MAINSTREAMING BIODIVERSITY IN THE SYLVO-PASTORAL AND RANGELAND LANDSCAPES IN POCKETS OF POVERTY PROJECT IN JORDAN

Project Terminal Evaluation
Main report and appendices

Mission date: 13/05/2017 - 19/05/2017
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Project No. GEF 3932

Contents

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LIST OF ACRONYMS

ADDSR	Agriculture Directorate for Developing the Sharah Region (MOE)
AWPB	Annual Work Plan and Budget
DBR	Dana Biosphere Reserve
IUCN	International Union for Conservation of Nature
MOE	Ministry of Environment
MOA	Ministry of Agriculture
M&E	Monitoring and evaluation
MSP	Medium – Size Project
NSAD	National Strategy for Agriculture Development
NBSAP	National Biodiversity Strategy and Action Plan
RBG	Royal Botanic Garden
RSCN	Royal Society for Conservation of Nature

SLM	Sustainable Land Management
UNCCD	United Nation Convention for Combating Desertification
HFDJB	Hashemite Fund for the Development of Jordan Badia
JOHUD	Jordan Hashemite Fund for Human Development
IFAD	International Fund for Agricultural Development
PES	Payment for Ecosystems Services

PROJECT IDENTIFICATION TABLE

GEF Project Number: 3932
IFAD Grant Agreement: GEF 025

Project Name: Mainstreaming Biodiversity in the Sylvo-pastoral and Rangeland Landscapes in Pockets of Poverty Project in Jordan

Country: Jordan

Duration of Project: 4 years

Date of approval: 09/09/2011

Effective Date: 12/04/2012

Mid Term Evaluation: Not Required for SZP

Completion: 31/12/2017

Terminal Evaluation: May 2017

Closing: 30/06/2017

GEF Implementing Agency: IFAD

GEF Focus Area: Biodiversity

GEF Strategic Programmes: Biodiversity

Project Framework: Kindly Refer to Annex II

IFAD Priority: Strategic Objective 5 of the 2011-2015 Strategic Framework, "A base of natural and economic resources for rural women and men more responsive to climate change, environmental degradation and the transformation of markets."

Amount financed by GEF: US$ 1,000,000.00

Cofinancing: US$ 3,300,000.00

EXECUTIVE SUMMARY

i. Mainstreaming Biodiversity in the Sylvo-Pastoral and Rangeland Landscapes in Pockets of Poverty in Jordan (BD) was approved in April 2011 and started in May 2012. The project faced delays in its early stages mostly due to late identification, from the executing partner (Ministry of Agriculture), of the project management team. Nonetheless, despite the late startup phase, the project managed to achieve most of its targets and to ensure sustainability and scaling up of the identified theory of change.

ii. The project secured a solid partnership strategy that allowed not only physical execution of the project but also sustainability and potential for scaling up. The involvement of local and

international organizations such as the Hashemite Fund for Development of Jordan Badia (HFDJB), the Royal Society for Nature Conservation (RSCN), the Royal Botanical Garden (RBG), the Jordanian Hashemite Fund for Human Development (JOHUD) and the International Union for the Conservation of Nature (IUCN) allowed for effective mainstreaming among communities, resource users as well as policy makers. Furthermore, associating protection and enhancement of natural resources with tailored livelihood training and financial support (Payment for Environmental Services) has allowed for trust and willingness to engage from communities.

iii. The project achieved about 76% of the expected outcomes[1] and reached directly over 657 rural households (3351[2] direct beneficiaries) in the areas including and surrounding the natural sites of Hisha and Manshya. Households as well as community groups have been involved in 19 training programs and supported with key investments such as water harvesting wells, solar heaters, food processing (dairy, herbs, fruits), green houses and beekeeping. In terms of indirect beneficiaries, the project has reached the target population of 2200 households. Potential benefits of the various interventions and practices established will increase rangelands productivity and will eventually open new market opportunities for local communities.

iv. Of the total budget of 4,300,000 USD (GEF→ USD 1,000,000 and GOJ → USD 3,000,000.00 and RSCN → USD 300,000.00), the project spent almost 100% of the budget and it will reimburse USD 2,100.05.

v. While impacts on rangelands are still not objectively verifiable and NDVI analysis is not 100% verifiable in the given context, the mission concentrated more on institutional, social and political impacts of the project which are considered moderately satisfactory due to low participation of the Ministry of Agriculture in follow up of the established procedures.

vi. The project completed its course from CEO endorsement, with minor changes in its targeting in 6 years. The extra two years of execution are due to late recruitment of the project management unit from the Ministry of Agriculture (MOA) staff. As per the project implementation report (PIR) of 2016, the project completed its activities in December 2016. Table 1 below presents a summary of project's ratings.

SUMMARY OF PROJECT'S RATINGS PER CATEGORY	
Criterion	**Rating**
Project Performance	**MS**
Assessment of Risks and to Sustainability of Project's Outcomes	**ML**
Assessment of M&E System	**MS**
Rural poverty impact	**S**
Additional evaluation criteria (Gender, Scaling Up, Innovation, CC, Targeting, NRM, Access to markets)	**S**
Partners performance	**MS**
Overall project achievement:	**MS**

Table 1:Summary of Project's Ratings per Category

[1] Refer to Annex I for a detailed analysis of achievements.

[2] Jordan Household Composition according the 2012 Jordan Population and Family Health Survey (JPFHS) carried out by the Department of Statistics (DoS).

vii. Taking into account the reviewed set of documents, direct observation in the field, responses from beneficiaries and stakeholders, the mission rates the project as moderately satisfactory. Details are provided in the following chapters and sections.

PROJECT BACKGROUND

a) The specific **Goal** of the project is to **Increase Biodiversity Conservation in Productive Landscapes in Pockets of Poverty in Southern Jordan**.

b) The project was designed to achieve this goal in three specific Ministry of Agriculture (MOA) Reserves (enclosures) which are intended to protect portions of the rangeland and sylvo-pastoral landscapes within the Agricultural Directorate for Developing the Sharah Region. By improving government and community understanding of the value of biodiversity, it is also intended to demonstrate that there are economic benefits and alternative livelihoods available if biodiversity conservation is improved. It is further intended that the successful outcomes of the project become sustainable and replicable within other geographic areas of Jordan.

c) The specific Objective of the project is to **mainstream biodiversity conservation in sylvo-pastoral and rangeland management activities** particularly in buffer zones associated with existing (and proposed) Nature Reserves and to produce local economic benefits and poverty alleviation in a sustainable and replicable manner. The project has **four Outcomes**:

- **Outcome 1**: Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies.
- **Outcome 2**: An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity.
- **Outcome 3**: Innovative pilot measures and introduction of "Payment for Environmental Services" (PES).
- **Outcome 4**: Project Management and Evaluation.

d) The proposed **Project Area** is included in the Agricultural Directorate of the Sharah Region. The activities of the project supported key national level activities. In line with IFAD's recent Targeting Policy, the project targeted rural people who are living in poverty and experiencing food insecurity. It expanded its outreach to proactively include those who have fewer assets and opportunities.

e) **Coordination and Management.** The Ministry of Agriculture (MOA) was the Lead Project Agency responsible for the project with the primary responsibility for execution of activities. MOA works through MOA's Department of Projects, with on-the-ground execution through a new Project Management Unit (PMU) within ADDSR, which assumed the role of PMU for the GEF project.

f) **Project Costs and Financing.** Total cost of the project equals US$ 4.3 million. GEF contribution accounts for US$ 1 million, and co-financing of US$ 3.3 million, from the following sources: (i) Government of The Hashemite Kingdom of Jordan's own resources (US$ 3 million in kind and cash to cover salaries and) (ii) RSCN (US$ 300,000 in kind (studies and technical support during design and implementation).

OBJECTIVES AND METHODOLOGY

Terminal Evaluation Objectives

g) The overall objective of the terminal evaluation was (i) to assess and document project implementation performances and achieved results, and (ii) to draw relevant lessons for the improvement of GEF projects designs and implementation. This process calls for an informed reflection on the relevance, effectiveness, efficiency and sustainability of project interventions. More precisely, the detailed objectives of the terminal evaluation process include the following:

a. To assess the relevance of project interventions and strategies at the time of project design and in today's context.

b. To assess the effectiveness of project implementation, or the extent to which project objectives were met, and to document the immediate results and impacts of project interventions.

c. To review project costs and benefits and the efficiency of the overall project implementation process, including IFAD's and partners' performance.

d. To assess the prospects of sustainability of project benefits beyond project completion.

e. To generate and document useful lessons from implementation that will help improve IFAD's or Borrower's future programming and designs.

f. To identify any potential for the replication or up-scaling of best project practices.

g. Appreciate the implementation context and modalities, including those relating to the interactions between the project, the beneficiaries and the implementing partners.

Methodology

h) Methodology of the mission included: (i) an in-depth analysis of the existing project documentation; (ii) field visits and discussions with all stakeholders (beneficiaries; national partners; service providers; platforms; etc.) on all the activities implemented by the project; (iii) in depth consultations with the project team; and (iv) sharing of main conclusions and recommendations with the project team and other partners involved with the project implementation.

i) The evaluation uses a Theory of change (ToC) approach to help assess project effectiveness, likelihood of impact, sustainability and scaling up. The team discussed the reconstructed ToC with the stakeholders during evaluation mission and interviews in order to ascertain the causal pathways identified and the validity of impact drivers and assumptions described in the ToC.

j) The mission used a mix of quantitative and qualitative tools in order to form an informed judgement on overall project performance and results

k) Primary sources of information included project reports and documents (supervision reports, project implementation reports, Annual Work Plans and Budgets (AWPB), etc.) M&E data and surveys / studies undertaken by the service providers.

l) In addition to primary sources of information, the mission collected relevant data from secondary sources, such as other donors' statistics (WB) and the civil society. These have been

used mainly to bridge information gaps on certain issues or to cross-examine the data generated from other sources.

m) The mission used also a variety of qualitative tools, such as key informants' interviews (community leaders and CBOs) and rapid case studies. Additionally, the mission included a representative sample of project sites, or locations where project activities were implemented, to collect impressions and feelings, verify that reported interventions took place, confirm that they met expected quality standards and beneficiaries' needs. Visited sites and areas are included in the attached Google Earth File summarizing the mission and presenting visited places. The file includes as well videos and maps of all visited sites.

n) All data and information have been georeferenced and provided in in GIS compatible format. All maps have been reported on Google Earth and are delivered as KML/KMZ files format.

PROJECT PERFORMANCE

Relevance

1. The theory of change identified and followed by the project is clear and well reported in the logical framework. Identified objectives have been adequately designed so to answer target groups needs and expectations.

2. The design process was the resultant of a well-executed participatory process that was put in place at different levels: (i) National and local Institutions, (i) Communities and Community Leaders, (iii) National NGOs, (iv) Community Based Organizations and, (v) International Organizations.

3. Given the social, political and environmental context, the project envisioned a balanced mix of community mobilization / empowerment processes and investments aimed at reducing communities' pressure on scarce natural resources such as water, wood and rangelands increasing as well the resilience of households and enhancing their adaptation capacity. Therefore, the promoted approaches are considerate appropriate and innovative.

4. The project was and still is in line with the national policies developed (i.e. National Biodiversity Conservation Plan 2015-2020) by the State to protect and enhance biodiversity, to adapt to climate change and to support rural development as well as with IFAD policies concerned with Environment and Climate Change and Rural Development (i.e. Environment and Climate Change Strategy). Project's objectives are consistent with IFAD's mandate, its Result Framework and with the current IFAD's Country strategy. The project remains consistent with focal areas and operational GEF strategies and addressed the needs of beneficiaries taking well into account GEF policies for targeting and natural resource management.

5. The theory of change is solid and well captured by the logical framework[3] of the project and the partnership strategy - identified to secure execution of activities as well as ownership and involvement of communities - is one of the assets of the project.

6. Risk and assumptions could have been more attentive to the importance of conflicts related to management of the Dana reserve that are still actual and that prevented the project not only to put in place the corridor between Dana reserve (Component 3 - Activity 3.2) and project areas but initially prevented community engagement of local communities into project's activities.

[3] The GEF-CEO Approved Logical Framework is reported in Annex II

7. Design overestimated the capacity of the Ministry of Agriculture to execute a project of such political relevance and this translated in about 2 years of delays mostly due to the fact that the executing partner could not secure the planned project management unit and management of the activities had to rely mostly on partners and IFAD**.** The mission could not determine objectively the causes that have delayed the government in ensuring the appropriate technical assistance. Nonetheless, from discussions with partners and other organization, it appears to be a common issue in remote districts of Jordan. Staff of the ministry appear to be reluctant in being relocated in such areas so that lack of technical staff as well as fast turnover of management and technician is a problem affecting projects in the southern governorates. The mission does not consider that the highlighted issue is a problem embedded in the design. While designing the project IFAD was probably well aware of the risks related to government performances and that is why the design team identified the described partnership strategy so to mitigate potential issues on that front. Nonetheless, such element could have been better reflected among the risks and constraints of the project. In conclusion the mission believes that, considering the business model of IFAD, the organization could not have not planned differently the project.

8. In addition to the proposed innovative and simple approach, the main factor that contributed to the positive conclusion of the project is the sound and wise partnership strategy developed during design. Without that, the project would have not been able to translate into action the proposed theory of change.

Concluding, the mission rated relevance of the project: **SATISFACTORY.**

Effectiveness

9. As reported in the previous paragraphs, the project started with a considerable delay and changed 3 project managers during execution. Regardless, thanks to the partnership strategy designed and supported by IFAD, the project managed to reach its objectives and deliver to and for local rural households. A complete analysis of project's achievements is included in Annex I.

10. In terms of execution, the project ensured all the activities but those related to Output 3.2 (A plan and implementation of cooperative activities between MOA and RSCN in the Dana NR Buffer zone). The project, as reported by the Project Management Unit and by Partners, stated that local communities refused to be in a project where Dana reserve was involved. Such hindrance from communities where the Dana Natural Reserve is mentioned is mostly due to the fact that Dana's communities perceive the Reserve as an imposition and feel that they have been deprived of their rights. Therefore, members of the Shobak communities fear that the same problems could arise also in their areas and refused to be involved in the project until the activity concerning the Dana Reserve was cancelled. The project therefore only executed the preparatory part of this activity and could not effectively execute the designed biodiversity corridor.

11. Expected outputs have been achieved in quantitative and qualitative terms and led to the intended outcomes by 70% and results meet quality standards. Table 2 below reports achievements and changes against targets as recorded during the mission from project documents, meetings with partners, beneficiaries, community leaders and involved partners.

Results Hierarchy	Summary of Achievements
Project Objective: To mainstream biodiversity conservation in sylvo-pastoral and rangeland management activities in the project area.	76%

Outcome 1: Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies.	100%
Outcome 2: An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity	54%
Outcome 3: Innovative pilot measures and introduction of Payment for Environmental Services" (PES)	73%

Table 2: Summary of Project's Achievements

12. As mentioned earlier, the project faced delays in the start-up phase due to late recruitment of dedicated staff and high turnover of project managers. This point was reported by IFAD to the GOJ in every supervision mission and related management letters. Nonetheless, budget as reported in the next section was fully allocated and spent according to the Financial Agreement. Funded activities are in line with project's logical framework, targeting strategy as well as with beneficiaries' needs.

13. Project M&E is probably the component that paid most the toll of delays and management turnover. M&E procedures are weak and fragile. Nonetheless, thanks to the partnership strategy identified at design, M&E was secured largely by project partners who are now in the process of updating files of the Ministry of Agriculture in project's area as well as briefing the newly appointed senior management of the region.

14. Having involved national and international organizations such as The Hashemite Fund for Development of Jordan Badia (HFDJB), the Royal Society for Conservation of Nature (RSCN), the Royal Botanical Garden (RBJ), the Jordanian Hashemite Fund for Human Development (JOHUD) and the International Union for the Conservation of Nature (IUCN) - ensured not only a clear and effective execution of project's activities but allowed also for a strong exit strategy that will allow the outcomes of the projects to impact long after the end of the project as well as in other regions of the Country.

15. Finally, while the project applied a remarkable partnership approach that factored in community needs, tribal influence and policy development, it concentrated mostly on engaging communities in biodiversity conservation and sound natural resource management, but omitted to involve and coordinate with some national organizations active in the same domain, such as NCARE, managing another GEF funded project based on biodiversity conservation and natural resource management (i.e. WB/GEF 5026 Badia Ecosystem and Livelihoods Project (BELB)).

16. The project did not formalize the exit strategy but included project's lessons learned and best practices in all its procedures[4]. Additionally, partners have included project's areas and

[4] A good example is the manual developed by IUCN to ensure effectiveness and efficiency of PES activities in Jordan. Practitioners' Manual: Payments for Ecosystem Services in Jordan, 2016.

beneficiaries in their strategies and plans so to ensure long term assistance to communities and local administration in managing biodiversity and ensure effective mainstreaming of biodiversity.

Concluding, the mission rated Effectiveness: **MODERATLY SATISFACTORY**.

Efficiency

Resources' Use

17. The project was funded with a total budget of USD 4,300,000 of which (Table 3):

Financier	***USD***	***%****
Ministry of Agriculture	3,000,000	70%
GEF	1,000,000	23%
RSCN	300,000	7%
Total Co-financing	**4,300,000**	100%

Table 3: Project Budget per Financier

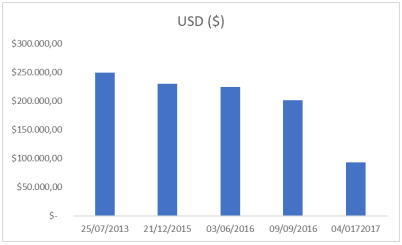

Figure 1: Disbursed Instalment (USD)

18. Notwithstanding the delays reported above, the project succeeded in spending almost 100% of the allocated budget and will return to IFAD and the GEF less than USD 2,000. While the budget invested by the Ministry of Agriculture was entirely spent by the Project management Unit, the remaining part of it (30%) was spent via the partners identified at project design (IUCN - USD 585,000: 58,5% and RSCN USD 121,000: 12,1%) and directly by the PMU (USD 293,000: 29,3%). Resources have been allocated by IFAD according to the trend reported in figure 1 above, and in line with the Annual Work Plan and Budget and disbursement capacity of the PMU. Allocated resources have been generally spent according to the Financial Agreement and in line with the project document report. Differences are noted in the Technical Assistance category that has been increased thanks to savings on training and vehicles.

19. Contributions from project financiers (Ministry of Agriculture), although delayed due to late first disbursement, have been confirmed and allocated according to project document report and budget. Contribution for RSCN (in kind) was allocated via technical studies and technical assistance from design phase to the Ministry of Agriculture and involved communities. Finally, cost of executed activities appears in line with expenditures of similar projects in Jordan while grant cost per household is USD 192[5] (cost per beneficiary: USD 38).

20. As already stated in the relevance and effectiveness sections, using local organizations as main execution partners played a major role in ensuring an optimal ratio between costs and benefits of the projects. While as reported in the impact sections, the mission could not assess impacts on households' assets, benefit of the project on biodiversity conservation and mainstreaming seems potentially positive.

21. Interviewed beneficiaries rated unanimously that PES activities had great impact on their lives thanks to financial and economic savings granted by simple practices and technologies such as the rain water reservoirs and solar heaters or by the economic activity support provided by the project (beekeeping, food/herbs processing). Additionally, communities expect great returns from the potential increase in grazing areas that the project allowed. As reported in the impact section, the mission could only report on community perception and visual observation on targeted grazing areas.

[5] Total number of beneficiaries: Households 657 (3350 beneficiaries) Project Documents and Data Set 2017.

Concluding, the mission rated Efficiency **MODERATELY SATISFACTORY.**

GOVERNMENT PERFORMANCE

22. Government performance has been rated against capacity to ensure smooth start-up and management of the project as well as against weight of the project management unit in the execution process. Project approval and start-up phase is characterized by the following milestones (Table 4):

GEF CEO Approval	09/05/2011
IFAD Approval	31/03/2011
Signature of the Agreement	12/04/2012
Entry into Force	12/04/2012
First Withdrawn	25/07/2013
Last Withdrawn	04/0172017

Table 4: Project Disbursement Timeframe

23. As per Table 4, notwithstanding IFAD aide memories, supervision reports, management letters and communications, the Ministry of Agriculture needed about 2 years to secure the project manager and did not manage to staff the PMU adequately. As a result, the project submitted its first withdrawn application with over one year of delay since entry into force of the agreement. Additionally, the project management unit changed project managers 3 times (almost once per year of execution). This has caused problems to the project momentum and reduced the overall capacity of the PMU to secure key processes such as procurement and M&E.

Concluding, the mission rated Government Performances: **UNSATISFACTORY**.

PARTNERS PERFORMANCES

24. The project was executed by the Ministry of Agriculture via its regional office in Shobak. The project included, as direct project partners, IUCN and RSCN. For the execution of activities, partners agreed on ensuring collaboration with local NGOs that are known in the country and that have offices in target areas so as to promote greater community mobilization and ownership. Structure of the partnership is reported below:

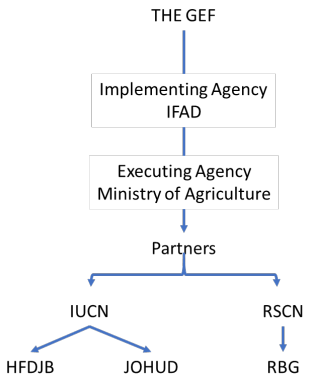

Figure 2:Project's Partners

25. The mission met with representatives of involved institutions and organizations as well as with communities and community leaders to assess the relevance and effectiveness of these institutions/organization in the field.

26. The partnership strategy, identified at design, proved to be successful and *de facto* allowed the project to reach most of its objectives and to recuperate most of the delays described in the previous sections. Interviewed community leaders, beneficiaries as well as ministry of agriculture's staff evaluate the involvement and active participation of the above-mentioned institutions / organizations as highly positive.

27. Having secured the involvement of local and international organizations that are active in the Country since several decades has allowed for a smooth and effective participation of communities and stakeholders. Furthermore, having each local organization represented at the very local level contributed in securing effective monitoring of activities as well as in building trust of community leaders and households that have had a constant and available reference point in their area. In fact, while IUCN developed and executed the mainstreaming components of the project, local organizations ensured not only the involvement and capacity development of beneficiaries but also the delivery of livelihood activities and technical assistance so as to ensure and enhance a conducive ground for biodiversity conservation and mainstreaming in Jordan.

Concluding the mission rated implementing partners: **SATISFACTORY**:

IFAD Performance

28. IFAD coordinated the design phase of the project and ensured a sound quality enhancement and process so to ensure a solid theory of change and a smooth implementation strategy. Furthermore, since start up, IFAD ensured seven field missions to support the MoA in planning and implementing the project, including the inception workshop, support the project team in terms of work planning, procurement, monitoring and reporting, engage necessary partners to support implementation and identify modalities for engagement of the partners.

29. In addition to the regular supervision missions, the implementing agency has invested as well in technical assistance (i.e. procurement) as well as in monitoring of project's achievements and partnership building with involved organizations and projects active in the same domain and region. Finally, in order to ensure the best possible assistance to the project, IFAD secured the assistance of a full time local consultant that has over 20 years of experience in the field of environmental project management. The consultant supported the project since its early beginning till present and supported IFAD in ensuring policy dialogue and effective development of identified partnerships.

Concluding the mission rated IFAD performances: **SATISFACTORY**:

PROJECT IMPACT

At the time of the mission, project impacts can be only estimated due to the fact that the required data could not be available at the time of the evaluation. This is explained by the nature of the project (policy mainstreaming and ecosystem restoration). Additionally, the objective of the project was not to increase assets but to ensure sustainable management of natural resources and biodiversity mainstreaming.

Household Assets

30. At the time of the mission, it was not possible to assess precisely if and how the project will have an impact on household's assets. Nonetheless, the nature and purpose of executed activities are expected to have not only a positive impact on local natural resources but also on the economy of involved beneficiaries and hence on their assets. In details, the activities executed under component 3 (*Innovative pilot measures and introduction of "Payment for Environmental Services" (PES)*) are expected to have relevant impacts on beneficiaries' assets. Table 5 below reports expected positive impacts and rationale.

Activity	Expected Impact on Households Assets	Rationale
Additional Grazing Opportunity	**Major**	The protection and enhancement of target enclosures and forests (about 2000 ha) will eventually reduce the time needed to graze animals and will increase the quality of meat and milk allowing for better market price.
Afforestation	**Medium**	Afforestation (30 ha within the Hisha reserve) will increase water retaining capacity and decrease soil erosion contributing therefore to improve the availability of those natural resources that are at the base of local economy.
Utilization of Non Timber Forest Products	**Low**	Although NTFP are expected to grow with afforestation and protection of rangelands, the activity is not expected to have relevant impacts on households' assets. The number of potential users greatly surpasses the potential of current and forecasted productions making the activity de facto economically less relevant. Although strongly connected, beekeeping and medicinal plant processing are not included among the NTFP products as these are described below.
Access to Garden Plots for Domestic or Commercial Use	**Medium**	The increased availability of water for beneficiaries (35 families) involved in the water collection activities will have more time and water to enhance current home gardens allowing as well for additional productions to be potentially sold at the local market.
Utilization of Medicinal Plants	**Major**	The use of medicinal plants in Jordan is well rooted in its culture and in its traditional pharmacopeia. Nonetheless, demand of such plants still exceeds the offer. Increasing local capacities to grow and process medicinal plants might therefore have a realistic major impact on households' assets and decrease pressure on wild specimens.
Bee Keeping	**Major**	The demand of honey in Jordan largely exceeds the offer and high quality honey can reach up to 10 JOD/kg (14 USD) in local markets. The distribution of beehives to 86 families as well as the training provided to poor households in target areas will most likely have positive impacts on beneficiaries' assets. Each of the 186 distributed beehives is reported active and households involved in this activity were among the most enthusiastic and active beneficiaries of the project.
Ecotourism	**None**	The activity was not implemented due to lack of interest of target communities
Craft Production (changed in fruit processing)	**None**	The activity was not implemented due to lack of interest of target communities. The project agreed with communities to provide the Jawharah Charitable Society (Community based organization of local women representing about 25 families) with training and equipment to convert unmarketable apples from local producers into vinegar. The activity could be profitable and will reduce post-harvest losses of apple producers increasing also the economic potential of members of the organization.

Water Conservation and Use	**Major**	Water being the limiting factor in target areas, increasing the availability of water at the household's level will have major impacts on their capacity to increase productivity of home gardens as well as providing animals with clean drinking water, increasing the quality and quantity of meat and milk obtainable from each head. Additionally, the project constructed water ponds for about 5000 m^3 thus increasing water availability as well as increasing the recharge capacity of local water sources.

Table 5: Expected Impacts on Households' Assets

Concluding, the mission rated Impact on Households' Assets: **SATISFACTORY**

Impact on Global Environment and Biodiversity

31. The project aimed at mainstreaming biodiversity conservation in Jordan and will most likely have positive impacts on natural resources / environment and support the development of national policies related to biodiversity management.

32. Expected impacts of local biodiversity are relevant and foreseeable. The combination of training, livelihood activities (PES) with fine-tuned community management strategies will reduce anthropic pressure on local natural resources and will allow natural regeneration of flora and fauna. Additionally, as confirmed in literature[6], activities such as beekeeping will ensure that involved communities see directly how biodiversity can be instrumental in sustaining livelihoods while at the same time enhancing local biodiversity. Interviewed community members involved in PES activities stated unanimously not only their direct engagement to prevent over exploitation of natural resources but also their interest in becoming actors of change among communities to promote conservation and protection of local ecosystems.

33. From the various interviews and meetings with partnering organizations and beneficiaries, it appears clearly that resources are exploited as a mean of survival and not for speculation. Hence, the importance of ensuring livelihood improvement and PES activities is a key element in forecasting positive impacts of project's interventions on local biodiversity and each of the executed activities has worked in that direction.

34. Unfortunately, due to the nature of the project, to the delays and to the socio-environmental context, it was not possible for the mission to assess objectively such positive impacts. Regeneration of natural resources in fragile contexts such as the Jordanian one requires time to be visible. The mission therefore could only assess the willingness of local communities and partners to ensure a conducive ground for positive impacts to concretize in the medium-long run.

35. Theories and practices that have been developed through the project will surely have a positive fall-out on global environment and biodiversity management practices both at national and international level. Analyzing impacts of the three executed components forecasts could be summarized as follows (Table 6):

Outcomes	Forecasted Impact	Rationale

[6] The Economies of Beekeeping in Jordan " by Shammout (2009) and The Monetary Value of Ecosystem Services Provided by Insects (A case study for selected crops in Jordan) by Shammout et al (2014)

Outcome 1: Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies.	**Positive**	Communities and decision makers have been provided with objective data on local biodiversity distribution, abundance and fragility as well as with clear and replicable tools to exploit the potential of available biodiversity without compromising it
Outcome 2: An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity	**Positive**	Communities and decision makers have been provided with objective data on local biodiversity distribution, abundance and fragility as well as with clear and replicable tools to exploit the potential of available biodiversity without compromising it
Outcome 3: Innovative pilot measures and introduction of "Payment for Environmental Services" (PES)	**Positive**	The project has promoted biodiversity management not only involving and empowering communities but also providing them with support aimed at diversifying their livelihoods and at reducing pressure on natural resources. Additionally, both the communities and decision makers have been provided with a tailored tool to manage natural resources at the local level.

Table 6: Outcomes Impacts on Global Environment and Local Biodiversity

36. In particular, the toolkit developed by IUCN could be easily replicated in other contexts and the Organization is already expanding its uses to other areas of Jordan as well as in other countries.

Concluding, the mission rated impact on Global Environment: **SATISFACTORY**

Adaptation on Climate Change

37. The project has addressed key elements related to Climate Change Adaptation. Beneficiaries have been involved in several training and capacity building activities to help enhance their capacity to manage and use available natural capital (rangelands, flora, soil and forests).

38. The extensive work done by project's partners in creating community based tools to manage natural resources as well as the attention given to introduce the concept of PES via target investments is most likely going to enhance sustainable use of natural resources and is already yielding results in terms of adaptation capacity as well as in terms of mitigation.

39. Via the various activities executed, the project has provided target beneficiaries with tools and knowledge to optimize the use of available resources as reported in Table 7.

#	Performed Activity	(HH)	Adaptation Impact	Notes
1	Development of a scientific Baseline of available flora in target areas	2200	**Knowledge** of available resources is a precondition not only for development but also for adaptation. Such knowledge is now available and **at the disposal of communities and decision makers** and constitute the corner stone of all future developments of the region	The study was done by RSCN and presented to the communities via dedicated training and focus groups. The same study was presented to Jordanian administrations (MOA, MOE, MOWI, JRV, NCARE) and is available online. A copy of the baseline is available as **Annex IV** to this document.

2	PES Activity: Rain Water Harvesting	35	Households have been provided with knowledge and technical assistance on **water savings** as well as on building underground **rain water collection** tanks. This has increased water availability throughout the year allowing the capacity of families to grow home gardens and to provide animals with water.	Each of the 35 families is using water mostly to grow crops and provide water points for animals
3	PES Activity: Beekeeping	76	The project distributed 186 beehives and provided the 76 households with training and market requirement/standards advise. Beekeepers are now on the frontline to **prevent overgrazing** as this will reduce the profitability of their business improving as well community **ownership of rangeland and biodiversity.** The introduction of beekeeping allows also **diversification** of activities reducing relevance of animal husbandry in the economy of target households.	To be noted here the important work done by the HFDJB in supporting beneficiaries with market analysis and training on quality standards, branding and other key element that are conducive to access modern markets
4	PES Activity: Solar heaters	75	The project distributed 76 solar heaters to poor families residing in proximity of forests. This family have been selected because of their high dependency on fuelwood to satisfy their needs of water heating. Thanks to such distribution households dispose of free hot water for all sanitation and food preparation needs and their dependency on natural fuelwood is reduced by over 80% allowing for women to be occupied in other activities and to **reduce impacts on scarce forest resources** and **reduce direct dependency from natural resources**.	The activity is relevant and interesting not only for the reported adaptation impacts but also for the strategy adopted by JOHUD (partner in charge of the activity) that agreed with the communities that beneficiaries will have to contribute with 50 JOD. JOHUD, in agreement with beneficiaries and community leaders, invested the obtained balance into community reforestation of 50 ha of damaged forest. The activity increased ownership of communities, increased local forest cover and provided jobs for unemployed youth from target communities.
5	PES Activity: Medicinal Plant Processing	35	Growing medicinal plants in home gardens and collecting them from the wild according to training and collection methods practices will increase diversification and ownership of local **biodiversity** that will become clearly i**nstrumental to households' economy** and will reduce dependency on animal husbandry.	The positive impact of medicinal plants is well documented in the project report.

Table 7: Summary of main adaptation impacts of the project

Concluding, the mission rated impact on Climate Change Adaptation: **SATISFACTORY.**

Gender Equity and empowerment

40. As per the project document, the project aimed at ensuring that at least 10% of beneficiaries are women. While the target had been reached (10%), the mission noted that the project did not really capture the important role of women in managing natural resources, adapting to climate change and last but not least in being effective and efficient actors of biodiversity protection and conservation.

41. From the analyzed documents, as well as from interviews and field visits, the mission noted that women have not been fully included in all the activities related to management of natural resources. Women were mainly involved in food processing activities.

42. A good example of the described situation, also highlighted by the head of the Women Cooperative (**Jawhara Women Organization**), is the fact that no women had been included in the study tour in Lebanon (REF: Annex II and no women was selected among the community leaders.

Therefore, although the project has included women and has reached its target, it lost a unique chance to empower women in management of natural resources and leadership.

Concluding, the mission rated Gender Equity and Empowerment: **MODERATELY SATISFACTORY.**

Impact on Human and Social Capital and Empowerment

43. The project had a tangible and well document impact on target communities. The various activities of training, awareness and community participation have brought a new set of competences and have allowed for extensive knowledge sharing within the country and in the region. Activities like the study tours and the knowledge management fairs allowed target communities and their leaders to be exposed to alternative and more sustainable ways to manage resources and ensure successful livelihood activities. As reported in the introductory paragraph to this chapter the mission could only base its analysis on data from the project and on interviews with beneficiaries, community leaders and partners. Among these there is consensus that the project created a momentum of positive change among communities and this is expected to have a positive impact as well as on natural resources and livelihood.

Concluding, the mission rated Impact on Human and Social Capital and Empowerment: **SATISFACTORY**

Food Security and Agriculture Productivity

44. Food security and Agriculture Productivity were not among the targets of the project and were not considered in the logical framework. Nonetheless, addressing key issues such as pasture availability and abundance (after restoration) and supporting diversification of livelihood strategies (including green house agriculture and agro-transformation) will most likely have a positive impact on food security and agriculture productivity of target communities that, has seen by the mission, have already started their own investments, as a follow up of project's support and trainings processes, into greenhouse agriculture and water saving technologies such as drip irrigation.

Concluding, the mission rated Impact on Food Security and Agriculture Productivity: **SATISFACTORY**

SUSTAINABILITY

45. The theory of change of the project is simple and well structured. Introduced innovations are in line with local capacities and traditional knowledge and represent an interesting approach to evolve and contextualize regional traditional knowledge of natural resources.

46. As reported in various parts of the document, the strength of the project was the capacity to create a solid and effective partnership involving stakeholders transversally and to secure participation with support to those that are more vulnerable or more depended on local ecosystem services to sustain their livelihoods and, in some cases, survival.

47. Thanks to the above, project's beneficiaries as well as theory of change have been fully embodied not only in key national strategies such as the Biodiversity Conservation Action Plan 2015-2020 but are also included in the working plan and strategies for the next five years of each partner.

48. Therefore, although the project did not formalize its exit strategy into a clear document, the strategy is de facto demonstrated by the catalytic effect of the project, by its cost-effective

replicability and ultimately by the fact that other projects in Jordan are adopting the same principles and approaches versus a more traditional top down approach.

Financial Sustainability

49. The project aimed at ensuring community management of local biodiversity and in providing livelihood assistance to target communities to lower impact and dependency on local natural resources. As the project succeeded in creating mechanisms of community participation as well as management of natural resources simply changing the approach of users towards natural resources and supporting livelihood diversification to reduce dependency and increase income, the mission does not recognize any limiting factor to financial sustainability of the project. Procured equipment and introduced technologies have no additional maintenance and operation cost. Each of the beneficiaries had been trained on regular maintenance and in case of extraordinary interventions, skills and spare parts are available locally at affordable costs.

50. Funded livelihood activities are in favor of a strong financial sustainability as delivered technologies and practices will maximize and optimize the use of available financial, human and natural resources of beneficiaries. As also reported by the GEF in 2015 simple technologies such as solar heaters can effectively and efficiently curb illegal logging and deforestation[7] and will reduce time needed (mostly by women) to fetch wood and use it for cooking and water heating purposes.

51. Finally, each of the livelihood activities supported by the project was associated with a dedicated market analysis as well as with assistance (technical and financial) to reach market standards and obtain national standards to ensure premium prices. That is the case for each of the processing activities supported by the project through HFDJB.

Concluding the mission rated Financial Sustainability: **Likely.**

Socio-political Sustainability

52. The project put in place, via various effective partnerships, an innovative bottom up methodology to enhance management of biodiversity (IUCN Toolkit for Mainstreaming Biodiversity in Jordan[8]) and piloted a concreate and replicable set of options for Payment for Ecosystem Services (PES)[9]. Nonetheless, it is yet not clear to the mission how decision makers at the central level will translate the proposed set of practices and methodologies into actions. In fact, although PES activities represented less than 10% of the total project's budget, future policies and national strategies will have to factor in support to communities engaged in natural resource management and the question of public financing of such approach remained unanswered.

53. On the contrary, the mission could appreciate how communities have engaged in the proposed process and how ownership of biodiversity seems to be perceived as a development opportunity. Community leaders confirmed this point also highlighting how relevant it is to ensure support of communities in addition to simple involvement.

Concluding the mission rated Socio-political Sustainability: **Moderately Likely.**

[7] https://www.thegef.org/news/solar-heaters-curb-illegal-logging-and-deforestation-jordan

[8] https://www.iucn.org/content/toolkit-mainstreaming-biodiversity-jordan and https://www.iucn.org/sites/dev/files/content/documents/policy_brief_-_promoting_exchange_for_conservation-final.pdf and https://portals.iucn.org/library/sites/library/files/documents/2015-037.pdf and https://www.iucn.org/content/promoting-novel-approaches-mainstreaming-biodiversity-jordan

[9] https://www.iucn.org/regions/west-asia/our-work/drylands-livelihood-and-gender-programme/mainstreaming-biodiversity-sylvo-pastoral-and-rangeland-landscapes-al-sharah

Technical Sustainability

54. The whole project is based on simple and transversal community management of natural resources. There was no introduction of technologies or practices that requires specific technical skills or knowledge.

Concluding, the mission rated Financial Sustainability: **Likely.**

Institutional Framework and Governance Risk

55. Natural resource management in Jordan is "shared" by different authorities with a diverse set of mandates. Ministry of Environment, Ministry of Agriculture, Ministry of Water and Irrigation, Jordan River Valley Authority are just few among the many that might or do have a say on natural resource management and therefore on biodiversity management. Additionally, the political weight of tribal traditions on policy related to natural resource management and biodiversity conservation should not be underestimated.

56. The large number of institutional actors might reduce effectiveness of governance and permeability of innovative practices such as the ones piloted by the project. Additionally, the high turnover of administrative staff might prevent a true execution of designed policies and strategies.

Concluding, the mission rated institutional framework and governance sustainability as: **Moderately Likely.**

Environmental Risk

57. The whole project aimed at mainstreaming biodiversity and the whole set of activities funded under its umbrella do not pose risks for the environment. On the contrary, funded activities are key in promoting optimization of natural resources and in reducing anthropic impact on ecosystems and biodiversity.

Concluding, the mission rated environmental sustainability as: **Likely.**

Climate Change Sustainability

58. Climate change is already severely affecting Jordan with water scarcity and increased temperatures. Forecasts assumes that negative impacts will increase in time and that stresses on communities and livelihoods will increase as well with possible conflicts arising over control of scarce resources such as water, land and biodiversity[10]. The project has taken this into consideration and worked with the communities so to ensure efficiency and foresight in managing local natural resources. Each of the activities planned by the project and executed during implementation is effectively increasing communities' resilience and reducing their adaptation gap. Table 6 above presents evidence of such sustainability.

59. Although as reported in Annex I the project did not produce any specific document/study/tool related to conflict resolution, the tools and methodologies introduced could, if properly absorbed by administrators and decision makers, play a major role in mitigating future conflicts related natural resource uses.

[10] http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=JOR&ThisTab=ImpactsVulnerabilities

Concluding, the mission rated climate change sustainability as: **Likely.**

TARGETING AND OUTREACH

60. Rangelands in project area are characterized by effective traditional land tenure systems and grazing rights which are associated with tribal institutions. Traditionally, boundaries where one group's authority ended, and another's began, were simply 'known' and respected by others. This protected resources and organized their use in a way that assisted in their conservation and continued productivity under the prevailing environmental and social conditions.

61. With the elimination of these systems and rights and declaration of grazing lands as state-owned land open for everybody, overgrazing and early grazing of range plants, plowing of rangelands to establish ownership rights and uprooting of bushes for use as fuel wood became more frequent and contributed to the well-known severe deterioration of soils and biodiversity as well as to the impoverishment trend of former Bedouin populations.

62. Many individuals or families in the project area consider themselves as having rights in rangeland and can classify an area as their 'traditional' grazing area. However, this does not mean they have any mechanism to prevent outside herds from coming in. The local community initially opposed the creation of the rangeland reserve since they consider those lands as an area of land traditionally used for grazing. It is clear that it is not in the immediate economic interest of individual producers to conserve the rangeland.

63. An important element that the mission considers necessary to be highlighted is that households (irrespective of their income) have never been restricted from using natural resources. On the contrary communities have been trained to use them sustainably and to diversify their activities so to reduce their dependency and increase their resilience.

64. In other words, the mission recognizes the intricacy of the social context and therefore the complexity of ensuring a transparent and pro-poor targeting mechanism. The project managed to mitigate the described situation via the creation of community committees that worked with the local administration, community leaders and representatives of the involved organizations. The high importance given to communities and their participation/ownership of management of natural resources brought PMU and partners to slightly modify target areas of the project. While targets, activities and outcomes remained unchanged the project decided, with IFAD agreement, to change one of the selected areas - Fujaij Reserve – in favor of the Mashieh one. The change is justified by the fact that the originally selected reserve is isolated with no communities living in its vicinity. The areas is therefore considered less at risk from anthropic pressure while Mashieh on the contrary is subject to constant pressure from local communities as well as from nomadic herders.

65. In the context described in the previous paragraphs, the project targeted directly over 650 households and reached out a community of over 2200 households. Outreach of communities had been secured thanks to the active involvement of key local organizations such as JOHUD and HFDJB that have permanent community development offices (3) in target areas and that are reputed rural development actors in Jordan. Furthermore, thanks to the involvement of IUCN, the project managed to reach out as well to decision makers and authorities as planned in the project document report.

66. The project recognized, as part of its founding strategy, the importance of local community involvement in decision-making over their natural resources in order to encourage local

sustainable development. Accordingly, local communities made the effort to control the area against intrusive herds or even against their own members overusing the resources.

67. The project followed the targeting strategy identified during design and reached out beneficiaries according to the following criteria:

- Part of communities living in or close by target rangelands and forests.
- Poor household.
- Women-headed household.

Similarly, the project involved institutions and organization according to the following criteria:

- Mandate include or depend on biodiversity and natural resources
- Presence in target areas
- Experienced in grass roots development and community outreach.

68. To select direct beneficiaries, the project applied a methodology whereby final direct beneficiaries (i.e. receivers of PES assistance or technical assistance) have been selected via community workshops, mediated by involved local organizations and community leaders, so to ensure precise targeting of the poorest and avoid elite capture. The entire identification of needs as well as of beneficiaries had been managed by communities themselves. While IUCN recorded precisely every step of the targeting process, the same cannot be assessed for beneficiaries that have been directly involved by the Ministry of Agriculture with its co-financing. Although current management informed the mission that they applied the same criteria this cannot be confirmed by evidence.

69. The project applied a gender sensitive approach to beneficiaries' selection and implementation ensuring women and women groups' participation to training and livelihood activities. Nonetheless, as described in the previous sections (*Ref: Gender Equity and Empowerment Impact*) the project involved women in traditional activities such as food processing and lost the chance to ensure substantial participation of women and women groups into management and mainstreaming.

The mission rated targeting and outreach of beneficiaries and key institutions: **MODERATLY SATISFACTORY**

INNOVATION

70. The project was designed to pilot in Jordan arid lands two innovative concepts:

- Community based natural resource management (Hima) and,
- Payment for Ecosystem Services (PES).

71. Both concepts have been designed and developed by IUCN and have been executed by IUCN with the RSCN, JOHUD, RBG and HFDJB under the supervision and guidance of the Ministry of Agriculture.

72. The applied innovations are in line with key national strategies (i.e. The National Biodiversity Conservation Strategy 2015-2020[11]) as well as with IFAD policies and guidelines (I.e. IFAD

[11] https://www.cbd.int/doc/world/jo/jo-nbsap-v2-en.pdf

Environment and Climate Change Strategy). Although both concepts are not new in other parts of the world, these are new in the Jordan context and in areas where tribal influence on natural management is still in place. Both concepts have been piloted and tested in project's area following, with minor adaptations, the strategy identified in the project document report.

73. While the PMU was not capable of effectively monitoring and following up on the strategy due to lack of technical staff, each partner carefully tracked down the process as well as its various achievements. These are included in the knowledge management package produced by the partners as part of the project and available on IUCN website.

74. The strategy as well as milestones and achievements have been presented to all involved stakeholders including the National Institutions both at central and national level. Additionally, partners (i.e. IUCN) have included both innovations in their social campaigns and both are well documented in their websites.

Concluding, the mission rated Innovation: **SATISFACTORY**

KNOWLEDGE MANAGEMENT AND SHARING

75. The project based its strategy on promoting sharing of practices and knowledge between "traditional" actors such as Government entities, sectorial organizations (both national and international) and communities.

76. Training, workshops and focus groups[12] have been promoted to ensure not only community participation but as well to ensure enhancement of human capacities and knowledge as a key activity to ensure efficient and effective community management of natural resources and biodiversity conservation.

77. As per reviewed documents, interviews and discussions with different project's stakeholders, the project succeeded in mainstreaming biodiversity conservation from communities to decision makers and developed a series of tools and methodologies[13] (i.e. toolkit, PES program, Technical Assistance, Partnership with local and international organizations) that are already being adopted by other projects and partners in Jordan and that can as well be transferred and translated to other communities in different contexts.

78. A series of papers and toolkits were made available to the mission but unfortunately, being the large majority of these in Arabic, their exportability seems to be reduced. Finally, activities and methodologies are well reported in the websites of partnering organization such as IUCN including a short documentary that summaries the relevance and importance of the project and its achievements.

Concluding, the mission rated Knowledge Management and Sharing: **SATISFACTORY.**

MONITORING AND EVALUATION

79. The mission followed the set of indicators provided by the project logframe (Annex II) and the GEF tracking tools. As reported in different sections of this evaluation document, outcomes and impact indicators cannot be objectively assessed right after the end of the project. The

[12] Details are provided in Annex I

[13] Documents are downloadable here: A, B, C, D

executed activities will most likely have positive impacts on biodiversity and availability of natural resources but this can be assessed only once the target ecosystems will have had the time to regenerate (see comment on NDVI). Data collected and interviews with beneficiaries drove the mission towards the optimistic assumption that impact will be visible in 5 years and that this impact will be reflected on households and verifiable via the approved set of indicators.

Design

80. The project document report included a detailed and sound description of the M&E strategy and processes of the project. A detailed responsibility and deliverable table was available including a detailed budget of each planned activity.

81. Overall, the identified set of indicators is simple, measurable, achievable and, given the nature and context of the project, time bound. Means of verification are clear, coherent with project's strategy and accessible. More efforts could be made in externalizing the means of verification that appears too project centric and therefore potentially subject to bias. M&E costs are clearly reported in the budget.

Concluding, the mission rated planned M&E (Design): **SATISFACTORY**.

Project implementation

82. While the M&E process is clearly described in the project document, the project did not ensure a smooth and clear execution of the given strategy. Regardless of what is stated in the project document and what was agreed on within the Financial Agreement, the Ministry of Agriculture – Project's Executing Institution – did not allocate the appropriate human resources to ensure a full and clear M&E process. Due to the large delay with which the MOA assigned staff to the project and because of the high turnover of project managers (3) the project did not really follow up on M&E.

83. Nonetheless, the partnership identified at project design and enhanced by IFAD during project's execution secured data collection, monitoring and evaluation. The entire set of data as well as reports on activities was provided by partners and is now being shared and filed in the Ministry of Agriculture archives to ensure the success of the IUCN and MOA exit strategy and to secure the institutional memory of the project within the Ministry.

Concluding, the mission rated M&E (Implementation): **MODERATLY UNSATISFACTORY**.

LESSONS LEARNED

84. There are several lessons learned from this project. The first is surely that in the given context, partnership with local and international organizations is proven worth the investment. The second one is that participation and support to communities facilitate management of biodiversity and ensure ownership of project's activities. In these regards, the project demonstrated that simple activities that are not expensive and that are easily replicable can secure major change.

85. As reported in the previous paragraphs (Ref: Impacts), it is too early to evaluate impacts on biodiversity and on rural poverty. Nonetheless, the project leaves a heritage of regained trust among communities and a precious tool for decision makers to really protect and enhance biodiversity.

86. Lesson learned have been summarized in a specific report by RSCN and IUCN and are available (in Arabic) on the respective websites.

Concluding, the mission rated Lessons Learned: **SATISFACTORY**

POTENTIAL FOR SCALING-UP (CATALYTIC ROLE)

87. One of the main objectives of the project was indeed to ensure biodiversity mainstreaming among stakeholders. The project therefore piloted a series of activities and methodologies that have allowed a conducive ground to effectively and efficiently mainstream biodiversity and partners are already replicating, mostly with Government funds, the tested innovations in other areas of Jordan.

88. New projects have been designed to expand and replicate the proposed theory of change and international organization such as UNEP and IUCN are already exporting the applied methodology to other countries and contexts.

Concluding, the mission rated Lessons Learned: **SATISFACTORY**

CONCLUSIONS AND RECOMMENDATIONS

89. In spite of the reported delays, the project achieved its objectives and demonstrated the relevance and potential of biodiversity mainstreaming. The partnership established by IFAD at project design proved to be successful and de facto allowed for mitigation and surpassing of difficulties.

90. Communities have been efficiently engaged and mobilized and the mission could appreciate how the combination of participation and livelihood support is indeed among the best tools to secure biodiversity management as well as mainstreaming.

91. Objectives of the project have been achieved by over 80% and each of the analyzed parameters demonstrate that sustainability of the projects is secured. The exit strategy of the project is clear, achievable and secured by adequate financial resources. The project succeeded in successfully managing and sharing the acquired knowledge and the same had been mainstreamed transversally between involved communities, development actors and decision makers in Jordan.

92. The various innovative approaches (in Jordan) piloted by the project via its main partners appears replicable in Jordan and in other similar contexts. Scaling up potential is therefore clear. In this regard, the mission could appreciate that the theory of change of the project is already part of key policies in Jordan as well as investments funded, among the others, by the GEF.

93. As reported, the project is an interesting example of biodiversity mainstreaming, nonetheless the mission recommends the following:

Recommended Action	Main Actor	Timeframe	Priority

• Although Dana reserve was excluded by the communities for the reasons expressed above, stakeholders should understand and analyze the main problems of Dana's communities and include them in the project exist strategy to demonstrate achievements and recreate an environment of trust.	RSCN/IUCN	As Soon as Possible	High
• Organize an informal workshop to gather state institutions as well as project's partners (including GEF focal point) to analyze project's bottlenecks (management and follow up).	MOA/IUCN	As Soon as Possible	High
• Although partners are present in project areas with their community development centers, secure dedicated follow up on communities and on biodiversity management on a regular base.	Project Partners	Every six months	High
• Involve national academia in monitoring impact on Himas and in general on local biodiversity so to capitalize and maximize the investment done via RSCN to prepare the biodiversity baseline.	MOA	Every two years	Medium

RATINGS

Criterion	PCR Rating	
Project Performance		
- Relevance	**5**	**S**
- Effectiveness	**4**	**MS**
- Efficiency	**4**	**MS**
- Sustainability	**5**	**S**
Assessment of Risks and to Sustainability of Project's Outcomes		
(GEF) Financial Risks	**L**	**-**
(GEF) Socio-political Risks	**L**	**-**
(GEF) Institutional Framework and governance risks	**ML**	**-**
(GEF) Environmental risks	**L**	**-**
Assessment of M&E System		
M&E Design	**5**	**S**
M&E Implementation	**3**	**MU**
Rural poverty impact		
- Households' incomes and assets	**5**	**S**
- Human and social capital and empowerment	**5**	**S**
- Food security	**5**	**S**
- Agricultural productivity	**5**	**S**
- Institutions and policies	**4**	**MS**
- **Overall rural poverty impact**	**5**	**S**
Additional evaluation criteria		
- Gender equity and women's empowerment	**4**	**MS**
- Access to markets	**5**	**S**
- Innovation	**5**	**S**
- Potential for scaling up (Catalytic effect)	**5**	**S**
- Environment and natural resource management	**5**	**S**
- Adaptation to climate change	**5**	**S**
- Targeting and outreach	**4**	**MS**
Partners performance		
- IFAD's performance	**5**	**S**
- Government performance	**2**	**U**
- Partners performance	**5**	**S**
Overall project achievement:	**4**	**MS**

Table 8: Detailed Project's Ratings

ANNEX I – Detailed Analysis of Project's Achievements

Hierarchy	Indicators	Targets	Achievements	Notes
Project Objective: To mainstream biodiversity conservation in sylvo-pastoral and rangeland management activities in the project area.	Improvement of plant and animal biodiversity in targeted sites	NA	NA	Context and timing of the project did not allow for a precise verification of the indicator. According to communities and project executors the improvement is visible and tangible. Nonetheless, since the project do not dispose of media or annual analysis based on a scientific methodology that can prove such position the mission decided to refrain from providing estimations on this point.
	1400 ha of rangeland systems contribute to biodiversity conservation	1400ha	Over 2000 ha of which 50 have been replanted and 30 afforested with community contribution	The project created the conditions for the targeted areas to potentially contribute to biodiversity conservation. The mission requested several time maps and geographical coordinates but never received them from the project of partners.
	Income increase from biodiversity-related livelihood opportunities	NA	NA	The nature and timing of the project do not allow for a precise verification of the indicator. More details are provided in the paragraphs dedicated to impacts to households' assets.
Outcome 1: Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies.	# of training modules developed and translated	8	27/8 (>100%)	Communities have been trained on 27 different topics. In this regards the project overachieved supporting communities with additional trainings related to sustainable management, use and marketing of natural resources.
	# of training sessions implemented (8 sessions by PY4)	8		
	Knowledge material produced, translated and disseminated	Not Specified in PDR	5	The project produced one documentary, a mainstreaming biodiversity kit, a PES development kit, a best practice and lesson learned document and several brochures on specific project themes.
Output 1.1 Training courses concerning the value of biodiversity and its potential local and regional economic benefit.	20% of the population of the communities trained by PY4	20%	23%	Data derived from reports received by the project and its partners according to logframe matrix means of verification.
	40% of the population with an increased awareness of the value of biodiversity area and its objectives by PY4	40%	60%	

	50% of the core communities of the Al-Fujij rangeland and Al-Hisheh sylvo-pastoral reserves participate to the activities of the project by PY4	50%	60%	
Output 1.2 A tool-kit for mainstreaming biodiversity in sylvo-pastoral/rangelands	Design and completion of the toolkit with IUCN assistance and intensive stakeholder involvement by PY1	1	1	The kit is available, shared with communities, partners and decision makers. The kit is as well available on line.
	30 % of land owners/users engaged is enhanced to support biodiversity mainstreaming in the sylvo-pastoral and rangeland ecosystems policies and practice	100%	NA	It was not possible to determine this achievement. The toolkit is still in its promotion phase and executors do not dispose yet of objective data on it
Output 1.3 New knowledge management and information sharing systems.	Completion of the knowledge management system within MOA At least 2 partnerships developed between agency and community for knowledge sharing and project programming	2	2	RSCN established the 2 partnerships with the MOA and the communities but the low level of engagement of the MOA at local level is jeopardizing the partnership.
	2 annual 'Knowledge Fairs' and 2 workshops held	2	2	Both IUCN and RSCN ensured participation to national KM fairs. Additionally, during all national and international conferences, workshops, and national meetings attended by both organizations flyers, brochures, and videos on biodiversity and the project has been presented and made available. ON this front both IUCN and RSCN actively participated in sharing the acquired knowledge and experiences
Output 1.4 Regional study tours to areas	4 Annual Regional study tours	4	3	The project organized one study tour in Lebanon and two in to

with biodiversity mainstreaming techniques already in place.	completed			protected areas of Jordan. The project decided to concentrate resources and time to visit a protected area (Lebanon- Arz Shouf Cedar Reserve) of international relevance where community management of NR had resulted in being among the keys of success
Outcome 2: <u>An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity</u>	20% of local communities supported to strengthen participatory relations with MOA and other stakeholders Measurable improvements (30%) in overall community support and involvement	20% + 30%	20%+30%%	Due to the high turnover within the PMU as well as within the local office of the Ministry of Agriculture, it was not possible to asses directly this specific achievement. Nonetheless, from the documents produced by project's partners and interviews with community leaders the target was reached.
	Options for new community co-management mechanisms investigated and tested by PY3	NA	1	IUCN has introduced and developed with target communities the concept of Hima
Output 2.1 Documented roles and responsibilities for community involvement in rangeland and sylvo-pastoral reserve management.	No indicator provided	NA	NA	IUCN carried out an assessment on the environmental and agricultural knowledge and practices in each of the project area. Additionally, with a participatory approach they prioritized the needs of each region and the sub-activities of the project in line with the strategic plan and vision of each region.
Output 2.2 Establishment of traditional "Hima" mechanisms for stakeholder involvement in biodiversity conservation	In consultation with community leadership and relevant stakeholders re-introduce the Hima approach and mechanism on a pilot basis in 2 sites (500 ha by PY3)	500ha	500 ha	A joint team was established from (MoA, HFDJB, IUCN), preparatory meetings were held with local community and stakeholders and several workshops were conducted gathering each stakeholder identified via a specific stakeholders' analysis performed by IUCN and partners
Output 2.3 Implementation of the legal and institutional framework for co-management and biodiversity conservation within MOA reserves and the project area.	New legal mechanism drafted and introduced as appropriate by PY3	No specific target identified	20%	No clear document reflects the conduction of a policy study on the available legal mechanism. However, and through MoA's representative in the Project, it has been possible to be introduced to the active laws, by-laws, and regulations.

Output 2.4 Supplementary ecological baseline research within each exclosure and within the project area and along the ecological west –east gradient Output 2.5 Detailed plans for potential expansion, co-management and biodiversity mainstreaming in each MOA exclosure.	Data available by PY2 Implementation of the expansion plans and completion of a biodiversity conservation plan and implementation schedule Plans completed and implemented by Q16 (with interim targets specified during the Inception Phase	1	1	RSCN developed the baseline for the target areas. The baseline is at the disposal of the Ministry of Agriculture and of communities for the needed following up activities.
Output 2.6 Conflict resolution /arbitration systems.	Development and putting in place of the conflict resolution system (and using it if necessary) System established by the end of Q3	No target available	NA	Project staff and partners claims that the very same project is a conflict resolution methodology and that reestablishing the Hima is de facto a tool for conflict resolution as it brings back to communities the responsibility of ensuring health and availability of biodiversity. The activity is therefore considered not done.
Output 2.7 Documentation and replication of lessons-learned.	Staff assigned to document lessons-learned.	100%	100%	Partners ensured documentation of lessons learned. These are also available on their websites
	Reports produced and disseminated	No target available	5	
Outcome 3: <u>Innovative pilot measures and introduction of "Payment for Environmental Services" (PES)</u>	Establishment of Jordan's first Payment for Ecological Services pilot activities.	1	1	The activity was fully implemented
	Re-introduction of Hima community co-management mechanisms to at least 2 areas in 500 ha by PY3	500ha	500ha	A joint team was established from (MoA, HFDJB, IUCN), preparatory meetings were held with local community and stakeholders and several workshops were conducted gathering each stakeholder identified via a specific stakeholders' analysis performed by IUCN and partners
Output 3.1 PES pilot activities at Fujaij Rangeland Reserve and at at Hisheh Sylvo-pastoral Reserve	Establishment of an intensive stakeholder process for the design and implementation of the PES process by PY2.	1	1	Pilot groups were formed within the work scope of the project and Several meetings were held with local committees, community members and representatives from the MoA, HFDJB and the other partners

	1. PES pilot activities designed and tested by PY2	9	9	PES activities have been designed and executed. These included small business development (beekeeping and food processing) for local groups and solar heaters, water harvesting reservoirs for poor households. The area of Fujaij was changed with Manshieh due to higher priority of the area in terms of biodiversity and anthropic pressure (no communities leaving in the buffer zone)
	Formal mechanism for dialogue with Dana Dibeen, Ajloun and Yarmouk NRs and related RSCN initiatives	No target available	20%	The activity was only partially executed due to lack of willingness of involved communities to be involved with the Dana Reserve and its management.
Output 3.2 A plan and implementation of cooperative activities between MOA and RSCN in the Dana NR Buffer zone.	An implementation plan of cooperative activities between MOA and RSCN established, approved and functional by PY2	1	1	The mission could not verify if the described agreement is functions. The person in charge of such agreements at the local branch of the MOA has just been appointed and had no record about such agreement. Unfortunately concerned RSCN staff was not in the Country during the evaluation
Output 3.3 Documentation of the principles, processes and benefits of the results of the PES pilots among the ADDSR and local communities	Quantity and quality of Knowledge generated and shared on PES	No target available	1	IUCN developed for the project a PES Manual, a Toolkit for biodiversity management a webpage and an economic evaluation of PES relevance in biodiversity management (in Arabic only).
Outcome 4: Project Management and Evaluation	All of the management mechanisms are in place, staff are trained and the M&E system is functional by PY1	100%	50%	The PMU was late in being effective and was never properly staffed. The M&E strategy of the PMU is weak. In the 4 years of execution the project changed 3 project managers. This had negative effects on the project

Table 9: Summary of Achievements against Targets

ANNEX II – GEF PROJECT FRAMEWORK AND LOGICAL FRAMEWORK

Project Objective: To mainstream biodiversity conservation in sylvo-pastoral and rangelands in the pockets of poverty of Jordan through the promotion of an enabling environment (policies, capacity, knowledge, and market incentives) that will be beneficial to local livelihoods and yield global environmental benefits. The project seeks also to promote innovative pilots for PES and investment support to biodiversity conservation.								
Project Components	Investment, TA, or STA[2]	**Expected Outcomes**	Expected Outputs	GEF Financing[1]		**Co-Financing[1]**		**Total ($)**
				($) a	**%**	**($) b**	**%**	c=a+ b
1. Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies	TA	1.1 Training courses concerning the value of biodiversity and its potential local and regional economic benefit. 1.2 A tool-kit for mainstreaming biodiversity in sylvo-pastoral/rangelands 1.3 New knowledge management and information sharing systems 1.4 Regional study tours to areas with biodiversity mainstreaming techniques already in place	Eight Training Courses on: -PRA/RRA -Traditional Knowledge -Community Co-management -Rangeland Rehabilitation Practicum -Afforestation Practicum -Water harvesting Practicum -Biodiversity Basics -Endangered Species Participatory Toolkit Preparation Knowledge management system Knowledge Management Fairs	266,600	26	424,000	13	931,600

			2 study tours					
2. An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity		2.1 Documented roles and responsibilities for community involvement in rangeland and sylvo-pastoral reserve management 2.2 Establishment of traditional "Hima" mechanisms for stakeholder involvement in biodiversity conservation. (or "co-management committees") 2.3 Implementation of the legal and institutional framework for co-management and biodiversity conservation within MOA reserves and the project area 2.4 Conflict resolution /arbitration systems 2.5 Ecological assessments within each exclosure and within the project area and along the ecological west-east gradient	Participatory planning for community participation options Re-establishment of stakeholder based Hima systems in and around the exclosure Policy study of available legal mechanisms. Pilot new contract system for community co-management and/or Hima Assessment and monitoring of biodiversity benefits. Potential Expansion of each exclosure Completion of a conservation management plan at each exclosure Conflict Resolution system established	302,100	30	956,000	29	1,258,100

		2.6 Detailed plans for potential expansion and biodiversity conservation management programming in each exclosure 2.7 Monitoring, documentation and replication of lessons-learned	Completion of Best Practices documents and related publications Completion of a strategy paper on the sustainable financing of the exclosures					
3. Innovative pilot measures and introduction of "Payment for Environmental Services" (PES)		3.1 PES pilot activities at Fujaij Reserve and Hisheh Sylvo-pastoral Reserve 3.2 A plan for and implementation of the connectivity corridor as a cooperative activity between MOA and RSCN in the Dana NR Buffer zone 3.3 Documentation of the principles, processes and benefits of the results of the PES pilots and distribution among the ADDSR and local communities	PES Activities designed and implemented Establishment and Implementation of a MOA/RSCN Cooperative biodiversity corridor Design and development of marketing tools to support involvement of and benefit to local communities Documentation and Distribution of the results of the PES experience	331,300	34	960,000	29	1,291,300
4. Project Management and Evaluation				100,000	10	960,000	29	1,060,000
Total Project Costs				1,000,000	100 %	3,300,000	100 %	4,300,000

Results Hierarchy	Indicators	Sources of Verification	Risks and Assumptions
Project Objective: To mainstream biodiversity conservation in sylvo-pastoral and rangeland management activities in the project area.	Improvement of plant and animal biodiversity in targetetd sites 1400 ha of rangeland systems contribute to biodiversity conservation Income increase from biodiversity-related livelihood opportunities	Quarterly and Annual Reviews by MOA and Steering Committee Independent Mid-Term and Terminal Reviews (measurement by external experts)	Government remains supportive of the biodiversity mainstreaming initiative in general and the project in particular.
Outcome 1: <u>Enhanced capacity building and awareness raising for biodiversity mainstreaming in local communities and government agencies</u>.	# of training modules developed and translated # of training sessions implemented (8 sesions by PY4) Knowledge material produced, translated and disseminated	Quarterly and Annual reviews by the Steering Committee with potential proposed revisions to the work-plans	Mid-Term Evaluation suggests achievable adjustments to the project Government remains supportive and stakeholders remain engaged and enthusiastic
Output 1.1 Training courses concerning the value of biodiversity and its potential local and regional economic benefit.	20% of the population of the communities trained by PY4 40% of the population with an increased awareness of the value of biodiversity area and its objectives by	Quarterly and Annual Review based on schedule established by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities

	PY4 50% of the core communities of the Al-Fujij rangeland and Al-Hisheh sylvopastoral reserves participate to the activities of the project by PY4		
Output 1.2 A tool-kit for mainstreaming biodiversity in sylvo-pastoral/rangelands	Design and completion of the toolkit with IUCN assistance and intensive stakeholder involvement by PY1 30 % of land owners/users engaged is enhanced to support biodiversity mainstreaming in the sylvo-pastoral and rangeland ecosystems policies and practice	Quarterly and Annual Review based on schedule established by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 1.3 New knowledge management and information sharing systems.	Completion of the knowledge management system within MOA At least 2 partnerships developed between agency and community for knowledge sharing and project programming 2 annual 'Knowledge Fairs' and 2 workshops held	Reports of training events Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities Participants are enthusiastic to join knowledge events
Output 1.4 Regional study tours to areas with biodiversity mainstreaming	2 Annual Regional study tours completed	Quarterly and Annual Review based on schedule established by MOA with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the

techniques already in place.			respective activities
Outcome 2: <u>An enabling environment which allows rangeland and sylvo-pastoral landscape users to understand and benefit from the conservation of biodiversity</u>	20% of local communities supported to strengthen participatory relations with MOA and other stakeholders Measurable improvements (30%) in overall community support and involvement	Quarterly and Annual reviews by the Steering Committee with potential proposed revisions to the work plans	Mid-Term Evaluation suggests achievable adjustments to the project Government remains supportive and stakeholders remain engaged and enthusiastic
Output 2.1 Documented roles and responsibilities for community involvement in rangeland and sylvo-pastoral reserve management.	Options for new community co-management mechanisms investigated and tested by PY3	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 2.2 Establishment of traditional "Hima" mechanisms for stakeholder involvement in biodiversity conservation	In consultation with community leadership and relevant stakeholders re-introduce the Hima approach and mechanism on a pilot basis in 2 sites (500 ha by PY3)	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 2.3 Implementation of the legal and institutional framework for co-management and biodiversity conservation within MOA reserves and the project area.	New legal mechanism drafted and introduced as appropriate by PY3	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities

Output 2.4 Supplementary ecological baseline research within each exclosure and within the project area and along the ecological west –east gradient	Data available by PY2	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 2.5 Detailed plans for potential expansion, co-management and biodiversity mainstreaming in each MOA exclosure.	Implementation of the expansion plans and completion of a biodiversity conservation plan and implementation schedule Plans completed and implemented by Q16 (with interim targets specified during the Inception Phase	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 2.6 Conflict resolution /arbitration systems.	Development and putting in place of the conflict resolution system (and using it if necessary) System established by the end of Q3	Quarterly and Annual Review based on schedule established by project team	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 2.7 Documentation and replication of lessons-learned.	Staff assigned to document lessons-learned. Reports produced and dissemniated	Quarterly and Annual Review based on schedule established by project team with oversight by MOA	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Outcome 3: <u>Innovative pilot measures and introduction of "Payment for Environmental</u>	Establishment of Jordan's first Payment for Ecological Services pilot activities.	Quarterly and Annual reviews by the Steering Committee with potential proposed revisions to the work-plans	Quarterly and Annual Reviews do not show major problems and difficulties within the project.

Services" (PES)	Re-introduction of Hima community co-management mechanisms to at least 2 areas in 500 ha by PY3	Independent Mid-Term and Terminal Reviews (measurement by external experts)	Mid-Term Evaluation suggests achievable adjustments to the project Government remains supportive and stakeholders remain engaged and enthusiastic
Output 3.1 PES pilot activities at Fujaij Rangeland Reserve and at at Hisheh Sylvo-pastoral Reserve	Establishment of an intensive stakeholder process for the design and implementation of the PES process by PY2. 1 PES pilot activies designed and tested by PY2 Formal mechanism for dialogue with Dana Dibeen, Ajloun and Yarmouk NRs and related RSCN initiatives	Quarterly and Annual Review based on schedule established by project team with oversight by MOA Independent Assessment by IFAD/Consultant	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 3.2 A plan and implementation of cooperative activities between MOA and RSCN in the Dana NR Buffer zone.	An implementation plan of cooperative activities between MOA and RSCN established, approved and functional by PY2	Quarterly and Annual Review based on schedule established by MOA with oversight by Steering Committee	MOA and project Team develop and retain the capacity, willingness and community support for the respective activities
Output 3.3 Documentation of the	Quantity and quality of Knowledge generated and shared on PES	Quarterly and Annual Review based on schedule established by MOA with	MOA and project Team develop and retain the capacity, willingness and

principles, processes and benefits of the results of the PES pilots among the ADDSR and local communities		oversight by Steering Committee	community support for the respective activities
Outcome 4: Project Management and Evaluation	All of the management mechanisms are in place, staff are trained and the M&E system is functional by PY1	Quarterly and Annual reviews by the Steering Committee with potential proposed revisions to the workplans Independent Mid-Term and Terminal Reviews (measurement by external experts)	Quarterly and Annual Reviews do not show major problems and difficulties within the project. Mid-Term Evaluation suggests achievable adjustments to the project Government remains supportive and stakeholders remain engaged and enthusiastic

Annex III – Tracking Tools

Applying the GEF Tracking Tools in GEF-4

Note: Given changes in the GEF's biodiversity strategy in GEF-4, a slightly modified Tracking Tool for this strategic objective has been developed. Please use this tool for all GEF-4 funded projects that fall under this strategic objective.

Objective: To measure progress in achieving the impacts and outcomes established at the portfolio level under the biodiversity focal area. The following targets and indicators are being tracked for all GEF-4 projects submitted under Strategic Objective Two and the associated Strategic Programs

Impact and Outcome Indicators for Strategic Objective Two and Associated Strategic Programs

Strategic Objective	Expected Long-Term Impacts	Indicators
To mainstream biodiversity conservation in production landscapes/ seascapes and sectors	Conservation and sustainable use of biodiversity incorporated in the productive landscape and seascape	• Number of hectares in production landscapes/seascapes under sustainable management but not yet certified[14] • Number of hectares/production systems under certified production practices that meet sustainability and biodiversity standards • Extent (coverage: hectares, payments generated) of payment for environmental service schemes

[14] This indicator will measure the coverage of management systems in production landscapes and seascapes that are in a transition process to certified production practices.

Strategic Programs for GEF-4 under Strategic Objective Two	**Expected Outcomes**	**Indicators**
4. Strengthening the policy and regulatory framework for mainstreaming biodiversity	• Policy and regulatory frameworks governing sectors outside the environment sector incorporate measures to conserve and sustainably use biodiversity	• The degree to which polices and regulations governing sectoral activities include measures to conserve and sustainably use biodiversity as measured through the GEF tracking tool
Strategic Programs for GEF-4 under Strategic Objective Two	**Expected Outcomes**	**Indicators**
5. Fostering markets for biodiversity goods and services	• Markets created for environmental services • Global certification systems for goods produced in agriculture, fisheries, forestry, and other sectors include technically rigorous biodiversity standards	• Number and extent (coverage: hectares, payments generated) of new payments for environmental service schemes created • Published certification systems that include technically rigorous biodiversity standards

Rationale: Project data from the GEF-4 project cohort will be aggregated for analysis of directional trends and patterns at a portfolio-wide level to inform the development of future GEF strategies and to report to GEF Council on portfolio-level performance in the biodiversity focal area.

Structure of Tracking Tool: Each tracking tool requests background and coverage information on the project and specific information required to track the indicator sets listed above.

Guidance in Applying the Tracking Tool: The tracking tools are applied three times: at CEO endorsement[15], at project mid-term, and at project completion.

[15] For Medium Sized Projects when they are submitted for CEO approval.

In GEF-4, we expect that projects which fall clearly within Strategic Objectives and support specific Strategic Programs under each Strategic Objective hence only one tracking tool will need to be completed.

On *very rare occasions*, projects make substantive contributions to more than one strategic objective. In these instances, the tracking tools for the relevant strategic objectives should be applied. It is important to keep in mind that the objective is to capture the full range of a project's contributions to delivering on the targets set for each of the strategic priorities. The GEF Implementing Agency/Executing Agency will guide the project teams in the choice of the tracking tools. Please submit all information on a single project as one package (even where more than one tracking tool is applied).

Multi-country projects may face unique circumstances in applying the tracking tools. The GEF requests that multi-country projects complete one tracking tool per country involved in the project, based on the project circumstances and activities in each respective country. The completed forms for each country should then be submitted as one package to the GEF. Global projects which do not have a country focus, but for which the tracking tool is applicable, should complete the tracking tool as comprehensively as possible.

The tracking tool does not substitute or replace project level M&E processes, or GEF Implementing Agencies'/Executing Agencies' own monitoring processes. Project proponents and managers will likely be the most appropriate individuals to complete the Tracking Tool, in collaboration with the project team, since they would be most knowledgeable about the project. Staff and consultants already working in the field could also provide assistance in filling out the Tracking Tool.

Submission: The finalized tracking tool will be cleared by the GEF Implementing Agencies and Executing Agencies before submission. The tracking tool is to be submitted to the GEF Secretariat at three points:

1.) With the project document at CEO endorsement[16];
2.) Within 3 months of completion of the project's mid-term evaluation or report; and
3.) With the project's terminal evaluation or final completion report, and no later than 6 months after project closure.

[16] For Medium Sized Projects when they are submitted for CEO approval.

I. Project General Information

1. Project Name: Mainstreaming Biodiversity in Sylvo-pastoral and Rangeland Landscapes in the pockets of poverty of Jordan
2. Project Type (MSP or FSP): MSP
3. Project ID (GEF): 3932
4. Project ID (IA):
5. Implementing Agency: IFAD
6. Country(ies): Jordan

Name of reviewers completing tracking tool and completion dates:

	Name	**Title**	**Agency**
Work Program Inclusion	**Naoufel Telahigue**	**Programme Manager**	**IFAD**
Project Mid-term			
Final Evaluation/project completion			

7. Project duration: ***Planned***___4____ years ***Actual*** ___4____ years

8. Lead Project Executing Agency (ies): Ministry of Agriculture

9. GEF Strategic Program:

X Strengthening the policy and regulatory framework for mainstreaming biodiversity (SP 4)

X Fostering markets for biodiversity goods and services (SP 5)

10. Production sectors and/or ecosystem services directly targeted by project:

10. a. Please identify the main production sectors involved in the project. Please put "**P**" for sectors that are primarily and directly targeted by the project, and "**S**" for those that are secondary or incidentally affected by the project.

Agriculture___P_____

Fisheries_____

Forestry_____P_____

Tourism_____P_____

Mining_____

Oil_____

Transportation_____

Other (please specify)_____

II. Project Landscape/Seascape Coverage

11. a. What is the extent (in hectares) of the landscape or seascape where the project will directly or indirectly contribute to biodiversity conservation or sustainable use of its components? An example is provided in the table below.

Targets and Timeframe **Project Coverage**	**Foreseen at project start**	**Achievement at Mid-term Evaluation of Project**	**Achievement at Final Evaluation of Project**
Landscape/seascape[17] area directly[18] covered by the project (ha)	1,400 hectares		1430 ha

[17] For projects working in seascapes (large marine ecosystems, fisheries etc.) please provide coverage figures and include explanatory text as necessary if reporting in hectares is not applicable or feasible.
[18] Direct coverage refers to the area that is targeted by the project's site intervention. For example, a project may be mainstreaming biodiversity into floodplain management in a pilot area of 1,000 hectares that is part of a much larger floodplain of 10,000 hectares.

Landscape/seascape area <u>indirectly</u>[19] covered by the project (ha)	7,000 hectares (Community co-management around A Hisheh - Hima) 1,000 hectares (connectivity corridor)		**7000 ha**

Explanation for indirect coverage numbers: The project, as reported in the terminal evaluation achieved all its targets but the 1000 ha foreseen fort the connectivity corridor with the Dana Biosphere Reserve that was blocked by communities not willing to be involved in any activity related to the Biosphere.

The indirect coverage numbers are related to the establishment of the Hima mechanisms for biodiversity conservation, as well as the connectivity corridor which will be created (in collaboration with RSCN) within the buffer zone of the Dana reserve. These two components will considerably contribute to the conservation of biodiversity and its sustainable use within the project area.

11. b. Are there Protected Areas within the landscape/seascape covered by the project? If so, names these PAs, their IUCN or national PA category, and their extent in hectares.

	Name of Protected Areas	IUCN and/or national category of PA	Extent in hectares of PA

[19] Using the example in footnote 5 above, the same project may, for example, "indirectly" cover or influence the remaining 9,000 hectares of the floodplain through promoting learning exchanges and training at the project site as part of an awareness raising and capacity building strategy for the rest of the floodplain. Please explain the basis for extrapolation of indirect coverage when completing this part of the table.

1.	Dana Protected Area (the project will be covering the buffer zone and expanding sustainable use activities within it, and not directly within the PA)	IUCN Category IV	30,000 ha

11. c. Within the landscape/seascape covered by the project, is the project implementing payment for environmental service schemes? If so, please complete the table below. An example is provided.

Targets and Timeframe	**Foreseen at Project Start**		**Achievement at Mid-term Evaluation of Project**		**Achievement at Final Evaluation of Project**	
Coverage **Environmental Service**	**Extent in hectares**	**Payments generated (US$)**	**Extent in hectares**	**Payments generated (US$)**	**Extent in hectares**	**Payments generated (US$)**
Ecotourism	2,400 hectares (project intervention area + connectivity corridor)	$ 10 per hectare per year *			NA	NA
Conservation of Medicinal Plants	1,400 hectares	$ 7 per hectare per year **				9 USD per ha per year
Other non-timber forest products	170 ha	30 USD per ha per year				50 per ha per year

*** This is calculated based on analysis of the ecotourism market in Jordan, and specifically within the Dana Reserve**

**** This is an lower-side estimation based on trials and market prices in Jordan**

III. Management Practices Applied

12.a. Within the scope and objectives of the project, please identify in the table below the management practices employed by project beneficiaries that integrate biodiversity considerations and the area of coverage of these management practices. Please also note if a certification system is being applied and identify the certification system being used. Note: this could range from farmers applying organic agricultural practices, forest management agencies managing forests per Forest Stewardship Council (FSC) guidelines or other forest certification schemes, artisanal fisherfolk practicing sustainable fisheries management, or industries satisfying other similar agreed international standards, etc. An example is provided in the table below.

Specific management practices that integrate BD	Name of certification system being used (insert NA if no certification system is being applied)	Area of coverage foreseen at start of project	Achievement at Mid-term Evaluation of Project	Achievement at Final Evaluation of Project
1. Hima: Traditional system for community conserved areas	NA	7,000 hectares		7000 ha
2. Site-based management plans	NA	1,400 hectares		**1430 ha**

IV. Market Transformation

13. **For those projects that have identified market transformation as a project objective**, please describe the project's ability to integrate biodiversity considerations into the mainstream economy by measuring the market changes to which the project contributed.

The sectors and subsectors and measures of impact in the table below **are illustrative examples, only**. Please complete per the objectives and specifics of the project.

Name of the market that the project seeks to affect (sector and sub-sector)	**Unit of measure of market impact**	**Market condition at the start of the project**	**Market condition at midterm evaluation of project**	**Market condition at final evaluation of the project**

V. Policy and Regulatory frameworks

For those projects that have identified addressing policy, legislation, regulations, and their implementation as project objectives, please complete the following series of questions*:* 14a, 14b, 14c.

An example for a project that focused on the agriculture sector is provided in 14 a, b, and c.

14. a. Please complete this table at **CEO endorsement for each sector** that is a primary or a secondary focus of the project.

Please answer YES or NO to each statement under the sectors that are a focus of the project.

Sector **Statement: Please answer YES or NO for each sector that is a focus of the project.**	**Agriculture**	**Fisheries**	**Forestry**	**Tourism**	**Other (please specify)**	**Other (please specify)**
Biodiversity considerations are mentioned in sector policy						
Biodiversity considerations are mentioned in sector policy through specific legislation						
Regulations are in place to implement the legislation						
The regulations are under implementation						

The implementation of regulations is enforced						
Enforcement of regulations is monitored						

14. b . Please complete this table at **the project mid-term for each sector** that is a primary or a secondary focus of the project.

Please answer YES or NO to each statement under the sectors that are a focus of the project.

Sector	**Agriculture**	**Fisheries**	**Forestry**	**Tourism**	**Other (please specify)**	**Other (please specify)**

Statement: Please answer YES or NO for each sector that is a focus of the project.						
Biodiversity considerations are mentioned in sector policy						
Biodiversity considerations are mentioned in sector policy through specific legislation						
Regulations are in place to implement the legislation						
The regulations are under implementation						
The implementation of regulations is enforced						
Enforcement of regulations is monitored						

14. c. Please complete this table at **project closure for each sector** that is a primary or a secondary focus of the project.

Please answer YES or NO to each statement under the sectors that are a focus of the project.

Sector **Statement: Please answer YES or NO for each sector that is a focus of the project.**	**Agriculture**	**Fisheries**	**Forestry**	**Tourism**	**Other (please specify)**	**Other (please specify)**
Biodiversity considerations are mentioned in sector policy						
Biodiversity considerations are mentioned in sector policy						

through specific legislation						
Regulations are in place to implement the legislation						
The regulations are under implementation						
The implementation of regulations is enforced						
Enforcement of regulations is monitored						

All projects please complete this question at the project mid-term evaluation and at the final evaluation, if relevant:

14. d. Within the scope and objectives of the project, has the private sector undertaken voluntary **measures to incorporate biodiversity considerations in production? If yes, please provide brief explanation and specifically mention the sectors involved.**

An *example* of this could be a mining company minimizing the impacts on biodiversity by using low-impact exploration techniques and by developing plans for restoration of biodiversity after exploration as part of the site management plan.

Although there was no direct involvement of the private sector in the project, apple producers of the areas contributed to the success of the livelihood support program to communities by providing their surplus production to the supported women cooperative to have free raw materials for their productions of apple vinaigrette and juices. This has direct implication on environment and natural resources as it minimizes post-harvest losses ensuring as well diversification of livelihoods activities of involved households.

VI. Other Impacts

16. Please briefly summarize other impacts that the project has had on mainstreaming biodiversity that have not been recorded above.

None

ANNEX IV – RSCN Baseline

الجمعية الملكية لحماية الطبيعة
RSCN
Nature Conservation Monitoring Center

Mainstreaming Biodiversity in the Sylvo-Pastoral and Rangeland Landscapes in the Al-Sharah Agricultural Development Region of Southern Jordan

Prepared By:

Anas Abu Yahya

September 2015

الجمعية الملكية لحماية الطبيعة
RSCN
Nature Conservation Monitoring Center

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SUMMARY

Jordan is a small country with tremendous level of biodiversity since four bio-geographical regions are dominated that reflected in presence of 13 vegetation types. As a component of this ecological diversity, the Agro-Biodiversity richness is promoted with recording high numbers of palatable plants that distributed all over the country while their importance was recognized by local communities since time immemorial as a rangelands. In turn, these rangelands are degraded due to overgrazing, soil erosion, Loss of rainfall and thus increase salinity, cultivation. All previous factors are leaded by urbanization causing prevailing poverty and forcing cattle owners to use non-sustainable land practices, which causing habitat degradation and depletion of natural resources. To conserve sustainability of rangeland, pastoral reserves were established to offer a sanctuary for grazing animals. Also, these fenced areas will protect biodiversity throughout implement capacity building and biodiversity mainstreaming activities for local communities in poverty pockets and thus improving standard of living.

A pilot project is seeking to increase biodiversity conservation in productive landscapes in southern Jordan (three fenced sites namely Al-Hisheh Forest Exclosure, Fujaij Rangeland Exclosure, and Manshiyya Rangeland Exclosure) through promote mainstreaming biodiversity in sylvo-pastoral and rangeland management activities. This project is funded by GEF and responsibility of Ministry of Agriculture, whereas RSCN is responsible for providing knowledge of palatable species. The main objectives for this project is preparing checklist of palatable species. In addition to suggest a monitoring program to support sustainable biodiversity conservation within the three sites.

Study areas are within Ma'an governorate (Al-Sharah Highland), which located in Mediterranean Region and characterized by high annual rainfall and moderate temperatures in summer with cold and snowfall in winter. Two vegetation types can be observed that are Mediterranean non-forest Vegetation and Juniper Forest Vegetation. The study was conducted during mid June 2015, using randomly selected route for preparing plants checklist. Sampling vegetation using $1m^2$ quadrate in 10000 m^2 sample area were used to compute vegetation attributes including frequency, density, diversity (Species Richness, Shannon Index, Raunkiaer's Life Form) and evaluate vegetation structure, ground cover, plant cover and biomass. All threats were recorded also.

A checklist contains 73 species belonging to 63 genera and 28 families were recorded within study areas. According to their conservation status four rare plant, five species are endemic to Jordan, and one threatened plant were included. Also; 16 palatable species, 13 plants of medicinal uses, three edible, four woody plants, two ornamental plants and one poisonous species were recorded according to their use. Many threats were recorded in study sites as local tourism activity, woodcutting, fence encroachments, hunting, and scattered pest infection.

Results of vegetation attributes indicated that three sites had poor vegetation cover and thus weak grazing capacity. The two vegetation strata within three sites had low availability of palatable species due to overgrazing and uncontrolled management for the sites. Thus main recommendations were focused toward improving a vision to frame a practical mechanism to manage the pastoral sites behind suggesting grazing regulation plan. In addition, governmental role should be take place through available possibilities and funded projects in planning, training, and implementing rational activities for local communities to sustainable production of natural resources in pastoral sites.

1. INTRODUCTION

1.1 General Overview

Jordan is a relatively small country with 89,287 km^2 total area of which over 80% are semi-arid and arid areas. It is represented longitudinally by three major topographical regions: the Rift Valley, the Mountain Ranges and the Eastern desert (Badia). From other hand, the geographical location among three continents; west Asia, north-east Africa and south-east Europe that lead up the country to be one of the most important routes for migratory birds worldwide. Meanwhile, physical attributes as altitude, annual rainfall, temperature and soil are also of these factors that help in presence four Bio-geographical zones as mentioned by Al-Eisawi (1996) that are: Mediterranean Region, Irano-Turanian Region, Sudanian (Sub-Tropical) Region, and Saharo-Arabian Region. These zones led to represent about 13 vegetation types dominated in Jordan with tremendous ecosystems and wide range of biological species.

This Geo-Physical diverse within small area promotes the Agro-Biodiversity richness of the country. Al-Eisawi (2013) reported about 2543 plant species were recorded in Jordan with extra new species of flora of Jordan are under investigation, and this including a wealth of native and endemic species and varieties. Of particular importance are the medicinal, aromatic and palatable species that are distributed all over the country while their importance was recognized by local communities since time immemorial. A total of 485 species of medicinal plants, which belong to 330 genera and 99 families, are reported from Jordan (Oran and Al-Eisawi, 1998). Whereas, palatable plant are till now of unlisted since more and more degradation of rangeland are increased.

Even though Jordan is classified as a range land country since there is only up to 10% can be used for cultivation without irrigation (Al-Eisawi, 1996), rangelands are being severely degraded because of overgrazing, soil erosion and thus losing in fertility, Loss of rainfall water through runoff that will increased Salinity and decreased underground water levels, inadequate cultivation patterns that causing uprooting of range plants (Ministry of Environment, 2001). In turn, these are driven by rapid population growth and urbanization that causing prevailing poverty and what forcing owners of cattle herds increasingly to adopt non-sustainable land use practices. Thus, as a result, will causing habitat degradation and depletion of natural resources, including decreasing numbers of important range plants behind expansion of poisonous and noxious plants.

Regarding to build up and conserve sustainability of rangeland wildlife habitats and palatable plant species, pastoral reserve or fenced area -that are established and directed by Ministry of Agriculture overall the country- can offer an aperture to help terrestrial ecosystems. Such sites considered a sanctuary for flocks of grazed animals, since safely, less competition and more palatable species richness alternative is offered.

Surveys and baseline studies for the conservation of the Jordanian rangelands are not new, since these Initiatives recognizing the problems and proposing solutions earlier. Indeed, the situation has become substantially worse more and more. Thus, the need for new activities that targets ecosystem management, policy implementation, partnerships, more effective capacity development, institutional development, and community collaboration, especially rural people who are living in poverty and experiencing food insecurity is featured necessarily.

1.2 Project Background

The Royal Society for the Conservation of Nature (RSCN) recognized the importance of integrity between communities planning that resulted with poverty reduction, and from the other hand, protect biodiversity of different habitats throughout implement pilot capacity building and biodiversity mainstreaming activities for local communities in such poverty pockets. Since this NGO is a pioneer in developing a large-scale conservation programs designated to integrate environmental protection with the socio-economic development of local people.

A project entitled "Mainstreaming Biodiversity in the Sylvo-Pastoral and Rangeland Landscapes in the Al-Sharah Agricultural Development Region of Southern Jordan" seek to increase biodiversity conservation in productive landscapes in pockets of poverty in Southern of the country throughout promote a new way of mainstreaming biodiversity in sylvo-pastoral and rangeland management activities. Otherwise; the project integrating framework to identify and implement capacity building and biodiversity mainstreaming activities and do this in a complementary manner underway primarily by RSCN.

Thus, upon request of Global Environmental Fund (GEF) and Ministry of Agriculture, RSCN is responsible for providing knowledge of grazing preferred plant species within three fenced area, through scanning the vegetation cover components, classified these species depends on their palatability and status. Moreover, it will provide baseline information for management attitudes including monitoring programs to support biodiversity conservation within the sites.

1.3 Objectives

1 Preparing a checklist of palatable species in three pastoral rangelands namely: Al-Hisheh Forest Exclosure, Fujaij Rangeland Exclosure, and Manshiyya Rangeland Exclosure respectively including their conservation status.

2 Preparing monitoring programs to support sustainable biodiversity conservation within the three sites.

1.4 Team Members

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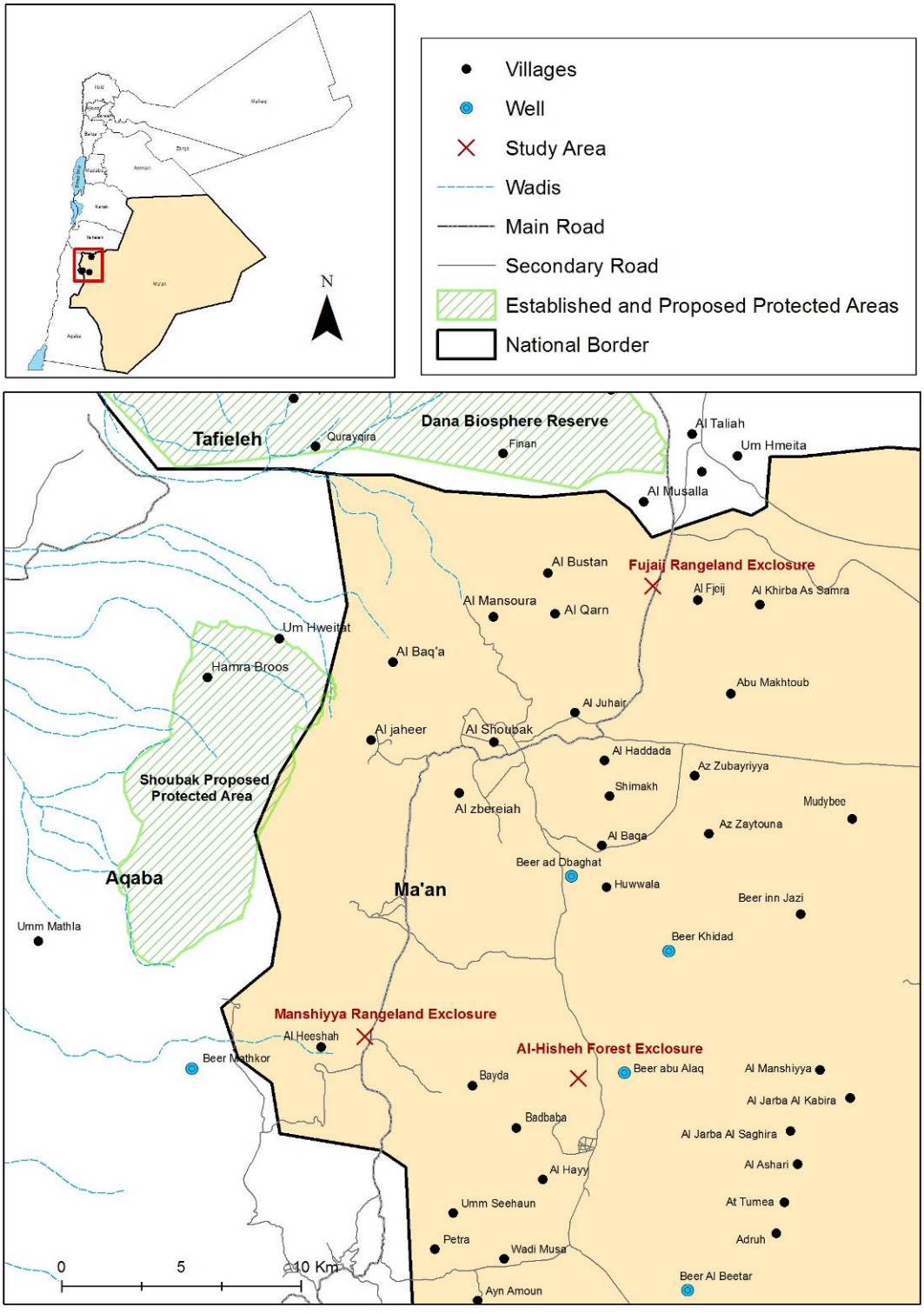
1.5 Site Description

1.5.1 Physical Description

1.5.1.1 Location

The study sites namely Al-Hisheh Forest Exclosure, Fujaij Rangeland Exclosure, and Manshiyya Rangeland Exclosure are located within Shoubak area, which is located in Ma'an governarate in Southern part of Jordan. It is just about 220km to the south from the capital Amman, not far away from Petra to the south (Map 1). The whole area is a group of scattered villages in addition to some tribal gatherings, where situated on a mountain ridge made of plateaus and mountain peaks namely Al-Sharah Highland that ranging between 1120m and 1651m above sea level.

This area has an old history due to its neighborhood to ancient site of Petra, where the Nabatean civilization was dominant there. The importance of this area is reflected by its old history of rich vegetation cover especially forests, medicinal, edible, economic, endemic, rare and endangered plants (Oran, 1994).



Map 1: Location of Study Sites in Jordan Map

1.5.1.2 Climate

Generally; the climate in study area is characterized by average annual rainfall up to 277ml. The average temperature in summer is about 19.8 °C, the maximum up to 25.9°C. The winter is cold and temperatures drop up to 5.8 °C with minimum temperatures of 1°C with probability snow at highland (RSCN, 2011).

1.5.2 Bio-geographical Zones and Vegetation Cover Characteristics

Jordan is dominated by four Bio-geographical zones; area of study is entirely represented by the Mediterranean Region (Map 2). This region characterized by having the best rainfall in the country that ranges from 400-600mm per year, the most fertile soil of both the red soil (Terra Rozza) and the yellow soil (Rendzina), the highest altitude (900-1700m), and thus the best vegetation cover especially the forest climax of *Pinus halepensis, Quercus coccfera, Quercus ithaburensis*, and *Pistacia* spp. (Al-Eisawi, 1996).

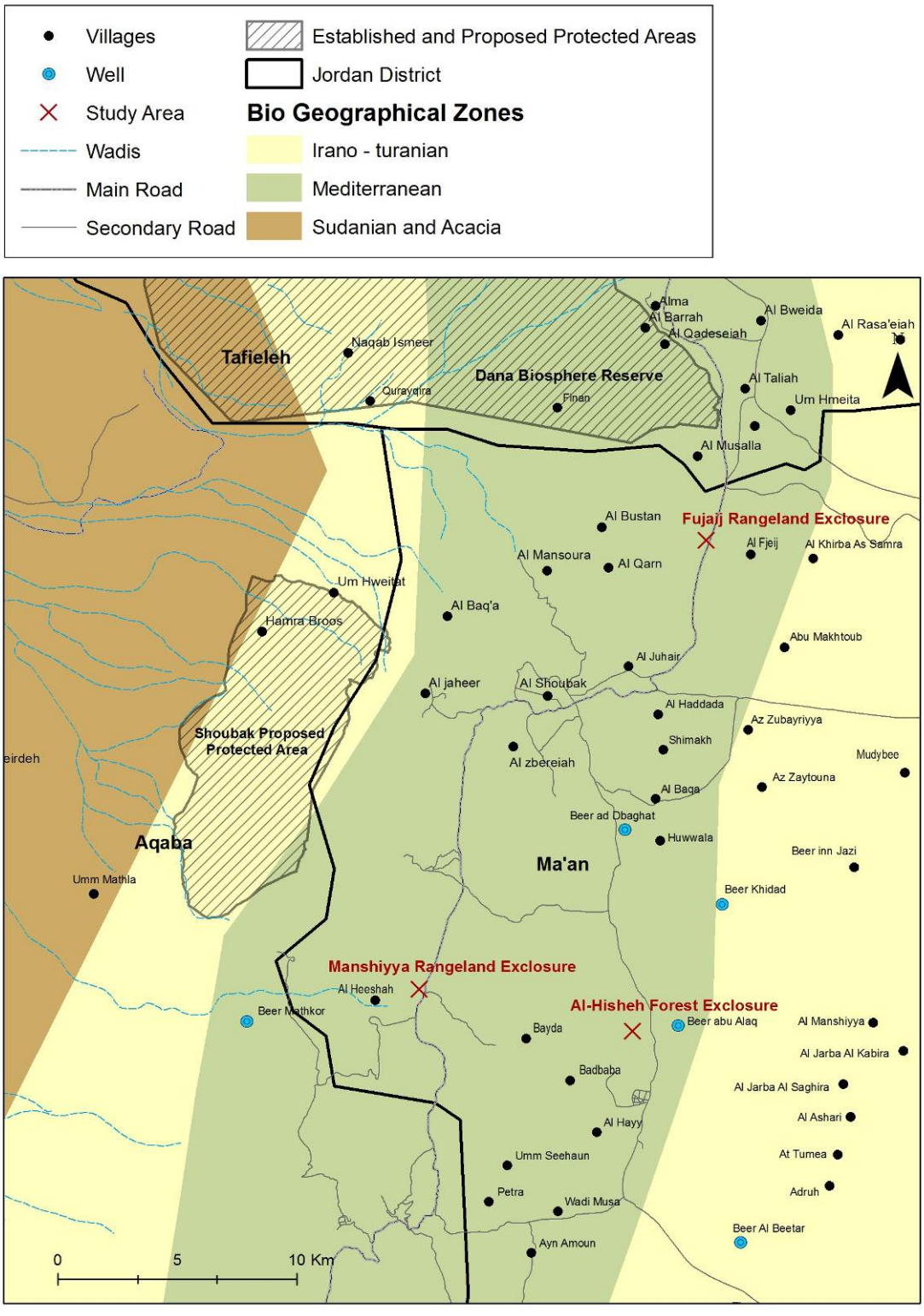
The previous diverse of regions within small area like Jordan, is reflected with presence of thirteen vegetation types that dominated and covering the country. Out of this thirteen vegetation types, two of them are present within study area as shown in map (3);

1. Mediterranean non-forest Vegetation

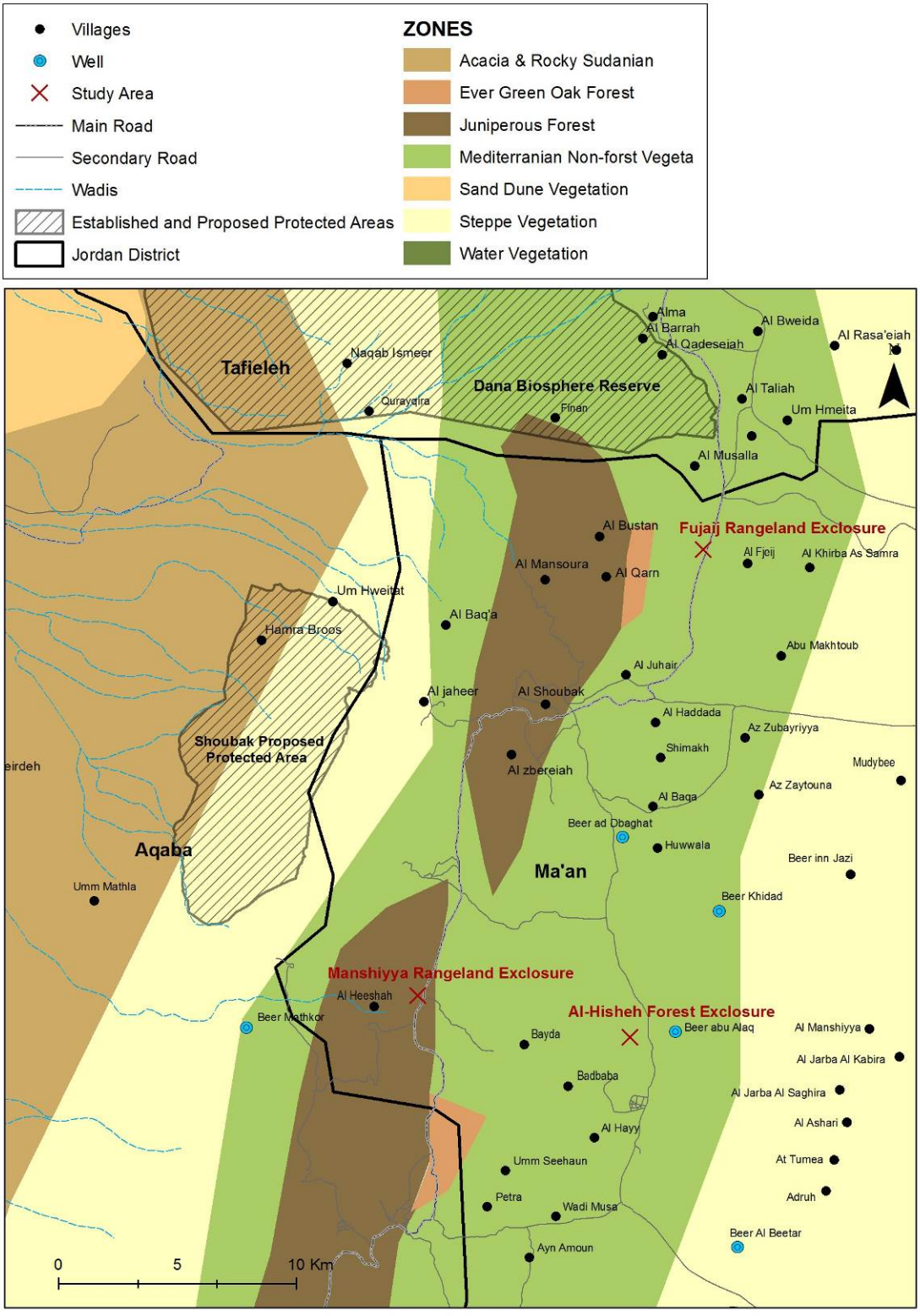
This type is treated as degraded forest which is not covered by forests elements; it contains some shrubs and bushes as *Rhamnus palaestinus* and *Calycotome viliosa*.

2. Juniper Forest Vegetation

Two strata of vegetation can be recognized in this type that Trees and Shrubs as *Juniperus phoenica* and *Quercus coccfera*. Bushes and herbs as; *Achillea santolina* and *Artemisia inculata*.



Map 2: Bio-Geographical Zones in study area (By Al-Eisawi, 1996)



Map 3: The Vegetation Types dominated in study area (By Al-Eisawi, 1996)

2. MATERIALS AND METHODS

The study of Mainstreaming Biodiversity in the Sylvo-Pastoral and Rangeland Landscapes in the Al-Sharah Agricultural Region was conducted during Mid June 2015.

2.1 Materials

1 Field guides and identification references: Field guide to wild flowers of Jordan and neighboring countries

2 Vegetation data sheet with stand for both plots and routes

3 Hand held Global Positioning System (GPS) Garmin etrex- legend. The coordinates were taken from the Universal Transverse Mercator (UTM) by meters with six digits in East and seven digits in North and -/+ 5m accuracy

4 Maps generated at GIS unit at RSCN Headquarter using GPS data

5 Rope of 100m long

6 Steel Pegs

7 1mX1m Quadrate

8 Paper bags

9 Digital Camera

10 4X4 Car

2.2 Methods

2.2. 1 Habitat Description

A standardized data collection sheet was used for habitat description, which includes all necessary information about physical attributes of the local environment, site coordinates, elevation, slope, annual rainfall and soil type.

2.2. 2 Randomly-Selected Route

At each study area, one randomly selected route was applied that varies in distance between each other, depending on area of rangeland. Coordinates of start point were recorded using a hand-held GPS, while the end point was determined when there is no change in the leading plant species.

2.2. 3 Species Status Assessment

The following criteria were used to prepare a checklist of plant species:

- Global importance, IUCN criteria.
- Medical importance for human and livestock healthcare.
- Economical and commercial importance.
- Cultural importance.

2.2. 4 Threats Identification

The following data were collected for threats identification:

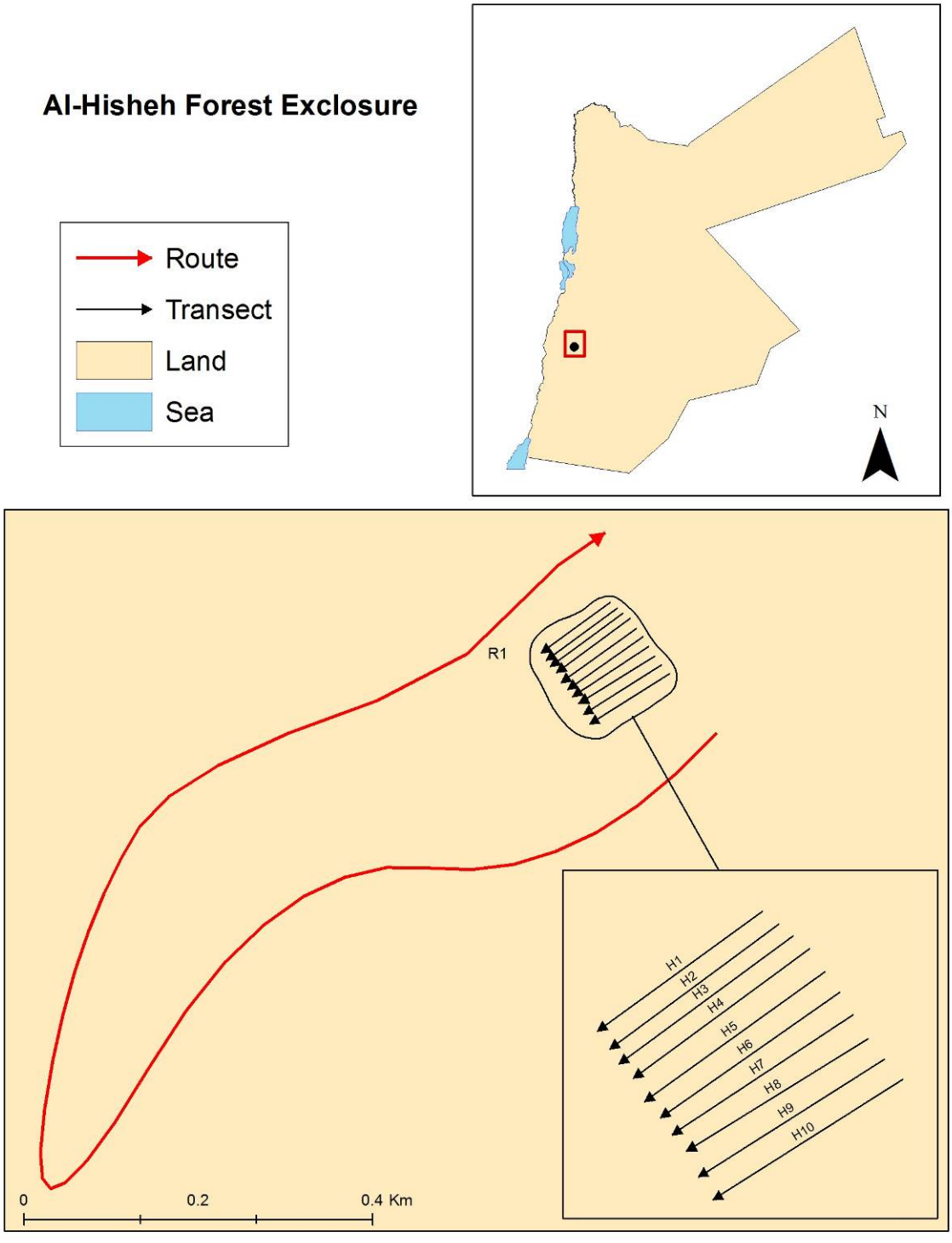
- Grazing
- Wood cutting.
- Plant collection.
- Plants used by local people and livestock.
- Agriculture activities (irrigation, water extraction…).

2.2. 5 Vegetation Sampling

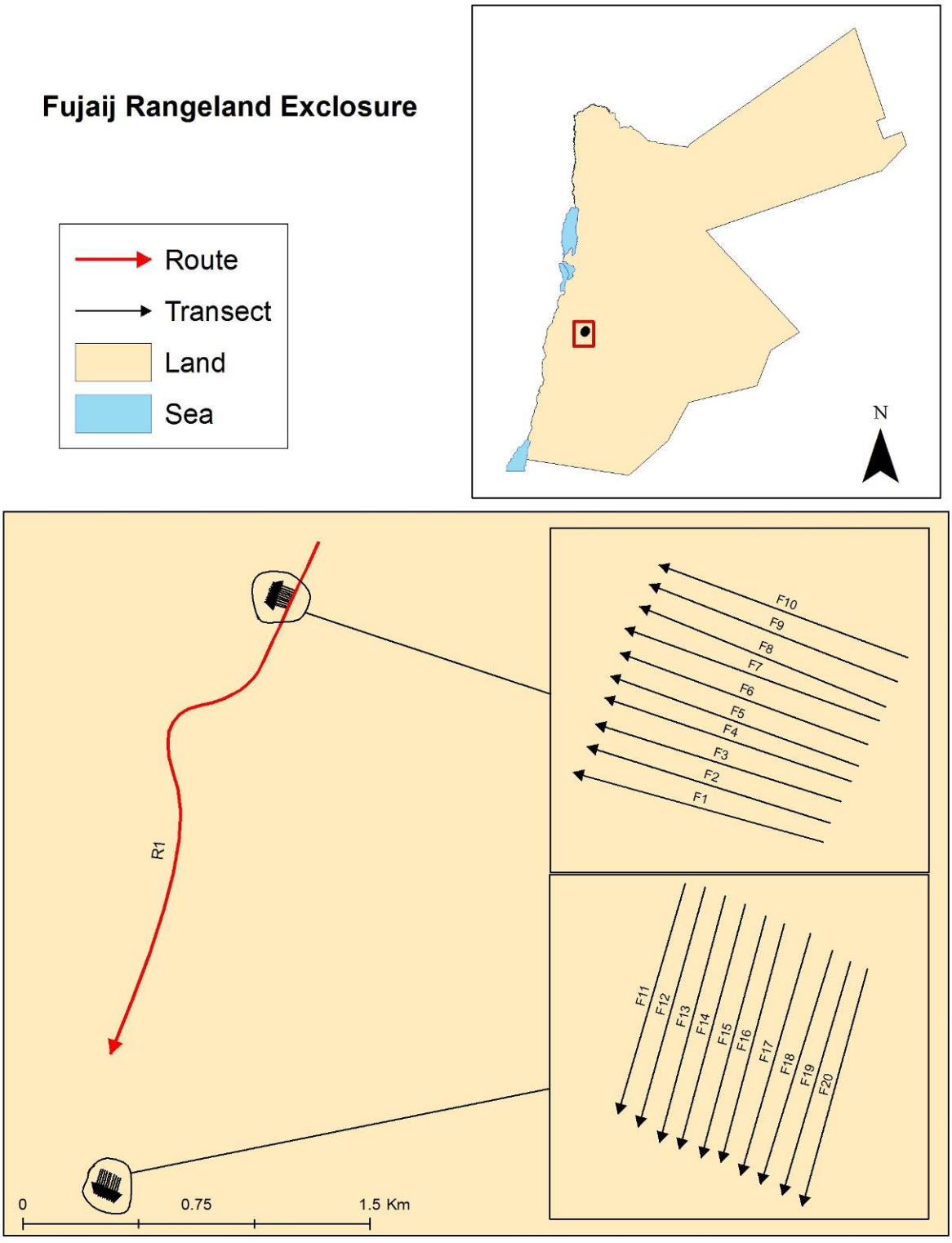
2.2.5.1 Sampling Protocol

For collecting data of vegetation composition, the following protocol was used. In the beginning; a representative site within each area was selected. A macro-plot was outlining by determining a main transect of 100m distance with a steel pegs that fixed at each end. Ten transects of 100m each were sampled from the main transect, with a hit every 10m were taken; resulting a total of 1000 hits per study area. Maps (4, 5 and 6) show All random routes and mapped transect in Al-Hisheh Forest Exclosure, Fujaij Rangeland Exclosure, and Manshiyya Rangeland Exclosure respectively.

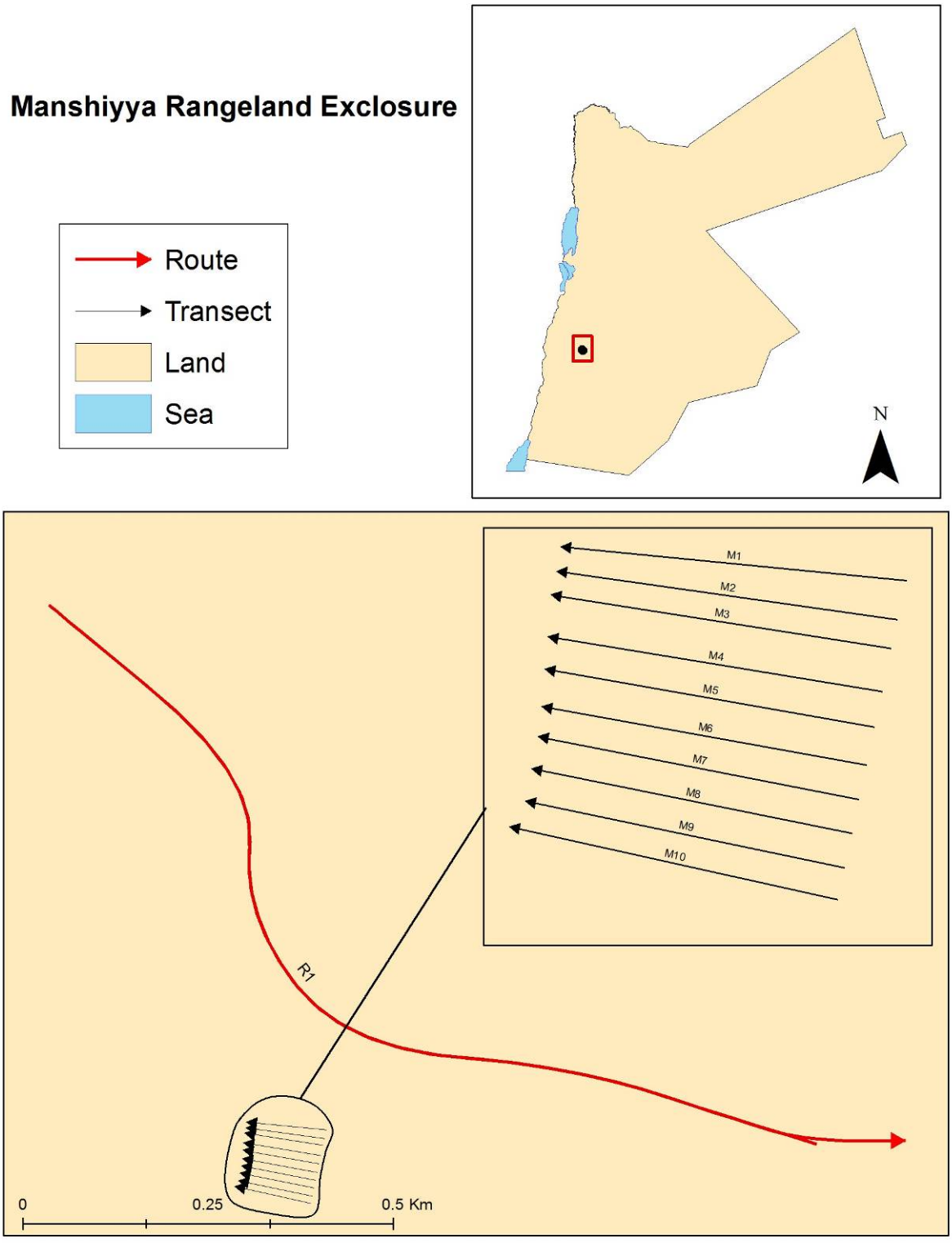
Every 10m, $1m^2$ quadrate was used where the ground cover within was recorded, then clipping all the plants encircled inside the quadrate for biomass determination, a total of 10 samples per transect. The clipped vegetation samples were examined for identification of the different plant species (forage and non-forage), and then dried in an oven at 75±5 °C for 48h to determine dry matter production (RSCN, 2013).



Map 4: Layout of Random Route and Mapped Transect in Al-Hisheh Forest Exclosure



Map 5: Layout of Random Route and Mapped Transect in Fujaij Rangeland Exclosure



Map6: Layout of Random Route and Mapped Transect in Manshiyya Rangeland Exclosure

After demarcating the layout as clarified before, the following attributes were measured.

2.2.5.2 Vegetation Structure

It is refers to the number of vegetation strata and distribution of plant species in study site, and determined visually.

2.2.5.3 Plant Cover

All plants coverage (forage and non-forage species) inside the $1m^2$ quadrate is visually estimated.

2.2.5.4 Plant Frequency

Expressed as number plots where the species present divided by the total number of sampled plots (Bonham, 1989). It is calculated using the formula:

$$\textbf{Frequency} = \frac{\text{Number of plots in which species occurs}}{\text{Total number of plots}} \times 100$$

2.2.5.5 Plant Density

Expressed as number of plants per plot and calculated using the formula:

$$\textbf{Density} = \frac{\text{Number of plants recorded in plots}}{\text{Total number of plots}} \times 100$$

2.2.5.6 Plant Diversity

The diversity of the identified plant species was expressed in three fashions as follow:

I. **Species Richness** (Magurran, 2004)

Calculated with this formula:

$$\textbf{Species richness} = \frac{\text{Number of plant species recorded in plots}}{\text{Total number of plots}} \times 100$$

II. **Shannon Diversity Index** (Krebs, 1998)

It is used to characterize species diversity in a community. The proportion of species (i) relative to the total number of species (pi) is calculated, and then multiplied by the natural logarithm of this proportion (ln pi). The resulting product is summed across species, and multiplied by -1. The Shannon diversity Index (H') calculated by:

$$H = -\sum_{i=1}^{s} p_i \ln p_i$$

III. Raunkiaer's Life Form (Raunkiaer, 1934)

The life forms of the identified plant species was categorized according to Raunkiaer's classification, which is based on the location of the renewal bud in relation to soil surface and the nature of organs shed in the harsh season. The categories include

- Pharenophytes (trees and shrubs taller than 1 m)
- Chamaephytes (semi-shrubs)
- Hemicryptophytes(perennial in which the renewal bud is located at the soil surface)
- Geophytes (perennial plants in which the renewal bud is located below soil surface)
- Therophytes (annual plants in which the renewal bud is in the seed).

2.2.5.7 Ground Cover

The ground cover (vegetation, rock-outcrops, stones, litter...) estimate visually (Bonham, 1989). Ground cover and bare soil percentages were estimated with these formulas:

Ground cover% = Vegetation cover % + rock outcrop cover % + stones cover % + litter cover % + cryptogams cover % + dry stumps and clumps cover %

Bare soil% = 100% - ground cover %

2.2.5.8 Plant Biomass

Due to rare of woody plants in study sites, the "Reference Unit Technique" was not used to calculate plant biomass. The harvesting technique was used, where all the plants (shrubby and herbaceous species) within the $1m^2$ were harvested by hand shears to ground level. The harvested material was placed into plastic bags, labeled and sent to the laboratory to determine the fresh weights and then was placed into paper bags and put into an air-circulating oven at 75±5 ^{0}C for 48 hours for dry matter determination. The percent moisture was computed from the data of fresh and dry weights of the clipped plant material. Plant biomass is expressed as kg per ha (RSCN, 2013).

3. RESULTS

3.1 *Flora Checklist*

A checklist contains 73 species belonging to 63 genera and 28 families were recorded in this survey. It includes a categorize depending upon conservation status and uses as shown in Table (1). All names were recognized according to Al-Eisawi (2013).

According to their conservation status four rare plant, five species are endemic to Jordan, and one threatened plant are included in this checklist. Moreover; 16 palatable species, 13 plants of medicinal uses, three edible, four woody plants, two ornamental plants and one poisonous species were recorded according to their use.

The detailed checklist of the present study revealed recording about 32 plants at Al-Hisheh Forest Exclosure, whereas in Manshiyya Rangeland Exclosure 28 species were presented in the checklist compared with 41 plant species in Fujaij Rangeland Exclosure. All detailed data for Manshiyya, Al-Hisheh, and Fujaij are reported in Annex 1, 2, and 3 respectively.

Table 1: Checklist of Recorded Plant Species in the Study sites

Conservation Status; C: common, R: Rare. En: Endemic. Th: Threatened.

Uses; M = Medicinal, O: Ornamental, Pa: Palatable, Po: Poisonous, W: Wood, Ed: Edible.

Raunkiaer's Life Form; Phar: Pharenophytes, Cham: Chamaephytes, Geo: Geophytes Hemi: Hemicryptophytes, Ther: Therophytes.

	Scientific Name	Common Name	Arabic Name	Status	uses	Raunkiaer's Life Form
			1. ANACARDIACEAE			
1	*Pistacia atlantica* Desf	Atlantic Pistachio	البطم الأطلسي	Th	M, Ed, W	Phar
			2. APIACEAE			
2	*Eryngium glomeratum* Lam		عود القزم	C	NA	Hemi
3	*Ferula communis* L	Common Giant Fennel	كلخ	C	M	Hemi
			3. ASCLEPIADACEAE			
4	*Carthamus tenuis* (Boiss & blanche) bornm	Slender Safflower	قرطم	C	NA	Annual
			4. ASTERACEAE			
5	*Achillea fragrantissima* (Forssk.) Schultz Bip	Sweet-smelling Lavender	القيصوم	C	M	Hemi
6	*Amberboa crupinoides* (Desf) DC			C	NA	Annual
7	*Artemisia incullta* Delile	Wormwood	الشيح	C	M	Cham
8	*Centaurea dumulosa* Boiss	Shrubby Centaury	جميلة شجرية	C	O	Ther
9	*Centaurea eryngioides* Lam	Eryngo Centaury	يمرار	C	Pa	Hemi
10	*Centaurea pallescens* Delile	Pale Centaury	مرار باهت	C	NA	Annual (Ther)
11	*Centaurea procurrens* Sieber ex Sprengel	Procumbent Centaury	مرار زاحف	E	NA	Cham
12	*Cousinia dayi* Post			E	NA	
13	*Cousinisa moabitica* Bornm & Nabelek	Moab Cousinia	شوك مؤاب	E	NA	
14	*Crepis* spp.					
15	*Echinops glaberrimus* DC	Globe Thistle	حرشاف	C	NA	Hemi
16	*Gymnarrhena micrantha* Desf	Gymnarrhena	خف الكلب	C	Pa	Annual

17	*Lactuca orientalis* (Boiss)Boiss	Oriental Lettuce	شخيص شرقي	C	NA	Hemi
18	*Lasiopogon muscoides* (Desf.) DC	Wooly Everlasting	كريشة الجدي	R	NA	Annual (Ther)
19	*Launaea mucronata* (Forssk.) Muschler			C	NA	Annual
20	*Notobasis syriaca* (L.) Cass	Syrian Thistle	خرفيش	C	Pa	Annual
21	*Onopordum macrocephalum* Eig	Cotton Thistle	قهوة الراعي	R	NA	Hemi
22	*Onopordum palaestinum* Eig	Palestine Cotton Thistle	عتور فلسطيني	C	NA	Hemi
23	*Picnomon acarna* (L.) Cass	Soldier Thistle	شوك الفار	C	Pa	Annual
24	*Silybum marianum* (L.) Gaertner	Holy Thristle	خرفيش الجمال	C	NA	Annual
		5. BORAGINACEAE				
25	*Alkanna tinctoria* (L.) Boiss	Dyer's Alkanet	حناء الغول		NA	Cham
		6. BRASSICACEAE				
26	*Matthiola logipetala* (Vent.) DC	Evening Stock	الشقارى	C	NA	
27	*Sisymbrium bilobum* (C. Koch) Grossh			C	Pa	Annual
		7. CAPPARACEAE				
28	*Capparis spinosa* L	Common Caper	القبار	C	Ed	Cham
		8. CAPRIFOLIACEAE				
29	*Dianthus strictus* Banks & Sol	Wild pink	قرنفل بري	C	NA	Hemi
30	*Gypsophila arabica* Barkoudah			C	M	Cham
		9. CHENOPODIACEAE				
31	*Anabasis syriaca* Iljin			C	NA	Cham
32	*Atriplex halimus* L	Tall Orache	القطف الملحي	C	Pa	Phar
33	*Bassia muricata* (L.) Asch	Hairy Saltwort	اللياء الأبرية	C	NA	Annual

34	*Chenopodium* spp.					
35	*Girgensonhnia oppositiflora* (pallas) Fenzl		شويكة ، كلشة	R	NA	
36	*Noaea mucronata* (Forssk) Asch. & Schweinf	Thorny Saltwort	شوك الحنيش	C	Pa	Cham
			10. DIOSCOREACEAE			
37	*Scabiosa porphyroneura* Blakelock				NA	Annual
			11. EPHEDRACEAE			
38	*Ephedra aphylla* Forssk	Ephedra	علند	C	NA	Phar
			12. FABACEAE			
39	*Astragalus bethlehemiticus* Boiss	Bethlehem milk-vetch	قتاد بيت لحم	C	NA	Cham
40	*Astragalus spinosus* (Forssk.) Muschler	Spiny milk-vetch	قتاد شوكي	C	Pa	Cham
41	*Colutea istria* Miller	Bladder senna	السيسبان	R	NA	Phar
42	*Ononis natrix* L	Shrubby Restharrow	لزيق ، لتين	C	M	Cham
43	*Retama raetam* (Forssk.) Webb & Berth	White Broom	الرتم	C	W	Phar
44	*Trigonella stellata* Forssk	Star fenugreek	حلبة مخملية	C	M, Pa	Annual
45	*Quercus coccifera*	Evergreen Oak	السنديان	C	W	Phar
			13. IRIDACEAE			
46	*Iris* spp.		السوسن			
			14. JUNCAGINACEAE			
47	*Marrubium vulgare* L	White Horehound	حشيشة الكلب	C	M	Cham
			15. LAMIACEAE			
48	*Ballota undulata* (Sieber ex Fresen.) Bentham	Common Black Horehound	شرمان، كتيلة	C	NA	Cham
49	*Phlomis brachyodon* (Boiss) Zohary	Desert Phlomis	لهيب شرقي	E	M	Cham

50	*Salvia lanigera* Poiret	Desert Sage	قرعية، نويمة	C	M	Cham
51	*Teucrium polium* L		الجعدة	C	M	Cham
			16. LILIACEAE			
52	*Allium* spp.			C		
			17. MALVACEAE			
53	*Malva parviflora* L	Mallow	الخبيزة	C	M, Ed, Pa	Annual (Ther)
			18. OROBANCHACEAE			
54	*Cistanche salsa* (C. A. Mey.)G.Beck	Pink Broomrape	ذئنون ملحي	C	NA	Parasite
			19. PAPAVERACEAE			
55	*Glaucium arabicum* F	Horned poppy	قطرة , بخيتة	C	NA	Hemi
56	*Hypecoum geslinii* Coss. & Kral					Annual
			20. PINACEAE			
57	*Pinus halepensis* Miller	Aleppo Pine	الصنوبر الحلبي	Cultivated	O, W	Phar
			21. POACEAE			
58	*Avena sterilis* L	Animated oat	الشوفان البري	C	Pa	Annual
59	*Bromus tectorum* L	Wall brome grass		C	Pa	Annual
60	*Bromus* spp.					
61	*Cynodon dactylon* (L.) Pers	Bermuda Grass	النجيل، الإثل	C	Pa	Cham
62	*Hordeum bulbosum* L	Bulbous Barley	شعير بصلي	C	Pa	Hemi
63	*Hordeum* spp.					
64	*Stipa capensis* Thnub	Cape feathergrass	صمعة ، ركيبة	C	Pa	Annual
65	*Stipa* spp.					

22. RESEDACEAE						
66	*Reseda lutea* L	Yellow migonette		C	NA	Annual
23. RHAMNACEAE						
67	*Rhamnus dispermus* Ehrenb. Ex Boiss	Buckthorn	سويد	R	Pa	Phar
24. RUBIACEAE						
68	*Galium* spp.					
25. RUTACEAE						
69	*Haplophyllum tuberculatum* (Forssk) Ad. Juss	Tubercled rue		C	NA	Cham
26. SCROPHULARIACEAE						
70	*Verbascum fruticulosum* Post	Mullein	العميا	E	NA	Cham
71	*Verbascum sinaiticum* Bentham			C	NA	Hemi
27. SOLANACEAE						
72	*Hyoscyamus desertorum* (Asch. Ex Boiss.) Tackh	Desert Henban	سكران	C	NA	Annual
28. ZYGOPHYLLACEAE						
73	*Peganum harmala* L	Peganum	الحرمل	C	M, Po	Hemi

3.2 *Threats Faced Vegetation Cover*

Many threats were identified within study sites during the field survey. At Al-Hisheh Forest Exclosure; woodcutting was the main activity that recorded although the site itself is with small area and weakly represented with floral elements (figure 1).

Figure 1: Woodcutting at Al-Hisheh Forest Exclosure

Also signs of local tourism were noticed within Al-Hisheh Forest Exclosure as in figure (2).

Figure 2: Local Tourism Signs at Al-Hisheh Forest Exclosure

At Manshiyya Rangeland Exclosure; encroachments of fence and as a result overgrazing will reduce the grazing capacity of the site for sheep and goat year after year (figure 3).

Figure 3: Overgrazing at Manshiyya Rangeland Exclosure

Whereas at Fujaij Rangeland Exclosure human activity had more impact, since hunting signs was clearly found (figure 4A) beside scattered pest infection (figure 4B).

Figure 4: A; Hunting Signs and B; Pest Infection in Fujaij Rangeland Exclosure

3.3 *Vegetation Attributes*

3.3.1 Vegetation Structure

In Manshiyya Rangeland Exclosure and Fujaij Rangeland Exclosure; the vegetation consisted of only one layer (perennial herbs) compared to two layers in Hisheh Forest Exclosure (dwarf trees and herbs) as shown in figure 5, 6 and 7 respectively.

Figure 5: Overview of Manshiyya Rangeland Exclosure

Figure 6: Overview of Fujaij Rangeland Exclosure

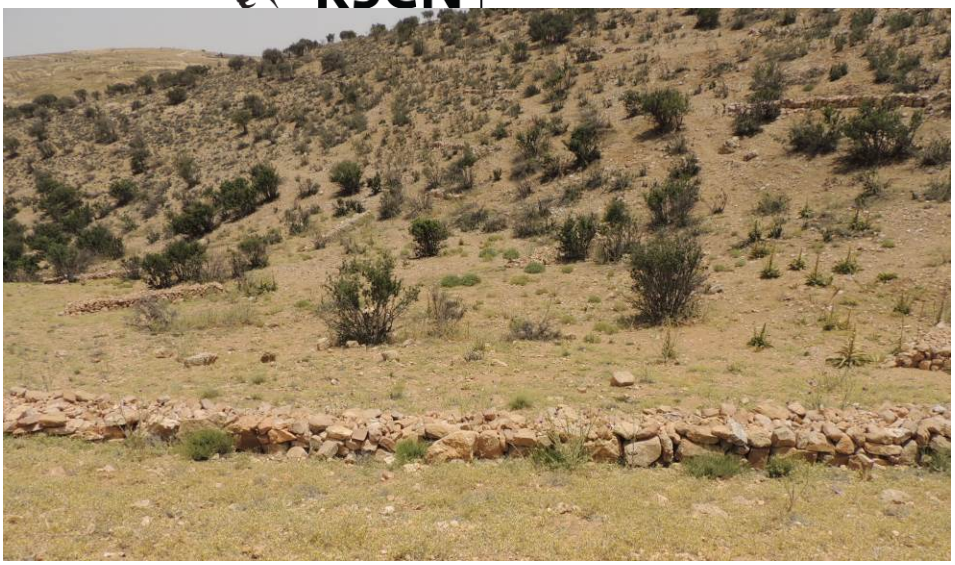


Figure 7: Overview of Al-Hisheh Forest Exclosure

3.3.2 Plant Cover

Table (2) shows proportion of forage and non-forage species in the three sites. The coverage varied with habitat and associated vegetation type, especially trees and shrubs.

Table 2: Coverage Values of Forage and non-Forage Plant Species in Study Sites

Species Percentages	Fujaij Rangeland Exclosure	Hisheh Forest Exclosure	Manshiyya Rangeland Exclosure
Forage Species	14.6	21.9	32.1
non-Forage Species	26.8	25.0	17.9

3.3.3 Plant Frequency

The computed frequency values revealed that *Artemisia incullta* recorded the highest value in the three sites, whereas all other species had very low values as shown in table (**3**).

Table 3: Frequency Percentages of Identified Plant in Study Sites

Site	Plant species	Frequency (%)
Hisheh Forest Exclosure	*Argyrolobium crotalarioides*	2
	Artemisia incullta	22
	Colutea istria	2
	Matthiola logipetala	1
	Teucrium polium	6
Manshiyya Rangeland Exclosure	*Artemisia incullta*	10
	Atriplex halimus	2

	Matthiola logipetala	1
Fujaij Rangeland Exclosure	*Artemisia incullta*	24.5
	Atriplex halimus	3
	Matthiola logipetala	0.5

3.3.4 Plant Density

Density percentages of collected plants revealed once more that *Artemisia incullta* recorded the highest value in the three sites. Table (4) showed that all species recorded very low values of density within three sites.

Table 4: Density Percentages of Identified plant in Study Ssites

Site	Plant species	Density (%)
Hisheh Forest Exclosure	*Argyrolobium crotalarioides*	2
	Artemisia incullta	76
	Colutea istria	3
	Matthiola logipetala	2
	Teucrium polium	7
Manshiyya Rangeland Exclosure	*Artemisia incullta*	17
	Atriplex halimus	2
	Matthiola logipetala	1
Fujaij Rangeland Exclosure	*Artemisia incullta*	35
	Atriplex halimus	3
	Matthiola logipetala	0.5

3.3.5 Plant Diversity

I. Species richness

Numbers of species richness in the three sites indicated low plant diversity as shown in figure (8) below.

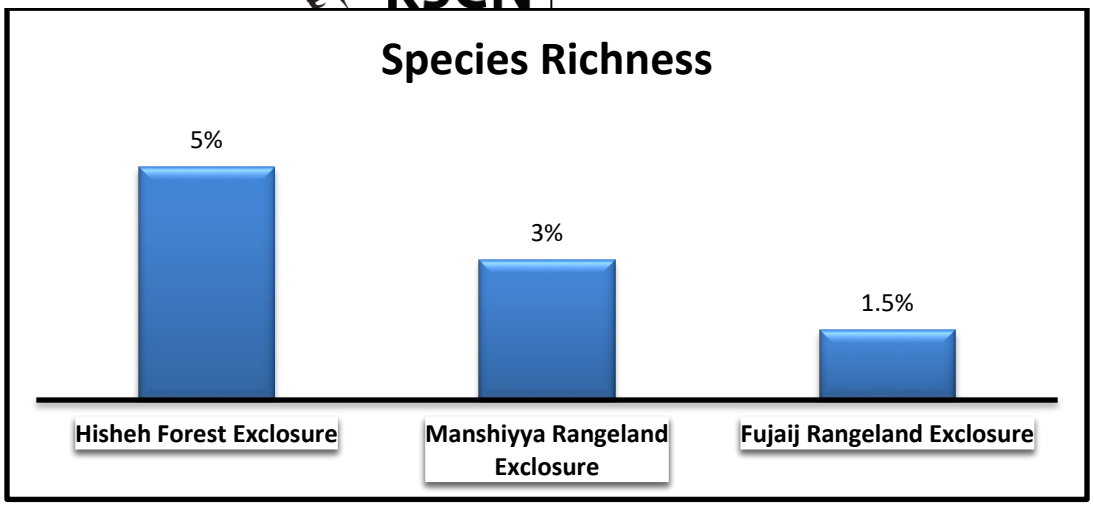


Figure 8: Species Richness Percentages in Study Sites

II. Shannon diversity index

The computed value of Shannon Diversity Index of the three sites was very low. It is recorded 0.34, 0.63, and 0.75 in Fujaij Rangeland Exclosure, in Al-Hisheh Forest Exclosure, and in Manshiyya Rangeland Exclosure respectively.

III. Raunkiaer's life form

As shown in figure (9) below, the dominant life forms of identified plant species within the three sites were Annuals and Chamaephytes, in addition to Hemicryptophyte with less value. Pharenophytes and Therophytes recorded low values within study areas.

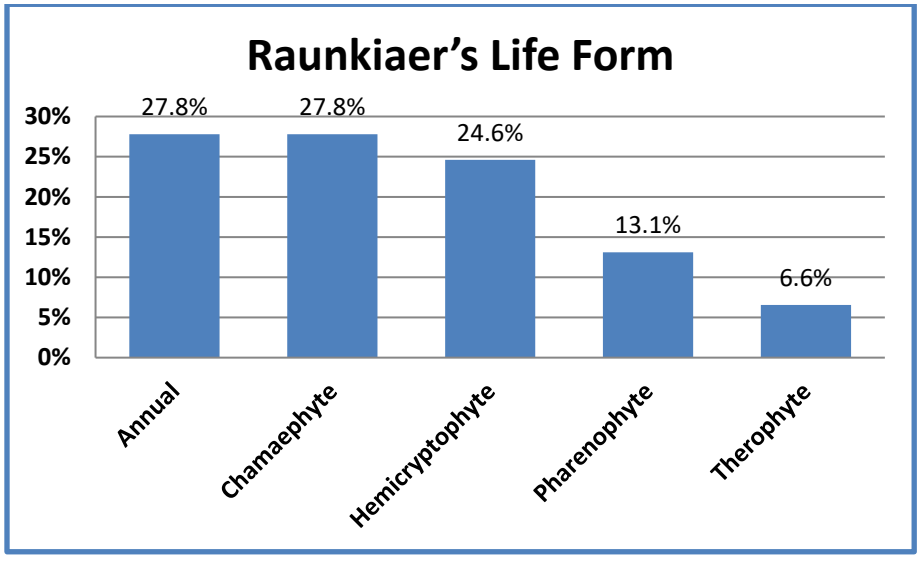


Figure 9: Raunkiaer's Life Form of Identified plant in Study Sites

3.3.6 Ground Cover

The results indicate that bare soil formed high part of soil cover, since ground cover –which revealed high values- is consisting of stones, rocks, letters and others (figure 10)

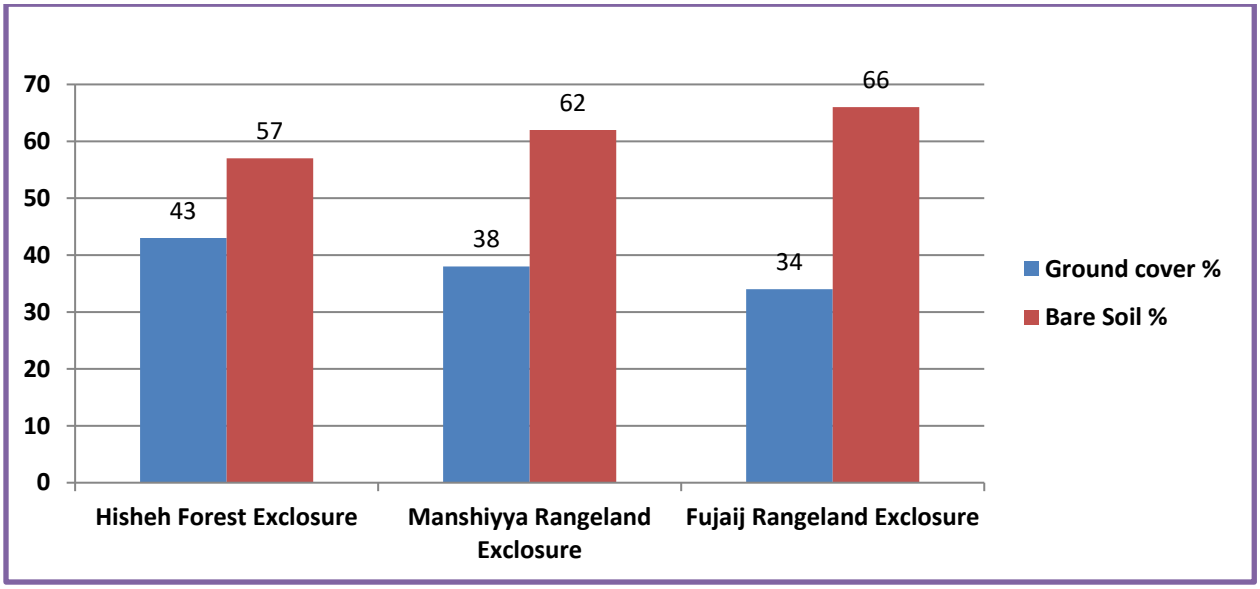


Figure 10: Ground Cover Categories and Bare Soil Percentages in Study Sites

3.3.7 Plant Biomass

Values of biomass production of forage plants showed very low attitude with $3.2X10^{-5}$, $9.8X10^{-6}$, and $5.9X10^{-5}$ in Al-Hisheh Forest Exclosure, in Manshiyya Rangeland Exclosure, and in Fujaij Rangeland Exclosure respectively.

3.3.8 Grazing Capacity

The grazing capacity revealed very poor values of forage plants since .0.0021, 0.0007, and 0.004 SUM per dunum monthly can grazed in Al-Hisheh Forest Exclosure, in Manshiyya Rangeland Exclosure, and in Fujaij Rangeland Exclosure respectively.

4. DISCUSSION

4.1 *Checklist of Floral Species and their Conservation Status*

The present study revealed a checklist containing 73 plants belonging to 28 families in three sites. Number of recoded species was 41 in Fujaij Rangeland Exclosure, whereas 32 plants at Al-Hisheh Forest Exclosure recorded compared to 28 species in Manshiyya Rangeland Exclosure. There are 17 plants presented within the three sites as (*Peganum harmala*), (*Launaea mucronata*), and (*Achillea fragrantissima*). The slightly difference in plant species number between study areas, as well as repeated plants that form about 23% of the checklist may explained by environmental conditions and other associated factors, since these sites located within the same bio-geographical zone and vegetation types.

The three study sites are fenced with more than 40 years of established for animal grazed purposes by Ministry of Agriculture. Thus, low number of plants with important conservation status is expected to be found. About 9.5% of recorded species are either rare or threatened or endemic plants. Meanwhile; 25% of these plants are palatable and 19% had medicinal uses. Al-Oran (1994) reported that shoubak area is rich with medicinal plants and economic species.

4.2 *Vegetation Attributes*

Study sites are composed of either one or two layers of vegetation stratum (dwarf trees and herbs). The attributes of vegetation cover showed the plant cover was less than 50% of total area in the three sites. Otherwise; majority of these species are non-forage, where uninterrupted encroachments upon pastoral areas can be noticed, which can be confirmed with low values of plant density and frequency. Furthermore; species diversity parameters including Species richness, Shannon diversity index, and Raunkiaer's life form recorded very low values. Hence, low values of forage species biomass and therefor grazing capacity.

4.3 *Threats Faced Vegetation Cover*

The previous scenario of degraded vegetation cover and poor forage species ratio, as well as increase number of sheep flocks will lead to decrease of palatable plants more and more. The absence of effective and rational management beside continuous destruction by local communities may also lead to completely destruction of forage stratum.

5. RECOMMENDATIONS

1. Improving a vision to frame a practical mechanism to manage the pastoral sites and try to form what called 'community based management' is should be one of main priorities.

2. Effective governmental role should be take place in planning, training, and implementing rational activities for local communities and livelihood, which lead to sustainable production of natural resources in pastoral sites.

3. Enhancing funded projects as conservation of biodiversity within pastoral areas and restoration programs of degraded pastoral sites. Since such activities will improving sustainability of biodiversity elements from grazing point view.

4. Grazing regulation plan is supposed an effective tool acting as potential themes of grazing that will maintain, develop, and sure sustainability of pastoral elements.

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7. ANNEXES

Annex (1): Checklist of plant species at Manshiyya Rangeland Exclosure

	Scientific Name
1	*Anabasis syriaca Iljin*
2	*Bassia muricata (L.) Asch*
3	*Hordeum bulbosum L*
4	*Atriplex halimus L*
5	*Noaea mucronata (Forssk) Asch. & Schweinf*
6	*Artemisia incullta Delile*
7	*Ferula communis L*
8	*Gymnarrhena micrantha Desf*
9	*Bromus tectorum L*
10	*Matthiola logipetala (Vent.) DC*
11	*Launaea mucronata (Forssk.) Muschler*
12	*Lasiopogon muscoides (Desf.) DC*
13	*Centaurea procurrens Sieber ex Sprengel*
14	*Allium spp.*
15	*Peganum harmala L*
16	*Girgensonhnia oppositiflora (pallas) Fenzl*
17	*onopordum palaestinum Eig*
18	*Verbascum sinaiticum Bentham*
19	*Echinops glaberrimus DC*
20	*Centaurea eryngioides Lam*
21	*Picnomoc acarna (L.) Cass*
22	*Astragalus spinosus (Forssk.) Muschler*
23	*Achillea fragrantissima (Forssk.) Schultz Bip*
24	*Trigonella stellata Forssk*
25	*Hyoscyamus desertorum (Asch. Ex Boiss.) Tackh*
26	*Scabiosa porphyroneura Blakelock*
27	*Ballota undulata (Sieber ex Fresen.) Bentham*
28	*Silybum marianum (L.) Gaertner*

Annex (2): Checklist of plant species at Al-Hisheh Forest Exclosure sure

Scientific Name

1	*Quercus coccifera*
2	*Picnomoc acarna (L.) Cass*
3	*Cousinia dayi Post*
4	*Launaea mucronata (Forssk.) Muschler*
5	*Galium sp*
6	*Onopordum palaestinum Eig*
7	*Astragalus bethlehemiticus Boiss*
8	*Centaurea pallescens Delile*
9	*Teucrium polium L*
10	*Hordeum bulbosum L*
11	*Stipa capensis Thnub*
12	*Rhamnus dispermus Ehrenb. Ex Boiss*
13	Artemisia incullta Delile
14	*Marrubium vulgare L*
15	*Verbascum sinaiticum Bentham*
16	*Centaurea eryngioides Lam*
17	*Cistanche salsa (C. A. Mey.) G. Beck*
18	*Colutea istria Miller*
19	*Cynodon dactylon (L.) Pers*
20	*Chenopodium sp*
21	*Cousinisa moabitica Bornm & Nabelek*
22	*Hypecoum geslinii Coss. & Kral*
23	*Ephedra aphylla Forssk*
24	*Glauciumresen arabicum F*
25	*Lactuca orientalis (Boiss)Boiss*
26	*Phlomis brachyodon (Boiss) Zohary*
27	*Pistacia atlantica Desf*
28	*Peganum harmala L*
29	*Achillea fragrantissima (Forssk.) Schultz Bip*
30	*Alkanna tinctoria (L.) Boiss*
31	*Echinops glaberrimus DC*
32	*Sisymbrium bilobum (C. Koch) Grossh*

Annex (3): Checklist of plant species at Fujaij Rangeland Exclosure

	Scientific Name
1	*Noaea mucronata (Forssk) Asch. & Schweinf*
2	*Artemisia incullta Delile*
3	*Atriplex halimus L*
4	*Ephedra aphylla Forssk*

5	*Scabiosa porphyroneura Blakelock*
6	*Cousinia dayi Post*
7	*Stipa* sp.
8	*Hordeum* sp.
9	*Peganum harmala L*
10	*Reseda lutea L*
11	*Avena sterilis L*
12	*Bromus* sp.
13	*Onopordum macrocephalum Eig*
14	*Matthiola logipetala (Vent.) DC*
15	*Retama raetam (Forssk.) Webb & Berth*
16	*Dianthus strictus Banks & Sol*
17	*Carthamus tenuis (Boiss & blanche) bornm*
18	*Verbascum fruticulosum Post*
19	*Crepis* sp.
20	*Gypsophila arabica Barkoudah*
21	*Ononis natrix L*
22	*Astragalus bethlehemiticus Boiss*
23	*Launaea mucronata (Forssk.) Muschler*
24	*Cistanche salsa (C. A. Mey.) G. Beck*
25	*Astragalus spinosus (Forssk.) Muschler*
26	*Hyoscyamus desertorum (Asch. Ex Boiss.) Tackh*
27	*Haplophyllum tuberculatum (Forssk) Ad. Juss*
28	*Allium sp*
29	*Iris sp*
30	*Amberboa crupinoides (Desf) DC*
31	*Ballota undulata (Sieber ex Fresen.) Bentham*
32	*Phlomis brachyodon (Boiss) Zohary*
33	*Eryngium glomeratum Lam*
34	*Notobasis syriaca (L.) Cass*
35	*Centaurea dumulosa Boiss*
36	*Onopordum palaestinum Eig*
37	*Salvia lanigera Poiret*
38	*Capparis spinosa L*
39	*Malva parviflora L*
40	*Pinus halepensis Miller*
41	*Achillea fragrantissima (Forssk.) Schultz Bip*