |
| 22 | ***Blepharispermum fruticosum*** Family [COMPOSITAE] | *Gahaydh* | A deciduous branched shrub, 1-2m tall. | A palatable browse plant for goats and camels. It has excellent firewood. It is also used in thatched roofs. | Near sea level–1000 m.<br><br>External range: Somalia and Eastern Ethiopia. | Seeds |
| 23 | ***Rotherca myricoides*** [family LAMIACEAE] | *Tiire* | A woody evergreen shrub, 2-3m tall. | Ethno-botanical use:<br>Roots macerated in water and then drunk by women after childbirth is believed as a uterine stimulant to contract the womb, while at the same time easing the removal of the placenta. | Golis Range and Hawd Mixed Bush.<br><br>External range: Native to Africa and widely cultivated elsewhere. | Seed; Root suckers, cuttings or root sections |

# 4. Conclusion

In the face of ongoing environmental destruction, with many decades of unabated pressure on the various ecosystems in Somaliland, it is unfortunate to see that many plant species are becoming threatened, endangered or even facing extinction in the wild. The study area (i.e. Somaliland), as in the wider Somali eco-region, has been characterized by a high degree of endemism, containing plants that are adapted to desert conditions. However, due to deforestation, land-use-changes, over-exploitation, habitat loss, recurring droughts, proliferation of invasive plants and climate change, many species are in peril. The continuous and unrelenting grazing and charcoal production has had a serious impact on rangeland health. Grazing pressure has impacted most on the more desirable species, followed by the less desirable ones. The situation also led to invasive weeds taking over large areas in the country. The most tangible result for the local pastoralist population, however, is the loss of browse – particularly trees that is fairly resilient to climate change. Raising awareness of the erosion of pastoralists' livelihood base may be one of the most important triggers for behaviour change. Loss of browse material has a direct bearing on the livelihoods of pastoralists. The less the rangelands could support sustainable pastoral production, the more we experience rural-urban influx, and equally a greater number of internally displaced persons (IDPs) camps – already a main feature in both rural settlements and major urban areas.

The study shortlists twenty three plants (19 trees and 4 shrubs) for their rare occurrence in comparison to previous times. It also attempts to capture their uses (socioeconomic, cultural, religious, and medicinal use).

Generally, biodiversity loss has a direct bearing on weakening the ecosystem services available for people. The visited communities expressed how they are 'impoverished' following the decline of and, in many cases, the disappearance of many trees and shrubs that they used to derive benefits from. During discussions, they showed enthusiasm and were generous with the knowledge of those plants. They also regarded any attempt aimed at saving and conserving these plants worthwhile and a noble endeavour.

# 5. Recommendations

- Overall, there is a need to carry out a wider study on the state of the vegetation dynamics in terms of their temporal and spatial patterns of disturbance and how these situations affect biodiversity. The study should contain recommendations for restoration and conservation which may include plans for the restoration of vegetation using grazing reserves, territorial protected areas, covering the various ecosystems and vegetation zones of the country. Establishment of protected areas should be aligned with 'centres for plant diversity' – areas likely to host high number of irreplaceable plants.
- As protection from grazing and charcoal production (among other uses) leads to a short-term decline in income, alternative income measures need to be introduced to bridge the gap until such areas are more productive. During past years, cash-for-work to erect soil and water conservation structures and beekeeping within protected sites have shown very positive results in terms of community-based protection and recovery.
- Establishment of ex situ conservation centres for threatened species. Specialized nurseries for endangered species can be housed within universities and MoE&RD nurseries.
- Establishment of botanic gardens and arboretums. These are ideal places for plant conservation as they serve as ex situ conservation sites for species threatened in the wild.
- Domestication as tool for conservation: Some of the threatened trees and shrubs can be used as amenity plants in cities and parks and in front of restaurants and shops for shade and beauty.
- Increase community awareness on the importance of tree conservation and overall environmental restorative measures.
- Develop compensatory action to support communities who are willing to take rangeland out of grazing and charcoal production and train communities in sustainable extraction measures that do not harm valuable trees and shrubs.
- Further promote the control by economical use of the most dangerous invasive species such as *Prosopis juliflora* and *Parthenium hysterophorus* that are competing with endangered plants.
- Bring the issue of endangered species to the classes as an add-on and enrichment content to encourage children and youth to espouse environmentally friendly practices, support and lead conservation programmes in their settlement.

- Introducing the issue of endangered species, invasive species and feasible, economically sustainable countermeasures into curricula of Universities in fields such as environmental, agricultural, land-use planning and veterinary studies.

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**Figure 1:** ***Acacia albida (Faidherbia albida)*** **- Dilla's iconic landmark**

**Figure 2:** ***Faidherbia albida*** **is known for its prolific pod production**

**Figure 3:** ***Berchemia discolor,*** **Dolow village, Saaxil Region**

**Figure 4:** ***Vachellia tortilis*** **canopy showing bare understory due to heavy goat browsing**

**Figure 5:** ***Vachellia seyal*****, north of Gumburaha Banka village, Maroodi jeex Region**

**Figure 6:** ***Maytenus undata*****, Laas Geel Rockart Site**

**Figure 7: *Boscia minimifolia* in the Hawd eco-zone east of Gudubi**

**Figure 8: *Delonix elata*, near Abdaal, on the highway between Hargeisa and Berbera**

**Figure 9:** ***Sterculia africana*****, Geed-Deeble National park**

**Figure 10:** ***Ximenia americana*****, Malluug village, near Geed-Deeble**

**Figure 11: Albizia anthelmintica, Geed-Deeble National Park.**

**Figure 12: *Cadaba heterotricha*, Saraar plain, Sanaag Region**

# Mapping Trees and Shrubs under Threat in Somaliland

**Questionnaires**

**Questionnaire to be completed by elders and older mothers**

**Name of the respondent _____; Age: _____**

**Gender: _____ Occupation: _____**

**Village _____ District/Region**

**List at least the ten most useful trees you know:**

| # | Name Botanical/ Vernacular | Ethno-botanical use | Availability frequency | Location[11] | Phenology[12] | Causes of decline /threats |
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| 1 | | | | | | |
| 2 | | | | | | |

[11] Location: What kind of environment preferences does the species have, if any?

[12] Phenology: What time of year does the species fruit, flower or drops its leaves (if it does so periodically)?

## General Questions related the most endangered trees/shrubs:

- Why are you are supposing above three are under endangered,
- What is last time these trees ware normal,
- What is the factors behind its decline (human activity, Climate, Animal and livestock overgrazing?
- How do think way to conserve those trees? Is there in community level or national level conservation?