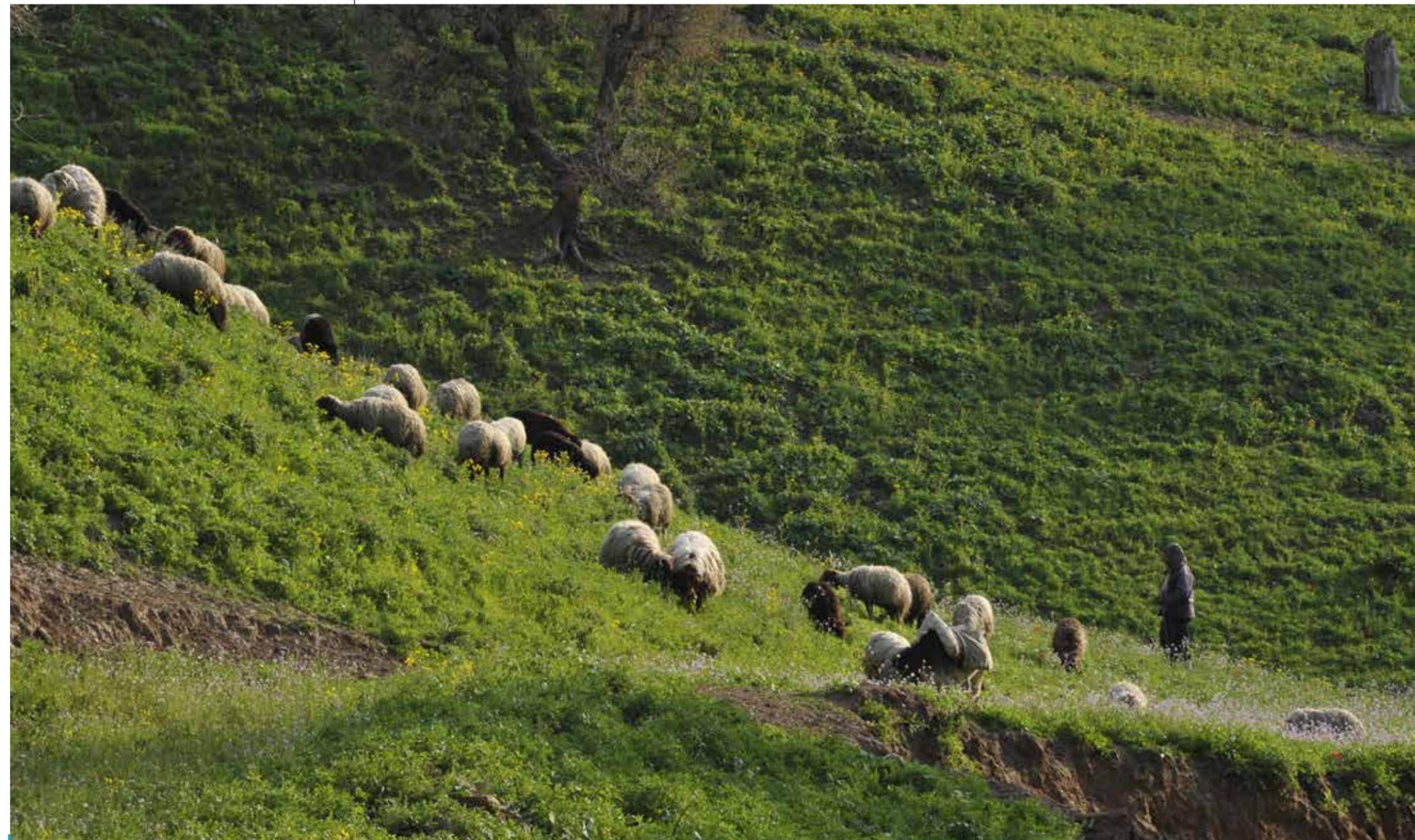




Sustainably Investing in Rangelands Jordan



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Sustainably Investing in Rangelands

Jordan

Credits

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Preface

Proceeding from the Ministry of Agriculture's mISSIOn for the purpose of achieving a sustainable development, conserving the environment and agricultural resources, enhancing self-sufficiency, protecting food security and linking the production to the needs and requirements of domestic and foreign markets, the Ministry has worked in collaboration with the International Union for conservation of Nature-Regional Office for West Asia (IUCN ROWA) to update Jordan's Strategy of Rangelands 2014 that is consistent with the three Rio conventions (Climate Change, Desertification and biodiversity). This strategy involves halt range-land's degradation by minimizing its underlying causes through enhancing sustainable range management, improving range vegetation cover quantitatively and qualitatively, enhancing local communities' participation in the natural resources management, raising their awareness thereof, organizing their institutions and strengthening their capacities. Accordingly, such can be supported by establishing projects and activities and implementing the Hima approach to the range resources management.

In spite of the decline in the rangelands over the past decades, however, the natural rangelands in Jordan play an important role in meeting the nutritional needs of the livestock, as they are still considered the main pillar of grazing animals' forage and an essential component of the ecosystems.

The Ministry of Agricultural in collaboration with the International Union for conservation of Nature-Regional Office for West Asia has striven for the dissemination of rangeland management practices using the participatory approach by implementing projects in Bani Hashem villages in Zarqa Governorate, then transfer these practices to other environmental areas in the Kingdom due to its economic, social and environmental impacts. Studies regarding the assessment of the economic and environmental effects for applying the Hima approach in Jordanian rangelands through the « Securing Rights and Restoring Lands for Improved Livelihood» project stated that the total value of the accumulative economic losses arising from rangeland's degradation (only due to direct use for grazing) is around 740 million Jordanian dinar during 1990-2011 and the total value of Jordan natural rangelands (if recovered as was pre-1990 levels) is around 136 million Jordanian dinar.

For healthy and sustainable rangelands in Jordan and ensuring the investment options, three main investment packages has been developed in this report as follows:

- 1.«Hima» Sustainable Range Management And Ecological Livestock Production
- 2.«Hima» Sustainable Range Management And Production Of Medicinal And Aromatic Range Plants.
- 3.«Hima» Sustainable Range Management And Eco-tourism We Hope these packages will provide solutions that conserve this national wealth and advance development further ahead.

Secretary-General of the Ministry of Agriculture

Dr. Radi Al Tarawneh

Acknowledgements

The “Sustainably Investing in the Jordan Rangeland” report is an outcome of consultations, research and a series of interviews and input from policy makers, donor representatives, relevant communities and rangeland stakeholders. We would like to express our sincere gratitude to all for their advice and to their institutions for supporting their participation.

The report is a first fruit of cooperation with the IUCN Commission for Ecosystem Management, notably the Drylands Group, represented here by Mr. Peter Laban -the Thematic Group Lead for Drylands Ecosystems. We thank Mr. Laban for his support in developing this report, building the capacities of related stakeholders and facilitating the national workshops and meetings with donors and investors.

Two national workshops, held in Amman, Jordan, brought together representatives of the Ministry of Agriculture, Ministry of Water and Irrigation, Ministry of Planning and International Cooperation, Ministry of Environment, Compensation Fund Program, German Agency for International Cooperation, Royal Society for the Conservation of Nature, Jordan Hashemite Fund for Human Development, Royal Botanic Garden, Hashemite Fund for Badia Development, Badia Restoration Program, West Asia–North Africa Institute, academic and research institutions, woman organizations, NGOs and the media. To all these and their representatives, we extend our deep appreciation for their commitment during the process of producing this national report.

We are especially grateful to Dr. Radi Al-Tarawneh, Secretary General of the Ministry of Agriculture, who provided the leadership and insights on adopting investments in the Jordanian rangelands.

We also acknowledge the valuable cooperation displayed by the Jordan Investment Commission and the advice they provided on the various investment sectors and facilitation of discussions with potential investors.

Special thanks are due to Mr. Saleh El-Kharabshah, Secretary General of the Ministry of Planning and International Cooperation for his commitment and support of the discussions with the donor committee in Jordan.

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A C R O N Y M S A N D A B B R E V I A T I O N S

CO2	Carbon Dioxide	MEMR	Ministry of Energy and Mineral Resources
CBO	Community Based Organization	MoE/ MoEnv	Ministry of Environment
CEM	Commission for Ecosystem Management (IUCN)	MoF	Ministry of Finance
DANIDA	Danish International Development Agency	Mol	Ministry of Interior
DM	Dry Matter	MoPIC	Ministry of Planning and International Cooperation
DRR	Disaster Risk Reduction	MTA	Ministry of Tourism and Antiquities
EIA	Environmental Impact Assessment	MWI	Ministry of Water and Irrigation
EMP	Environmental Management Plan	NAP	National Action Plan
GDI	Global Dryland Initiative (IUCN)	NDVI	Normalized Difference Vegetation Index
GDP	Gross Domestic Product	NGO	Non-Governmental Organization
GEF	Global Environmental Fund	PES	Payment for Ecosystem Services
GIS	Geographic Information Systems	REEZ	Rangeland Ecological Economic Zone
GIZ	German International Cooperation	ROWA	Regional office for West Asia (IUCN)
GM	Global Mechanism (UNCCD)	SCA	Special Conservation Area
GoJ	Government of Jordan	SDCA	Stakeholder Dialogue and Concerted Action
GWC	Green Water Credits	SDG	Sustainable Development Goals
ISRIC	International Soil Reference and Information Centre	SLM	Sustainable Land Management
IUCN	International Union for the Conservation of Nature	SME	Small Medium Enterprise
JD	Jordan Dinar	SRM	Sustainable Range Management
JCA	Jordan Cooperative Association	S&WC	Soil & Water Conservation
LDN	Land Degradation Neutrality	UNCCD	UN Convention to Combat Desertification
MARPs	Medicinal and Aromatic Range Plants	UNCBD	UN Convention on Bio Diversity
Mlj	Million	UNDP	United Nations Development Programme
MDG	Millennium Development Goal	UNFCCC	UN Framework Convention on Climate Change
MoA	Ministry of Agriculture	VCA	Verified Conservation Areas
		WTP	Willingness To Pay

1 Background and Study Rationale

1.1 Contributing to the country economy and sustainably preserving its rangeland resources

The Jordan Ministry of Agriculture supported by the IUCN's Regional Office for West Asia (ROWA) is studying the prospects for large-scale and sustainable investments in the vast rangeland areas in the Jordan Badia and in the Jordan mountains. These investments aim to recover the rich resources of these areas in a long-term sustainable and economically viable way, while at the same time improving the living conditions of Bedouin and other local communities who are living here and are the main land users and custodians of the rangelands. This study on investment options in the Jordan Rangelands builds importantly on the orientations given by the recent Rangeland Strategy of the Ministry of Agriculture (2013) and further elaborates on the Aligned National Action Plan to Combat Desertification (2020-2015) as developed with the Ministry of Environment (2015). An important basis for this study is furthermore given by studies on economic valuation (Jabarin, 2014), a GIS mapping for selecting high potential rangeland watersheds for investment (Al Bakri 2015) and detailed vegetation dynamics studies in 4 selected range sites in the Jordan Badia and Steppe areas (Abu Zanat, 2015). The last two studies as well as this study on investment options have been made possibly by DANIDA funding for the "Sustainable Dryland Landscapes" project implemented with the IUCN Global Dryland Initiative and Regional IUCN Offices in Burkina Faso and Kenya as well as – together with the Ministry of Agriculture - the IUCN Regional Office for West Asia in Jordan. The economic valuation study was made possible by IUCN-ROWA as a background document for the UNCCD/Aligned National Action Plan to Combat Desertification in Jordan (2020-2015) developed under the responsibility of the Ministry of Environment.

It is considered critically important for Jordan as a country to invest in one of its major resources, the natural rangelands (covering about 80 to 90% of its territory). On one hand this is important to preserve one of the country's principal assets and on the other hand to contribute to the country's economic development. Investments in these areas until now are however limited and when made, have often contributed to land degradation and exhausting the natural resource basis.

Different economic valuation studies have approximated the monetary value of rangelands (restoration), notably by estimating the cost of imported fodder grains that can be saved when replaced by natural forage (as such or as a result of sustainably managed rangelands). Although different methods are used, their results, the monetary value of the rangelands can be estimated in terms of cost of saved animal fodder purchase when replaced by natural forage (dry matter, DM) from the rangeland. An assessment made over a 24 years period (2013-1990) estimates at 16 million JD/year the average value of total range forage production of all rangelands in 1 to 3 months (depending rainfall) over this period. This value can be used as a proxy for the economic value of the rangelands in terms of a potential national saving when imported fodder is replaced by natural forage production from well managed rangelands. The study on rangeland investment options has used a slightly different valuation approach that is based on the factual and more recent results in four different range sites of the above mentioned ground truthing studies for this project. Also here the increase in available palatable forage dry matter production² thanks to controlled grazing management is valued against cost of equivalent purchased fodder (barley). A total value of increased forage production in moderate rainfall years³ is then estimated at 4.7 Million JD/yr for the 10,000 km² of Steppe areas lands and at 18.5 Million JD/year for the 71,000 km² of the Badia. The total for both areas would then be 23.2 Million JD/year which can be used as a value of rangeland restoration and management.

As a possibly realistic priority target at the national level the potentially productive areas/watersheds for rangeland management mentioned above are used as a geographic basis for investment strategies: 3,300 km² in the Steppe areas

¹ Ministry of Environment - Desk study (Jabarin, 2014) for the (UNCCD Jordan NAP 2020 -2015)

² As compared to actual estimations of DM forage production in Steppe and Badia areas in open access situations (100 resp. 40 kg/ha)

³ Production in moderate rainfall years being estimated at 50 % of the production in high rainfall years as experienced in the winter of 2015/2014

and 20,170 km² in the Badia. For this total area of 23,470 km² the value of estimated forage production increase thanks to sustainable range management (SRM) would be 6.7 Million JD on an annual basis. To this the value of 7.8 Million JD/yr of enhanced ground water recharge can be added because of the same range management measures (Westerberg, ⁴ (2014). Together this means that sustainable range management in the here targeted areas can potentially add around 15 Million JD/year economic value to the economy. This is a minimum estimate as this amount does not take into account that the same sustainable range management will also add value in terms of increased biodiversity, soil carbon sequestration and reduced siltation of water reservoirs.

1.2 Important questions that require to be answered

In order to make informed policy decisions in Jordan, at national and local levels, there are a number of pertinent issues that need to be further researched and given answers to:

1. Why would the Jordanian Government and local rangeland users invest in rangeland ecosystem services?
 2. What are technically rational, economically viable, and socially acceptable and ecologically sound SRM measures for investing in the Jordan rangelands?
 3. How benefits of ecosystem services can be valued so as to justify the cost of SRM investments
 4. What other investments are necessary to create an enabling environment (local governance and management, other) for sustainable range management?
 5. What kind of investors can be engaged in range management that will both strengthen a more business oriented approach to range management and comply with concerns of long-term sustainable use?
- With these questions in mind further study has been made by the Ministry of Agriculture and IUCN ROWA, so as to come to provisional proposals in May 2015.

The main objective of this further study is to explore and propose viable options for sustainable investments in the Jordan rangelands that are of interest to Jordan's government, civil society and its business community, while articulating why such investments are necessary and important for the country and for long-term sustainability of rangeland management.

1.3 Methodology

Preparatory work has been undertaken in the past year on a GIS⁵ based study to select watersheds with productive rangeland potential, a detailed study to vegetation recovery and dynamics in selected rangeland sites, within these productive rangeland watersheds⁶. Outcomes of these studies are summarized in section 3.5 of the next chapter on the available rangeland resource base in Jordan. Also further work on economic valuation of rangeland restoration has been done for the National Action Plan to combat desertification 2015-2020.

In parallel of this preparatory work a state of the art Technical Brief on "sustainably investing in the world's rangeland ecosystems", was prepared by the IUCN Global Dryland Initiative and the Dryland Ecosystems Thematic Group of the IUCN Commission on Ecosystem management (CEM) and submitted to the 3rd UNCCD Scientific Conference in Mexico in March 2015 (Davies et al, 2015). The preparatory work itself was followed-up by a "rangeland investment identification" workshop with stakeholders and resource persons who have knowledge and expertise in the domain of rangeland management. This workshop took place from 20 to 22 April 2015 in Amman and this report articulates the proposals and rationale for tangible investments in the Jordan rangelands as well as for the enabling policy environment that needs to be put in place to make such investments sustainable and effective. The workshop was characterized by a high degree of interactive work in two sub-groups, supported by insights gained from earlier preparatory work done (see section 2.8), Jordan policy documents such as the NAP on combatting desertification (MoEnv, 2015) and the new Rangeland Strategy (MoA, 2013), and the above mentioned Technical brief on sustainably investing in rangelands.

The work done identified viable options for government and private investments that are profitable while at the same time preserving in a sustainable the rangeland resource basis (the natural capital of the rangelands). Such investments can be in resource assets (water, land, vegetation infrastructure) as well as in the organizational structures that are necessary for strengthening local governance of rangeland management.

⁴ Based on ArcSWAT model analysis that predicts a shallow aquifer recharge increase of 24.2 m³/ha/yr thanks to a Hima land use scenario against a Willing to Pay (WTP) value of 2 JD/m³.

⁵ Conducted by Dr. Jawad Al Bakri for the Sustainable dryland landscapes project t 2015

http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf

⁶ Conducted by Dr. Abu Zanat, for the Sustainable dryland landscapes project t 2015

http://cmsdata.iucn.org/downloads/rangeland_20ground_20truthing_20report_20_20jordan_1_202015.pdf

2 Rangeland Resource Base in Jordan⁷

2.1 Rangeland resources in the world Worldwide,

in the dry and more humid lands, rangeland cover 51% of the total land area of the world (World Resources Institute, 1986). Rangeland covers between two thirds and three quarters of the world's dryland area, and make up there roughly 30% of the earth surface. Drylands are tropical and temperate areas with an aridity index of less than 0.65 that collectively cover nearly half of the land mass: 41.3% of the earth surface (Safriel et al, 2005). Drylands are home to a third of all humanity - about 2.5 billion people, with the majority living in developing countries (Middleton et al, 2011).

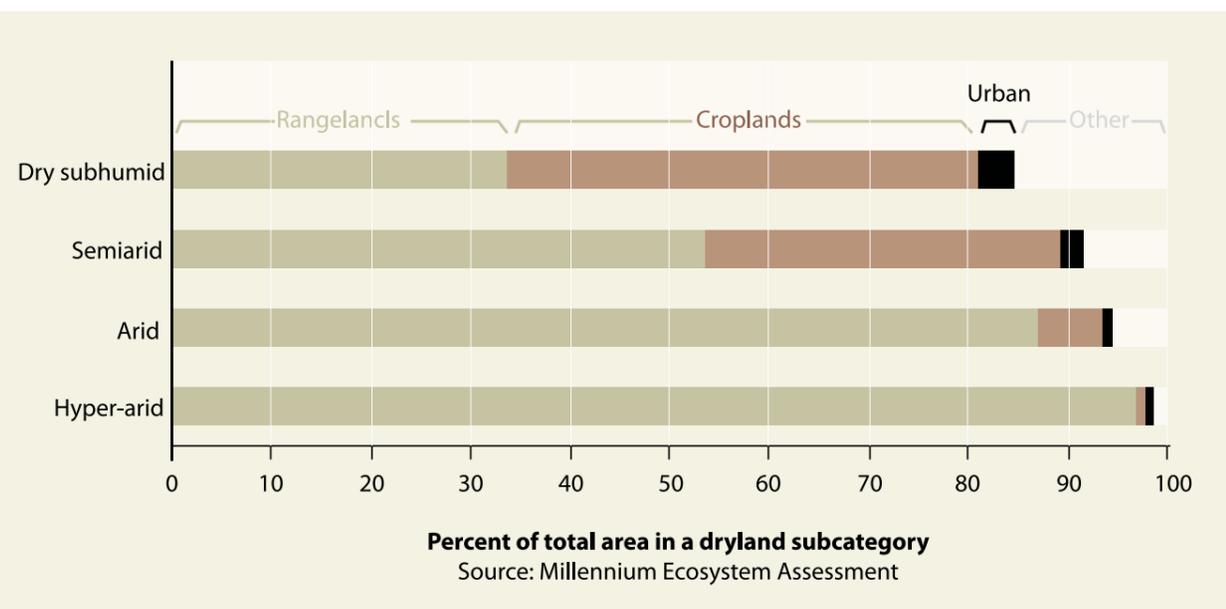


Figure 1. Land uses by dryland category (MEA, 2005)

2.2 Rangeland resources in Jordan

The rangelands in Jordan are found in the arid (< 200 mm/yr) and semi-arid (200 – 500 mm/yr) Agro-ecological Zones of Jordan: the steppe areas (200 – 350 mm/year) in the southern and middle highlands in the western parts of the country, as well as in the area between the highlands and the eastern desert; and the Badia, the desert areas in the east and south of the country, occupying about 80% of Jordan and receiving less than 200 mm rainfall/year. The main ecosystem types are native grasslands, shrub lands and woodlands. There is no clearly defined boundary to the rangelands. Boundaries move according to climatic conditions (MoA, updated Rangeland Strategy, 2013).

The rangelands are a strong element in the Jordanian culture, historical course, social imagery and history, and have a significant cultural and heritage value. The land area of Jordan's rangelands depends largely on the definition adopted. An inclusive definition joins together much of the desert, the steppe region and the highlands, thus identifying some 97% of the land area of Jordan as 'rangelands' (MoA, Rangeland Strategy, 2013). Rangelands are here considered as "the wide-open, non-fenced lands where fodder grow naturally, that are not suitable for traditional farming due to lack of rain, low fertility, rough terrain and high rockiness or because of a combination of these factors, which makes the lands optimum use restricted to production of fodder for animals" (MoA, Rangeland Strategy, 2013).

However, if only the regions unsuitable for rain-fed cropping, with rainfall below 200 mm annually, are defined as range this would give a figure near to 80% of the total land area. The Agriculture Law No. 20 for the year 1973 defined the ranges as "all lands registered as such and any other state-owned lands where annual rainfall is below 200 mm and that do not have sustainable irrigation, or the lands confined for public use". Since 1985 there has been an acceleration of all types of agriculture, gradually eating into the area of the rangeland (MoA, Rangeland Strategy, 2013).

In the past the range resources in the rangelands used to sustain the flocks of grazing animals most of the year. The original productivity of the Steppe and Badia before 1990 was estimated at 20kg and 8kg per dunum of dry matter, respectively. Supplemental feeding was practiced only in drastic situations such as severe-prolonged drought or very cold conditions. At present, different studies reported that the natural range resources are highly degraded and their contribution to the feeding calendar of grazing animals is less than 20% (MoA, Rangeland Strategy, 2013). After 1990 and due to the unsustainable policies and practices that prevailed during that era, the productivity of the rangeland represented by the Steppe and Badia was estimated at 10kg and 4kg per dunum of dry matter, respectively. This means that the traditional pastoral systems are at risk and about 250,000 of inhabitants (5% of Jordan's population) engaging directly or indirectly in pastoral activities will be severely affected (MoA, Rangeland Strategy 2013).

2.3 Land use in the Jordan rangelands

The most significant economic use of the rangelands is pastoralism. The most common animal herded is sheep, although goats are more numerous in the south. This represents a major change from camel production, which was predominant until the 1940s. Camels are still kept in certain areas, but their numbers are much reduced. This change has almost certainly affected the vegetation patterns as the large thorny bushes that camels graze cannot be eaten by sheep or goats. Controlled systems of land use in the rangelands, such as the Hima system (a traditional conservation system used by Bedouins to organize grazing and keep lands protected and conserved) persisted until the early twentieth century. Given the extremely low rainfall, the rangelands are not usually regarded as suitable for agriculture. However, cropping is common all along the western edge of the rangelands. The most common agricultural pattern is rainfed winter barley. Yields are however so poor that it is difficult to consider this production of economic value (MoA Rangeland Strategy, 2013).

⁷ Sections 3.2 through 3.5 of this chapter owe much to the recently updated Rangeland Strategy published by the Ministry of Agriculture (2013); this strategy provides a good overview of the basic facts pertinent to rangeland management in Jordan. This report on rangeland investments considers this information as an important reference for a better understanding of the proposals made for sustainable investments in the Jordan rangelands

Box 1. Drivers of land degradation

In many other countries, conversion of range land to cropland is one of the most significant drivers of land degradation of the rangelands.

Such conversion is often triggered by

- ❖ The presence of water and high soil fertility inducing crop cultivation but pushing ecosystem balances over the edge into land degradation
- ❖ A biased view that over-grazing is one of the key causes for desertification (many rangeland ecosystems depend on herbivores to maintain plant communities and to avoid development of scrubland and degradation processes)
- ❖ A negative image of pastoralists among farmers and urban people
- ❖ Underestimation and lack of knowledge of the values of rangelands
- ❖ An investment and institutional bias towards croplands (in terms of R&D and agricultural extension)
- ❖ Policy failures, as related to weak resource rights and governance; weak influencing capacity of rangeland stakeholders; inadequate economic incentives; and Insufficient/inadequate data and information, knowledge

Source: IUCN/CEM, 2015. *Technical Brief on Sustainably Investing in Rangelands*

Livestock, predominantly sheep and goats, contributes about 55% of the agricultural production in Jordan. The animals are generally raised on a crop-residue, planted fodder and barley grain based system with the rangeland contributing about one month (about 8%) of livestock feeding in normal years. The rangeland contribution to animal feed is severely reduced in over-grazed areas and during extended drought years. The maximum potential contribution of improved rangeland is not expected to exceed 30% of the daily feed requirements of one adult sheep or goat (MoA, Rangeland Strategy, 2013).

Supplementary feed has been encouraged by the government barley subsidies and reducing forage availability and has as a result led to decreasing profit margins of producers and low competitiveness of their products at national and international markets, due to the increasing world market prices for imported fodder. Twenty years of subsidies and ease of transportation around the desert have encouraged the livestock industry to become dependent on imported barley, which accounted for 63% of feed costs for producers. The government policy for subsidizing prices of imported inputs especially during the dry seasons has also encouraged livestock herders to keep large number of animals exceeding the carrying capacity of the rangeland and hence contributing to rangeland degradation (MoA, Rangeland Strategy, 2013).

2.4 Range management in Jordan

Since ancient times Jordan's grazing lands were characterized by effective traditional land tenure systems and grazing rights which were associated with tribal institutions.

Bedouin tribes practiced a traditional land management system expressed by the term "dirah," the area throughout which a group migrated, including pasture and some cultivated zones. They used a grazing system known as "Hima" in which good forage within a tribe's territories was sought out while heavily grazed land was allowed to lie fallow to recover. Within the dirah, certain good grazing areas, such as wadis and marabs (wadi fluvial outwash zones that are typically well vegetated), traditionally "belong to" individual families and clans whose property rights are recognised and respected by others. This protected the resources in these lands and organized their use in a way that assisted in their conservation and continued productivity under the prevailing environmental and social conditions. Fifty years ago, nomadic Bedouins raised their livestock with no regard to political borders, venturing into Jordan, Syria, and Saudi Arabia, as well as locations around the Iraqi borders. They migrated with their livestock to nearby lands in order to let the forage and resources in their original local areas regenerate without the interference of their sheep, using a 'Hima-like' system. In those days, around 74% of livestock owners used to travel to the east of Jordan (Al Hammad region) for grazing purposes, and 55% were also entering into Syria and 30% into Saudi Arabia due to droughts in Jordan (MoA, Rangeland Strategy, 2013). According to participants in a study, living a nomadic life and raising livestock across what has become international borders was also very beneficial to the land, which was able to naturally replenish itself while the livestock grazed in other locations (MoA, Rangeland Strategy, 2013).

With all the Bedouins now residing permanently in Jordan, 71% raise their livestock in the northern Badia region. Modern-day

political borders no longer allow them to cross over into other countries and, as a result, Jordan's limited rangeland resources now have rare opportunities to regenerate. The change to a non-migratory grazing regime has put stress on the land as the Bedouins now keep their livestock year-round in roughly the same place (Al-Tabini et al. 2012). With the elimination of these systems and rights, and the declaration of grazing lands as state-owned land, open for everybody, new land uses became prominent such as overgrazing and early grazing of range plants, ploughing of rangelands to establish ownership and property rights, urbanization, uprooting of bushes for use as fuel wood, arbitrary movement of vehicles, quarries and mining activities. Many of these areas were over-used without consideration to their resource requirements or their productivity. The change in land tenure also discouraged pastoralists and Bedouins to maintain and conserve their resources and lands and control their grazing.

2.5 Resource rights in the Jordan rangelands

Box 2. Land degradation in the drylands

In the drylands, land degradation is often called desertification. Land degradation is defined as a process of 'persistent reduction of biological and economic productivity' of the land itself (Adeel et al, 2005). Many consider land degradation as '*the greatest environmental challenge of our time*' and '*a threat to global well-being*' (UNCCD,). With a loss of 20 mli ha/yr of fertile land

- ❖ 12 % decrease of global food production, pushing up food prices by up to one third (UNCCD)
- ❖ Disrupts hydrological cycles
- ❖ Causes loss of biodiversity and ecosystem services
- ❖ Contributes to occurrence of natural hazards (droughts and floods)
- ❖ Increases emission of greenhouse gasses (carbon stored in soils (2,700 GTs) is double the amount in biomass (575 GT) + the atmosphere (780 GT))
- ❖ Triggers (rural > urban) migration and conflicts and creates social unrest

Source: IUCN/CEM, 2015. *Technical Brief on Sustainably Investing in Rangelands*

Indeed, according to formal laws, land nowadays can be owned individually or by groups in Jordan, where the state claims ownership over all uncultivated or non-built-up land, including pastoral areas. Subdivisions of land ownership within the Jordan rangelands include: a) privately owned land; b) State owned land /Treasury of the Hashemite Kingdom of Jordan; and c) lands registered in the name of a number of government institutions and Jordan Armed Forces (MoA, Rangeland Strategy, 2013).

Secured resource rights are related to registered use rights granted by the state (miri) and private property rights (molk). Holders of property rights have full control over their land resources whether that was through traditional tenure (the dirah), state land or private ownership. A common problem in the region is weak control over areas of rangeland by the people who are the primary users (and custodians!) of those lands. Some form of pastoral cooperatives could be the contemporary substitute for the traditional tribal authority that could prevent flocks from outside the community from trespassing onto prime grazing land, but these cooperatives are often ineffective. Central governments are reluctant to assign sufficient responsibility to pastoral communities to allow them exercise full land tenure privileges. Without effective local control over range resources however, there is little incentive for pastoral communities to accept management recommendations or technological interventions that increase resource productivity.

Although pastoral land is now claimed as government property, traditionally the land is considered tribal domain with full rights of use by the tribe. This creates land use conflicts and also leads to mismanagement of the natural resources leading to overgrazing and desertification. These changes in resource rights and landownership have indeed led to important degradation of the rangelands; and a review of these resource rights would greatly assist in setting new strategies for their development and improvement (MoA, Rangeland Strategy, 2013).

2.6 Rangeland management practices

Rangeland management practices need to include (MoA Rangeland Strategy, 2013):

1. **Protection:** Protecting the natural resources of rangelands by reversing improper grazing practices and detrimental actions such as ploughing.
2. **Improvement:** improvement and development of rangelands through water harvesting, planting rangelands seedlings, reseeding rangelands species and regulating the exploitation of pastures⁹.
3. **Production:** rangeland production systems in Jordan largely revolve around small ruminants (sheep and goat) and included the following: (i) a nomadic system, adopted in the past by people who mainly rely on livestock as their source of living making them move most of the year searching for food and water for their animals; and (ii) a transhumance system, practiced by people who are essentially cultivators but also practice livestock keeping and making use of climate differences by moving animals to graze at different altitudes and latitudes¹⁰. Where the real nomadic system can almost not be practiced anymore most of the rangeland production can be considered as different forms of a transhumance system.

Four complementary measures are suggested in the MoA Rangeland Strategy (2013) to stimulate better resource management:

- (1) development of pastoral cooperatives,
- (2) the redefinition of pastoral rights,
- (3) re-introduction of the Hima concept; and
- (4) the development and improvement of the rangelands through capacity development (of local users and government staff).

In the National Action Plan to Combat Desertification (MoE, 2015) the following Sustainable Rangeland Management practices are proposed:

- Restoring soil fertility (by increasing organic matter content)
- Implementing soil conservation (terraces, stone walls)
- Improving water management (through water harvesting)
- Maintenance of stream flows and water springs
- Re-vegetation of degraded range
- Restoration of community rangeland governance and management
- Improving livestock production (veterinary services)
- Improving livelihoods through sustainable intensification of resource use

⁹ The Ministry of Agriculture has established 34 reserves to protect and manage the rangelands plant species and conserve the ecosystem.

⁹ In Africa, a transhumance livestock system is rather understood as similar to a nomadic production system

¹⁰ Today many livestock production systems should be rather considered as "sedentary systems" where sheep and goat are kept close to the house and depend on fodder (grains, planted fodder and crop residues) and direct health care provided to them. Such sedentary systems are not necessary dependent on rangelands.

2.7 Recent studies on rangeland potential

Selection of rangeland watersheds

A GIS study⁵ was done for the Jordan Badia, east of the highlands, to identify watersheds with high potential for rangeland development. 16 main rangeland watersheds with 69 sub-watersheds have been identified (Figure 2) to have such potential and are characterized by altitude and topography, rainfall, soil characteristics, vegetation zone and type and type of land ownership¹¹. These 69 sub-watersheds were selected out of a total of 437 watersheds in the Badia (< 200 mm average rainfall). These watersheds that are considered having productive development potential represent 28.5¹² % of all the Badia rangelands in Jordan east of the highlands. Box 3 provides insights on the criteria used to come to this selection. The map on the next page indicates where these watersheds are located. After the work done on the GIS study it was decided in a stakeholder meeting that rangelands in the highlands may also be considered as relevant for rangeland development. Hence, to the 16 watersheds in the Badia can be added relevant watersheds in the semi-arid zones of the highlands with rainfall between 200 and 350 mm.

Box 3. Selection of sub-watersheds in the Jordan Badia with high potential for rangeland development

- Watersheds only with rainfall < 200 mm, while land mainly owned by the Treasury of the Kingdom: 437 < 323 sub-watersheds;
- Soil map: excluding areas with sand dunes, mud flats, and saline soils: 323-204 sub-watersheds
- Land use maps/plan: excluding areas dominated by quarries and mineral extraction, industrial activities, irrigation and eco-tourism (Wadi Rum): 204 < 181 sub-watersheds
- The network of roads and tracks and the map of watering points (Hafeer and earth dams) were used to exclude areas with no access: 181 < 140 sub-watersheds
- Topography and vegetation index maps: only areas with slopes (<6%) and NDVI index of <0.20 selected: 140 < 69 sub-watersheds

Source: IUCN Sustainable drylands landscapes project Funded by DANIDA (Dr. Jawad Al Bakri)
http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf

¹¹ Geological characteristics would have been an important other element as bedrock influences hydrology.

¹² Percentage based on data in Al Bakri (2015)

http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf

Selection of pilot rangeland sites

In the same and a follow-up stakeholder meeting a selection of pilot rangeland sites for further study was made, taking also into account watersheds in the highlands. The criteria for selection of these pilot rangeland sites are summarized in Table 1.

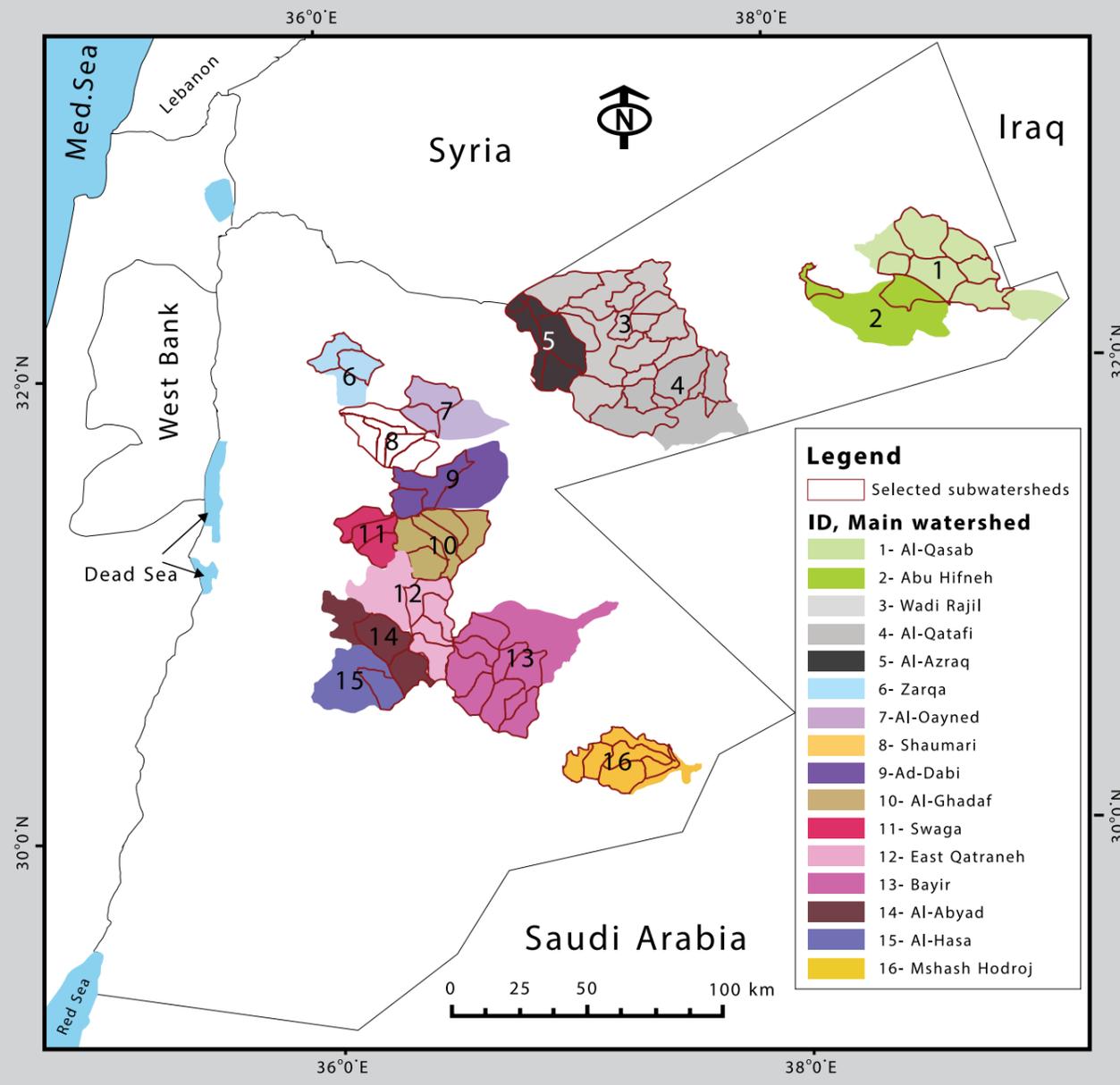


Figure 2. Map of the initially selected sub-watersheds within main watersheds

TABLE 1

Summary of criteria for refined selection of rangeland sites (Al Bakri, 2014).

Parameter	Criteria for selection (inclusion)
Vegetation	- Selected sites shall include different types of vegetation and wide ranges of NDVI. - Condition of vegetation: high potential for recovery as indicated by field visits and previous work of Ministry of Agriculture. - Areas must be important for local communities (in terms of grazing resources).
Ecological importance	- Areas that include different bioclimatic gradient or rangeland ecosystems.
Land use plans	- Areas that show no conflict with other activities (industrial, mining, housing and tourism) in the present or in the near future.
Social	- Areas with communities that showed interest or previous experience in community-based participation in rangeland protection.

On the basis of field visits and subject matter expertise four range sites were selected for ground-truthing and further study, including a range site in the western escarpment of the highlands descending into the Jordan Valley. These are:

1. Hima Bani Hasshim site in Zarqa Watershed (Zarqa Basin)
2. Kharraneh-Fraisheen site in Shaumari Watershed (Azraq Basin)
3. Ayra Reserve site in Ayra Watershed (Jordan Valley Basin)
4. Husseinayah site in Al Hasa (al Khor) Watershed (Jafir Basin)

The map in Figure 3 locates these four range sites, while Table 2 provides an overview of their geo-physical characteristics.

TABLE 2

Main geo-physical characteristics of selected range sites

Range site	Bani Hasshim	Al Fraisheen	Husseiniyah	Ayra
Watershed	Zarqa	Shaumari	Al Hasa	Ayra
Watershed area	550 km ²	1050 km ²	270 km ²	45 km ²
Altitude	500 – 700 m	600-630 ,	940-1100 m	100 - 500 m
Geology	Dissected Limestone	Limestone Plateau	Gravel Plain on chalk/marl bedrock	Sandstone/lime
Soils	Clayloam (?) Calcic Inceptisols	Silty Loam Calcic Aridisols	Silty clayloam Calcic Aridisols	Typic Torriorthent (Sandy Entisols)
Topography	Hilly with steep slopes (20-30%)	Flat (1-5% slopes)	Flat (1-2 % slopes)	JV Escarpment (12-27% slopes)
Rainfall	200 – 250 mm	80-100 mm	50-100 mm	150-400 mm
Poverty %	1.7-15.7 %	15.8 – 25.1 %	25.2 – 42.8 %	8.9 – 15.7 %
Ownership	MoA	Treasury Lands	Treasury Lands	MoA
Resource tenure	Community	-----	Open-Access	MoA

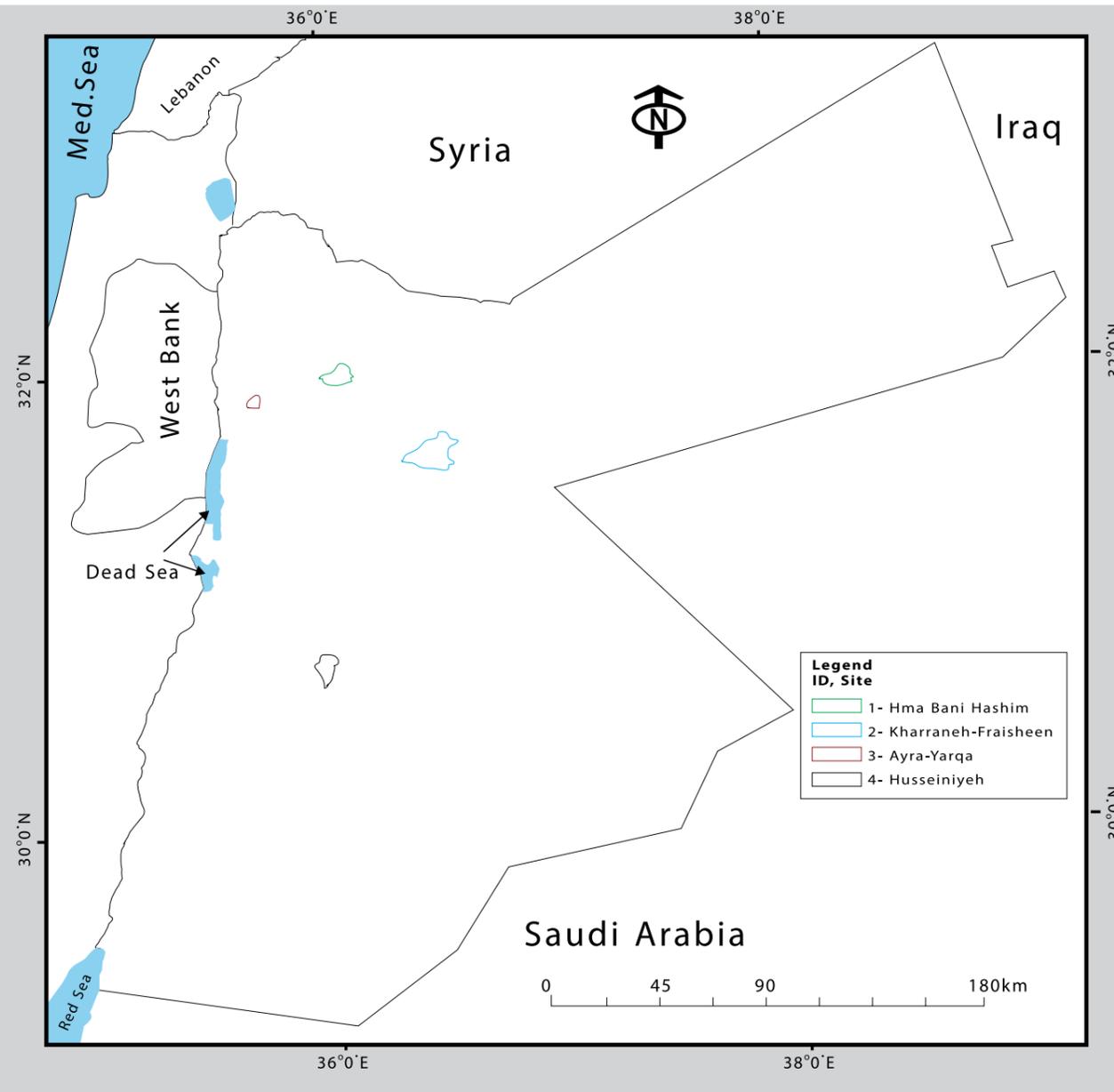


Figure 3. Map of selected range sites (Al Bakri, 2015)

Ground-truthing in selected range sites

In the four selected range sites mentioned above, further study was done about vegetation aspects and dynamics⁶. Table 3 gives an overview of the main vegetation characteristics in the four range sites.

In general it can be said that the four sites represent 3 different **vegetation types**: Chert-Hammada, Batha steppe and Mediterranean non-forest (Albert et al., 2003). The Chert-Hammada vegetation is mostly composed of fleshy plants which can resist hot conditions. Most of Hammada vegetation is restricted to the wadis where soil moisture is available.

The Batha steppe has a scrubby appearance with low growing shrubs and herbs. Mediterranean non-forest consists of scrub and many species of herbaceous vegetation. In general, the **vegetation structure** of the visited sites consisted of two layers where the dwarf shrubs occupied the upper stratum and the herbs in the understory. The species composition of the two strata differed from one site to another. Visual estimation of **vegetation cover** was fair (10-25%) for Kharraneh-Fraisheen and Al-Husseiniyah sites and good (> 25%) for Hima BaniHashim and Ayra Reserve. Prolonged history of destructive grazing at the four sites has depleted most of the forage species. **Biomass production** of palatable and non-palatable plants in the period of investigation was high (563 to 1164 kg/ha) due to the very good rainfall the winter of 2014/2015 (see Table 3 below). Even in view of the long history of irrational use, notably overgrazing, the biomass measured this year must be considered as a maximum potential productivity of rangelands in Jordan (Abu Zanat, 2015). Nevertheless the measurements demonstrate that recovery of vegetation is fast and can be accomplished in a period of two years. It is worth mentioning that there are innovations in pasture management elsewhere that need to be introduced to Jordan, based not on the number of animals but the duration of grazing and recovery periods.

Grazing practice could be described as uncontrolled for Kharraneh-Fraisheen and Al-Husseiniyah sites, fairly controlled at some parts of Eyra reserve and controlled at Hima Bani Hashem. Besides grazing, several **agricultural activities**, especially cultivation of barley, are taking place within sites (Kharraneh-Fraisheen and Al-Husseiniyah) or at the boundaries on private lands (Eyra reserve). The studies done in the four selected rangeland sites have not provided clear-cut evidence under what **grazing management** vegetation recovery and biomass production is highest. The two sites with higher scores are also situated in areas with better rainfall and possibly better soils. However, in both these sites grazing management was better controlled, either by Hima communal management (Hima Bani Hashim) or as a range reserve by the MoA (Eyra). In the other two sites (Al Fraisheen and Husseinieh) grazing was under a more or less open access modality. Without much doubt, the protection that was provided by the controlled grazing regimes has contributed to the high performance of vegetation recovery. To note that the majority of rangelands in Jordan are treasury lands where the right of use is guaranteed or secured for local communities but the ownership of these lands is not granted. In reality, the tribes still claim that these lands are tribal lands and should be solely used by certain tribes. Another lesson learned from the participatory range studies is that herders prefer to graze their flocks on areas without any disputes on land tenure and this issue is one of the entry points to promote the idea of Hima or community-management of grazing lands (see Box 4 below).

Box 4. Hima Revival and Biodiversity Conservation

The Bani Hashem community in Zarqa watershed presents a successful example of the re-introduction of the Hima system. The reviving of the Hima system at Bani Hashem villages is an attempt for showcasing how strengthening local community capacities (of both women and men) enables them to protect and manage their land resources in proper communal efforts that will be reflected positively on their natural resources as well as socio-economic growth. The community (supported by the Ministry of Agriculture) has identified 1500 hectares of public forest land that they refer to as "the last green area" in the rapidly industrialising Zarqa river basin area. Negotiations between the Bani Hashem community and the Directorate of Rangelands and Badia Development, involving the prime minister's office were carried out to grant the community the right to manage the lands as rangelands. Approval was given to the community to start management on 100 Ha, to be scaled up to 1500 Ha if this management attempt proves to be successful.

Through the EU funded "Securing Rights and Restoring Lands for Improved Livelihoods" project, led by IUCN ROWA, the community at Bani Hashem has developed a local tribal law, called "Meathak Sharaf", to help enforce the new land management system by restricting grazing. Meathak Sharaf has been endorsed by the Zarqa governor who represents the local government and can help enforce the law. The Ministry of Agriculture has established a community based group (Hima Bani Hashem CBO) to follow up and sustain the process. After one year of activities and protecting their Hima area from free-grazing by herders but without using any fencing, biodiversity benefits have already become observed through the increase of biomass and restoration of indigenous floral species such as *Artemisia herba-alba*. Protecting the pilot area allowed shrubs and grasses to regenerate, restoring the land's vegetation. A total of 36 native plant species were recorded in the site, mainly in the area that receives the highest rainfall.

Source: IUCN- ROWA and MoA (MoA, Rangeland Strategy, 2013)

TABLE 3

Main vegetation characteristics of selected rangeland sites¹³

Range site	Bani Hasshim	Al Fraisheen	Husseiniyah	Ayra
Watershed	Zarqa	Shaumari	Al Hasa	Ayra
Vegetation type	Batha Steppe	Chert Hammada	Chert Hammada	Mediterranean non-forest
Vegetation structure	2 layers: shrubs and herbaceous	2 layers: shrubs and herbaceous	2 layers: shrubs and herbaceous	2 layers: shrubs and herbaceous
Vegetation coverage	Good (59%)	Fair (36%)	Fair (25%)	Good (45%)
Nr of reported species	56	34	20	40
Fresh biomass:	Kg/ha	Kg/ha	Kg/ha	Kg/ha
Non-palatable*	209	167	200	183
Palatable	955	439	363	691
DM palatable	478	220	182	346
Use	Controlled Grazing + medicinal plants	Uncontrolled Grazing + Barley	Uncontrolled Grazing + Barley	Uncontrolled Grazing + Barley + Olives
Threats	None	Land tenure conflicts +barley	Land tenure conflicts +barley	None
Investment potential (size, access)	Limited area; moderate access;	Sizable area; easy access;	Sizable area; easy access	Sizable area; moderate access;
Investment potential (graz. index)	good grazability; index: 43	fair grazability; index: 38	fair grazability; index: 36	good grazability; index: 40

* Non-palatable: poisonous, thorny, hairy

2.8 Key Stakeholders and their interests

There is no in-depth substantial stakeholder analysis done yet as relevant to their engagement in activities in the Rangelands. Key governmental actors and their main policy objectives, according most recent policy and strategy documents, are:

Ministry of Agriculture with notably its Directorate of Rangelands and Badia Development

“The recent Rangeland Strategy of 2013 has updated the Strategy that dates from 2001.

The five main goals of this strategy are:

1. Rangelands sustainable development and management.
2. Improvement of social and economic conditions for livestock breeders and pastoral communities taking into consideration gender issues
3. Enhancement of capacity building (training and awareness)
4. Monitoring and evaluation of rangeland status
5. Engagement of Local communities in sustainable rangeland development and management.”

The MOA obviously has to play a key and leading role in SRM in the country and its Rangeland Directorate seems to be well placed for this

Ministry of Water and Irrigation

“Three national water master plans strategies have been produced since the first in 1998. In 2004 the National Water Master Plan was prepared which provided more of a focus on environmental impact than before. Subsequently, the Jordan Water Authority produced a strategic plan for 2008-2012, which focused on operational efficiency. In 2008 a new national water plan, ‘Water for Life 2008-2022’, incorporated climate change obligations into its strategy and policies, especially the prospect for reduced water resources in future.”

In view of the importance for Jordan to make as efficient use of its scarce water resources and the potential of the rangelands to increase ground water recharge The MWI would be an important actor for SRM in Jordan.

Ministry of Environment

The Aligned National Action Plan to Combat Desertification of 2015 has **four Strategic Objectives:**

- 1: To improve the living conditions of affected populations.
- 2: To improve the condition of affected ecosystems.
- 3: To generate global benefits through effective implementation of the UNCCD/NAP.
- 4: To mobilize resources to support implementation of the Convention through building effective partnerships between national and international actors

These 4 strategic objectives will be implemented through **5 Operational Objectives:**

- 1: Advocacy, Awareness Raising and Education.
- 2: Policy Framework.
- 3: Science, Technology and Knowledge.
- 4: Capacity Building.
- 5: Financing and Technology Transfer.

The importance of the rangelands for soil carbon sequestration, climate change adaptation and biodiversity will require strong involvement of the MoE in further developments around SRM

The Hashemite Fund for Development of Jordan Badia

“Its 2008 Master Plan highlighted the socio-economic challenges in the Badia and their integration to natural resources management with a focus on water and rangeland resources. Proposed diversification of sources of income, and exploring alternative income earning possibilities in the Badia, to reduce dependence on livestock keeping. This will reduce some pressures on the rangelands and help to ease land degradation from overgrazing. It included nine specific themes including one theme on ‘youth and environment.’”

Its strong focus on community development makes the Hashemite Fund for the development of the Badia a key player in any further strategy for SRM.

The Ministry of Energy and Mineral Resources

An updated Master Strategy of Energy Sector for the period 2007-2020 was prepared in 2007 by The Royal Commission. Whilst not directly linked to climate change obligations, the following proposals were related to GHG mitigations and some adaptation measures:

- Alternatives to crude oil and oil by-products supply;
- Proceed with a renewable energy law to stimulate the private sector to increase its investments in this field;
- Implement wind energy projects for electricity generation;
- Complete necessary studies for thermal solar energy projects;
- Focus studies on biogas fuel for the industrial and transport sector;
- Create a fund to aid renewable energy projects; and
- Implement Energy Consumption Efficiency Programmes.

¹³ IUCN Sustainable drylands landscapes project –ground truthing activity conducted by Dr. Mahfouz Abu Zanat 2015. http://cmsdata.iucn.org/downloads/rangeland_20ground_20truthing_20report_20_20jordan_202015_1.pdf

In view of the high potential in the country and certainly also in the rangelands, the MEMR need to be closely involved in further action for SRM.

Ministry of Tourism and Antiquities

The National Tourism Strategy set out a mission that “Jordan will develop a sustainable tourism economy through a partnership of government, the private sector and civil society to expand employment, entrepreneurial opportunity, social benefits, industry profits and state revenue”. The strategy stated that tourism development will be sustainable and characterized by:

- Preserving the environment and adopting ecologically sound policies;
 - Respecting the lifestyles and cultures of the people and communities; and,
 - Balancing the principles of profits with the need for socially responsible business practices.
- The National Tourism Strategy for 2004-2010 relied on private-sector initiatives to develop tourism into a major income-generating sector. Whilst this Strategy placed an emphasis on ecotourism it did not address the need to monitor or measure the impact of tourism on biodiversity, for example. The strategy did highlight the importance that community-based tourism would play.

The important potential to combine SRM with ecotourism will make it important to involve also closely the Ministry of Tourism in further strategizing for SRM.

Other important key stakeholders that need to be involved in further strategizing for SRM in the Jordan Rangelands are: Treasury Lands Directorate in the Department of Land and Survey of the Hashemite Kingdom of Jordan. As formal owner of most of the land in the Badia and the Steppe areas, their early involvement in further SRM activities is a must.

The Jordan Cooperative Association. As discussed in this report high importance is given to herder cooperatives for the local development and implementation of SRM activities. It is only logical then that an umbrella body at the national level will get closely involved as a spokesman for them at the national level

As discussed in section 5.4, it will be important to engage in detailed stakeholder analysis exercises in the areas selected for further work on SRM.

3

Range Investment Packages and Their Environmental Impact

3.1 Preamble and principles

Through different consultation meetings with rangeland key stakeholders and resource persons to come up with proposals for a number of investment packages feasible to be implemented in the Jordan rangelands. These proposals are formulated with a concern for being realistic and effective, in the interest of local range users as well as Jordanian society at large, while they are intended to contribute both to the national economy of Jordan and to preserve the rich resources of Jordan's rangelands in a sustainable way.

The proposals here developed are informed by the conceptual framework for sustainable investments in rangelands and by the different strategies developed by the Jordanian Ministries discussed in this report, by the recent preparatory work implemented and discussed in section 4.6 and foremost by the knowledge and experience about the Jordan rangelands of the participants to these “*rangeland investment options*” workshops set-up by IUCN-ROWA and Ministry of Agriculture.

With “investments” we mean here all technical and non-technical options or measures that Government, civil society and private sector could consider to ensure sustainable production of rangelands and consequently improve the livelihoods of pastoral communities. Investments can be seen in terms of efforts in time and by human resources, in terms of change in institutional arrangements and in terms of financial contributions to create or restore necessary infrastructure and other long-term assets. In all cases such investments would contribute to Sustainable Rangeland Management of Ecosystems either by protecting, maintaining and strengthening ecosystem services in healthy ecosystems; or by restoring ecosystem services in degraded ecosystems

The investment packages here presented focus on both technical-physical investments in the rangeland assets (land, water, vegetation and biodiversity) and on investments in the local governance framework needed to sustain rangeland asset investments and ensure long-term impact. Enabling measures at policy and institutional levels necessary for successful implementation of these investments are discussed in the next chapter.

Three investment packages are proposed by the rangeland key stakeholders. These different investment packages are not mutually exclusive and can be used in different combinations depending local context, potential and needs.

Three comprehensive investment packages

- 1. Ecological livestock production/”Hima” integrated range management (including soil, carbon, water and energy conservation measures)**
- 2. Protection, management, production and marketing of medicinal and aromatic rangeland plants (including soil, carbon, water and energy conservation measures)**
- 3. “Hima” integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures)**

All three investment packages have five principles in common:

- By being economically viable contributing to GDP, while ensuring ecological sustainability of range ecosystems
- Engaging with different kinds of investors in different segments of the value chain

- Privileging local investors (CBOs, Cooperatives, Women Associations) where possible
- Strengthening local governance modalities to enhance empowerment, ownership and accountability of such local actors
- Enhancing wise resource tenure arrangements, not necessarily property rights (by appropriate modifications in legal and indigenous rules and frameworks)
- Capitalizing on high off-site benefits (externalities) to justify long-term investments.

The three investment packages provide a basic framework and are built up by 4 to 6 investment components. However, these components can be combined also in different investment package configurations. The basic investment components are:

- “Hima” Integrated Grazing Management
- Soil, Carbon & Water Conservation and improvement
- Improved Ecological Livestock Production
- Biodiversity, Medicinal and Aromatic Range Plant (MARP) Protection and Production
- Management of eco-tourism sites with historic and archaeological value
- Renewable Energy Sustainable Use
- Value Chain Development and Marketing
- Local community organizations as change agents for impact and sustainability

The **first seven investment components** that can find a place in these three investment packages are further detailed in sections 3.2, 3.3 and 3.4, identifying the different interventions under each component and their direct local impact and impact at society level.

Chapter 5 elaborates on the local and enabling actors/stakeholders that need to be involved and what is necessary to strengthen local organizations to engage and invest in the here proposed investment packages for sustainable range management. This will provide the basis for investments in the last investment component: **SRM and local community organizations as agents for development**

3.2 SRM and ecological livestock production

T A B L E 4

Investment Package 1: Ecological livestock production/“Hima” integrated range management (including soil, carbon, water and energy conservation measures)

Interventions	Direct local Impact	Societal impact (externalities)
A. “Hima” Integrated Grazing Management		
Prepare plans for improved rotational grazing management according to carrying capacity of land;	Improved vegetation quality and density and hence forage productivity;	Improved biodiversity
Explore potential for reviving winter-summer pastures transhumance by protected corridors	Increased livestock production (quality and quantity)	Improved soil carbon sequestration
Setting-up participatory herder experimentation in rangelands management through Herder-Field Schools and enhancement of local knowledge	Enhanced local ownership and community accountability for range management (see section 4.5)	Increased economic activity in rural range areas with new job opportunities created
(where necessary and feasible): seeding with preferred grass species; developing technologies for seed-dispersal – e.g. manual or livestock-managed	The age-old “Hima” range management arrangements revived	rural-urban migration and social urban tension minimized
	Job opportunities created in rural range areas and rural-urban migration minimized	

B. Soil, Carbon & Water Conservation and Improvement		
Stone terraces and walls, gully control/check dams, hafeer and earth dams	Reduced soil erosion and increased soil moisture	Improved ground water recharge and reduced siltation in water reservoirs; safer drinking water and higher public health
Amendments with Phosphorus fertilizer to stimulate leguminous species	Improved soil fertility and increased carbon sequestration	
Construction of cisterns, micro-catchments, stock ponds; maintenance of existing ponds; Rehabilitation of ground water wells; check quality	Increased water harvesting for livestock drinking water	Improved biodiversity and Increased soil carbon sequestration
		Increased economic activity in rural range areas, minimizing rural-urban migration
C. Improved ecological livestock production		
Organize and deliver (mobile) livestock services to herders (veterinary and artificial insemination –local breeds)	Improved animal health; reduced mortality and abortion rates Increased productivity	Improved herder livelihoods and incomes - Increased economic activity in rural range areas, minimizing rural-urban migration - Improved ground water recharge, biodiversity, soil carbon sequestration and reduced siltation in water reservoirs
Set-up effective veterinary laboratories	Improved disease diagnosis and preventive animal health care	
Raise genetically high quality rams (local breeds) for breeding purposes	Increased productivity and reduced mortality	
Establish fattening feedlots (lambs and kids)	Increased productivity	
D. Install renewable energy facility for low-cost energy consumption and production		
Solar / wind electricity provision of processing and storage houses	Reduced electricity consumption cost	Less CO2 emissions
Solar / wind energy plants to connect to grids	Reduced electricity production cost	Reduced national energy budget
Solar / wind energy provision to SRM villages	Reduced electricity consumption and production cost	Financial resources for SRM in range lands (Payment for Ecosystem Services)
E. Value chain development and marketing		
Adapt slaughtering houses for producing ecological meat products	Improved processing of quality animal products	Strengthened rangeland ecological livestock sector
Facilitate credit facilities for productive loans	Strengthened economic positions of herders	Improved livelihoods, rural incomes and rural economic activity
Organize and train women groups in quality processing of dairy products	Improved processing of quality animal products	Contributions to Agricultural Sector GDP
Organize labelling/certification of ecological livestock products	Increased added value of quality livestock products	Reduced rural-urban migration and social urban tensions
Improve (local) marketing channels and outlets	Increased income, jobs and product credibility	

3.3 SRM and medical and aromatic range plants (MARP) production

TABLE 5

Investment Package 2. Protection, management, production and marketing of medicinal and aromatic rangeland plants (including soil, carbon, water and energy conservation measures)

Interventions	Direct local Impact	Societal impact (externalities)
A. Enhanced biodiversity protection, management and ecological production of valuable medicinal and aromatic range plants (MARPs)		
Prepare local plans for designation and management of sites with valuable indigenous plants	Improved growth, quality and density of valuable plants (biodiversity)	Improved biodiversity Increased economic activity in rural range areas with new job opportunities created
Enhance natural regeneration of selected MARPs	Increased biodiversity Increased production	
Develop harvest protocols for sustainable production	Ensured long-term production	
Natural fencing against animals (where necessary in selected sites)	Increased biodiversity Increased production	
Reviving and if necessary re-introducing native indigenous species	Increased biodiversity and added value to MARP production	
B. Soil, Carbon & Water Conservation and integrated site management		
Bench terracing/ gradonies, gully control/check dams; micro-stock ponds (where necessary in selected sites)	Reduced soil erosion, increased soil moisture and improved soil fertility	Improved biodiversity Improved ground water recharge
C. Install renewable energy facility for low-cost energy consumption		
Solar /wind electricity provision of processing and storage houses	Reduced energy consumption	Financial resources for SRM in range lands (Payment for Ecosystem Services)
D. Value chain development and marketing of MARPs		
Market analysis (domestic and export markets)	Ensured niche outlets for MARP products	Developed MARP niche sector Improved livelihoods, rural incomes and rural economic activity Contributions to Agricultural Sector GDP Reduced rural-urban migration and social urban tensions
Create storage, laboratory (for quality assurance) facility at CBO levels plus packaging machine	Improved storage, processing and packaging of quality MARP products	
Organize and train women and youth groups in quality processing of MARP products	Empowered women groups and increased women incomes	
Organize labelling/certification of ecological livestock products	Increased added value of quality MARP products	
Improve (local) marketing channels and outlets	Increased income, jobs and credibility	

3.4 SRM and Eco-tourism

TABLE 6

Investment Package 3. “Hima” integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)

Interventions	Direct local Impact	Societal impact (externalities)
A. “Hima” Integrated grazing management		
Prepare plans for improved rotational grazing management according to carrying capacity of land; Setting-up participatory herder experimentation in rangelands management through Herder-Field Schools and enhancement of local knowledge Explore potential for reviving winter-summer pastures transhumance by protected corridors (where necessary and feasible): seeding with preferred grass species; developing technologies for seed-dispersal – e.g. manual or livestock-managed	The age-old “Hima” range management arrangements revived Improved vegetation quality and density (biodiversity) and hence forage productivity; Enhanced local ownership and community accountability for range management (see section 4.5)	Improved biodiversity Improved soil carbon sequestration Increased economic activity in rural range areas with new job opportunities created rural-urban migration and social urban tension minimized
B. Soil, Carbon & Water Conservation and Improvement		
Stone terraces and walls, gully control/check dams, hafeer and earth dams	Reduced soil erosion and increased soil moisture	Improved ground water recharge and reduced siltation in water reservoirs Safer drinking water and higher public health Improved biodiversity and increased soil carbon sequestration Increased economic activity in rural range areas, minimizing rural-urban migration
Amendments with Phosphorus fertilizer to stimulate leguminous species	Improved soil fertility and increased carbon sequestration	
Construction of cisterns, micro-catchments, stock ponds; maintenance of existing ponds; Rehabilitation of ground water wells; check quality	Increased water harvesting for livestock drinking water	
C. Install renewable energy facility for low-cost energy consumption and production		
Solar /wind electricity provision of processing and storage houses and eco-tourism facilities	Reduced electricity consumption cost	Less CO2 emissions Reduced national energy budget
Solar / wind energy plants to connect to grids	Reduced electricity production cost	
Solar / wind energy provision to SRM villages	Reduced electricity cost for consumption and production	Financial resources for SRM in range lands (Payment for Ecosystem Services)

D. Limited ecological livestock production		
Organize and deliver (mobile) livestock services to herders (veterinary and artificial insemination –local breeds)	Improved animal health; reduced mortality and abortion rates Increased productivity	Improved herder livelihoods and incomes
Other livestock production interventions (as above) could possibly be considered, dependent on scale and range objectives (in case of high biodiversity and minimum grazing, to be limited and mainly for niche quality dairy production)	Improved storage, processing and packaging of quality MARP products	Increased economic activity in rural range areas, minimizing rural-urban migration
		Improved ground water recharge, biodiversity, soil carbon sequestration and reduced siltation in water reservoirs
E. Enhanced biodiversity protection, management and ecological production of valuable medicinal and aromatic range plants (MARPs)		
Prepare local plans for designation and management of sites with valuable indigenous plants	Improved growth, quality and density of valuable plants	Improved biodiversity Increased economic activity in rural range areas with new job opportunities created
Enhance natural regeneration of selected MARPs	Increased biodiversity Increased production	
Develop harvest protocols for sustainable production	Ensured long-term production	
Natural fencing against animals (where necessary in selected sites)	Increased biodiversity Increased production	
Reviving and if necessary re-introducing native indigenous species	Increased biodiversity Added value to MARP production	
F. Value chain development and marketing		
As under ecological livestock and MARP investment packages		
G. Management of eco-tourism sites with historic, cultural and archaeological value		
Enhance CBO management of eco-tourism facilities	Increased ownership and local jobs and incomes	Strengthened local livelihoods Increased economic and alternative activity in rural range areas with new job opportunities created Contribution to GDP by increased tourist flows Increased visibility of Jordan in terms of cultural and natural heritage
Promoting local eco-tourism infrastructure and services (eco-lodges, visitor centres; bird observatory points; hunting facilities)	Increased income and local job opportunities; Increased eco-tourism visibility	
Promote traditional handicrafts and cultural/heritage events	Enhanced cultural heritage and increased income and local job opportunities	

4

Economic Rationale for Investing in the Jordan Rangelands

4.1 A value chain approach

The investment packages presented in Chapter 3 essentially follow a value chain approach. Value chains in land use related economic activity have to ensure that the resource basis is well managed for productive activities being sustainable. Hence an important emphasis is given to integrated range management and soil and water conservation. The proposed value chains are developed around two land use production systems typical for range ecosystems, ecological livestock production and protection and production of medicinal and aromatic plants. Further value chain development and marketing is necessary to deal with everything from production through processing, trade and marketing to delivery of products to consumers. Eco-tourism can be considered as another form of land use, capitalizing on the scenery and history of the landscape. Evidence from other countries indicates that availability and development of renewable energy resources can activate systemic change that in turn, would accelerate further progress towards sustainable land use production and consumption in many other sectors¹⁴. Together with eco-tourism renewable energy provision provides also important leverage to finance and pay for ecosystem services provided by the rangelands and to economically enhance the development of these value chains. The interactions between these different investment components can be depicted as is done in Figure 4.

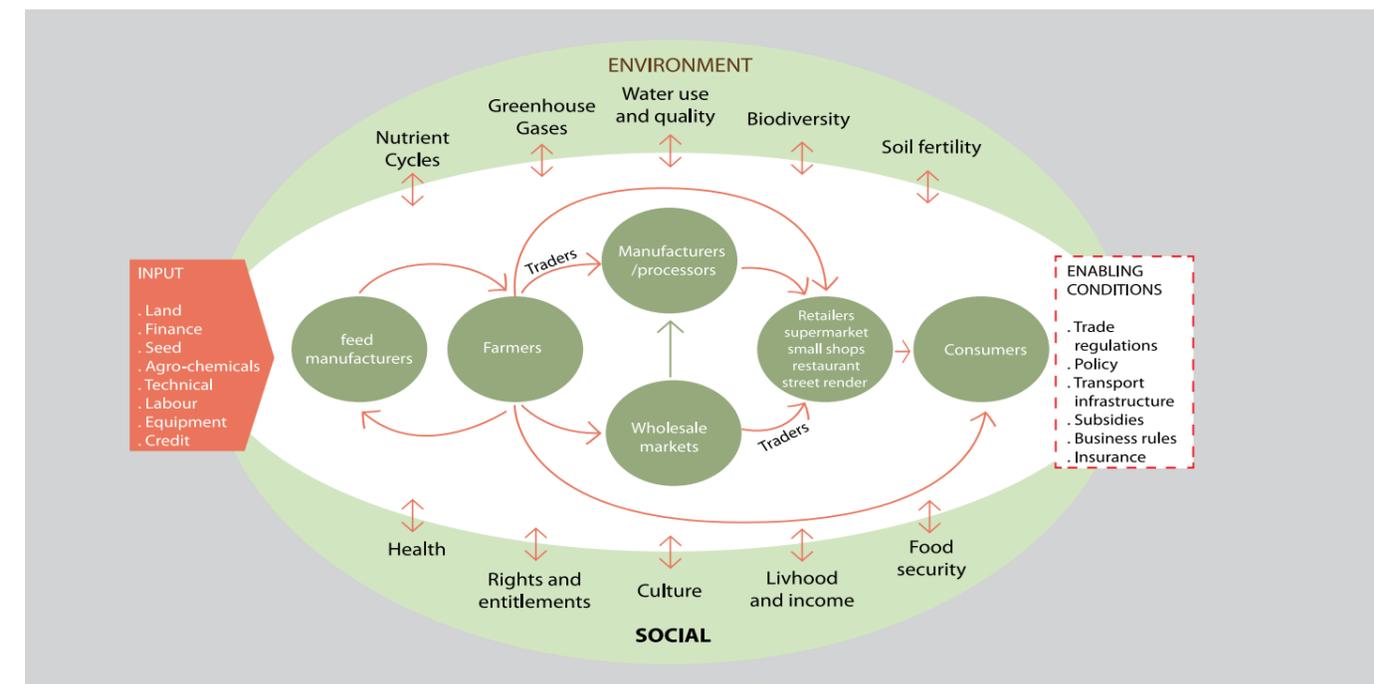


Figure 4. A land use related value chain considering environmental, social and economic aspects (Jennings, 2014).

¹⁴ Simone Quatrini, Global Mechanisms UNCCD; personal communication

In such a value chain the environment forms a critical basis for sustaining land use productive activities, through water and soil fertility resources, while the land use system, if well managed, ensures the maintenance of biodiversity, soil carbon, hydrological and nutrient cycles and reduced CO₂ emissions. Much of this is determined by how well social and cultural values are respected and to what extent the land use production systems contribute to livelihoods, food security and health. The production systems themselves form the basis for a complex process of service and inputs provision, processing, packaging, trading, transport, marketing etc. that together will provide the added value that can make the land use production system economically interesting.

The proposed investment packages have therefore emphasized the need for investments in further value chain development. Where it is beyond the scope of this study to elaborate in detail what this would entail for the three investment packages proposed, it will require the social organization of the different actors that can play a role in each value chain, their complementary engagement so as to create win-win situations to develop a value chain that is of interest and profit to all actors involved. For development of the here proposed value chains also Investments in the related legal and organizational frameworks need to be assured.

Further value chain and actor analysis can best be done for well determined significantly large geographic investment areas in Jordan suitable for the promotion of high value-generation sustainable land use activities compatible with the policies and traditions of the country, such as those as are presented in Chapter 3. Such investment areas could possibly be labelled as “Rangeland Ecological Economic Zones”. They need to be prioritized with the key stakeholders to be involved and probably be situated around bigger towns that can serve as a pull factor for produce from the land use production systems; this would apply also to the investment package around eco-tourism activities. An initial selection of such geographic areas could possibly be made on the basis of the 16 watersheds in the Badia as well as other rangeland watersheds in the Jordan highlands not covered by the GIS exercise in the Badia. A value chain analysis with relevant stakeholders could follow the Stakeholder Dialogue and Concerted Action (SDCA) Approach as described in Chapter 5.3.

The following sections of this chapter will deal with the economic rationale for investments such as here proposed, and the economic valuation of eco-system services needed to substantiate such rationale. Chapter 5 will elaborate on the crucial role that needs to be played in these investment packages by local community organizations and what is needed for them in terms of local governance measures to be functional and effective. Chapter 6 will close this study by stressing that in order for these investment packages and the related value chains to have impact, important enabling investments have also to be made at the national level so as to “unlock” investments by the private sector and local community organizations.

4.2 Fostering ecosystem service benefits for more sustainable range management

Where most services provided by actors in value chains can be rather easily valued in economic terms (cost and benefits largely being dependent on market dynamics), this is more difficult to assess for the many services provided by the range ecosystems.

A good number of the benefits of these ecosystem services are mentioned in Chapter 3 detailing the different investment packages. The interventions proposed here aim to impact and strengthen the range ecosystems so as to sustain the land use production systems proposed. This will ensure that local range users are rewarded for the management of these range ecosystems and that the range ecosystems are rewarded for their benefits. Among direct (on-site) impacts are mentioned: reduced soil erosion, increased soil moisture, improved soil fertility, and hence improved vegetation quality and density, higher forage productivity and - with more available drinking water for animals - increased livestock production (quantity and quality), especially if this is done by applying ecological sound land practices. These impacts would lead to higher incomes and improved livelihoods as well as an increase in job opportunities in range areas. The organization and management of specific sites with valuable medicinal, aromatic and other plants could further add to the benefits of well managed rangelands and biodiversity, while in range areas in the vicinity of historic and otherwise cultural interesting places further added value could be brought by investing in eco-tourism activities that would support and strengthen investments in SRM. Many of these positive direct impacts of ecosystem services, if well managed, contribute to important benefits for society as depicted in the diagram below.

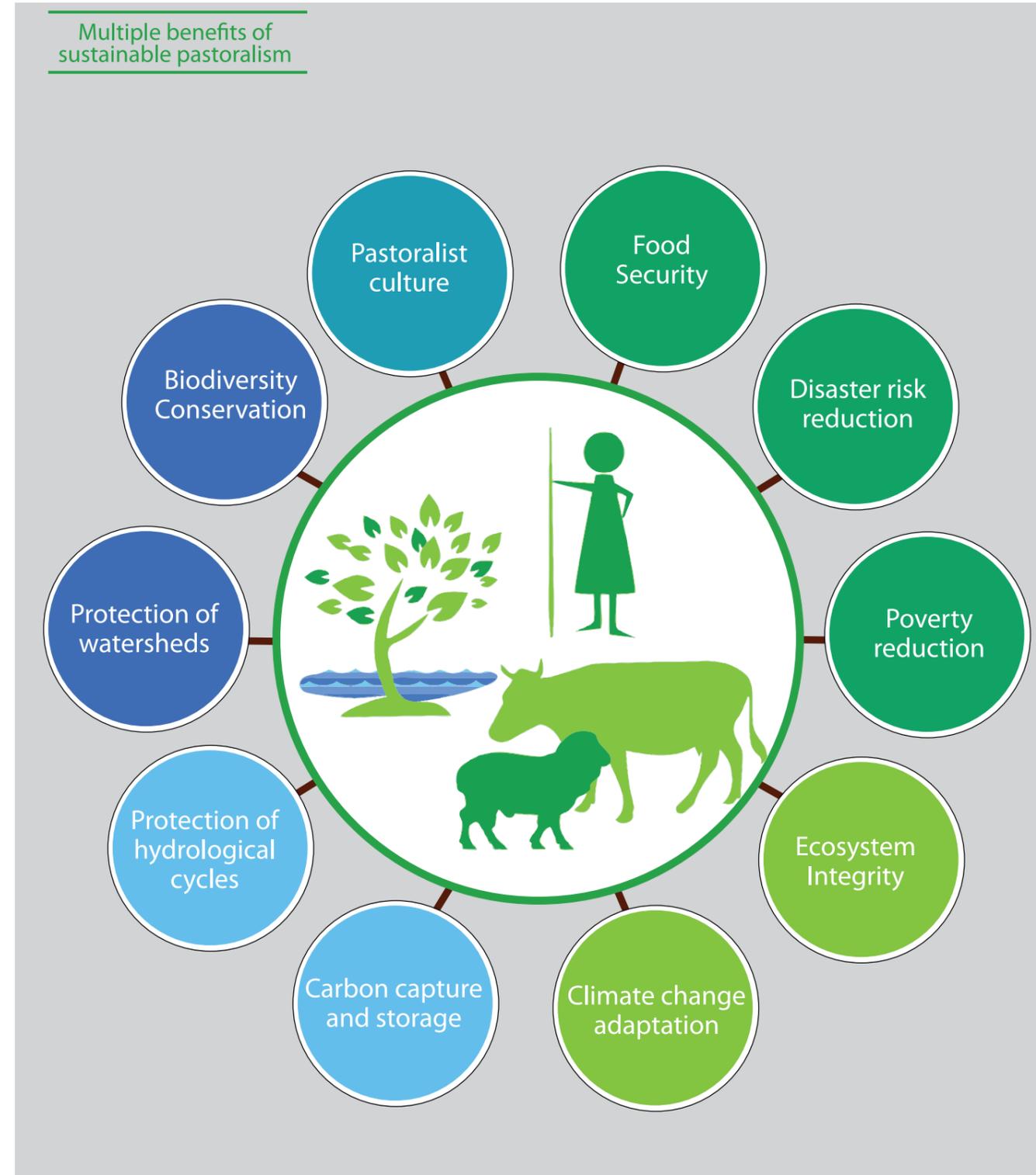


Figure 5. Multiple benefits of sustainable rangelands management (Mc Gahey et al, 2014)

What is important to emphasize here for the rangeland ecosystems, and probably for many other ecosystems, is the critical role of hydrological cycles. If well managed, they are in many situations the key for securing other important ecosystem services as is depicted in the diagram below. Without preserving the water cycles in an ecosystem other ecosystem services, from soil fertility to biodiversity and carbon sequestration will be much less performing. This in turn will impact negatively the benefits ecosystem services can provide to society as a whole. It is for this reason that in the investment packages proposed in chapter 3 important emphasis is given to soil and water conservation interventions. If well taken care of, investments in soil and water conservation will induce higher soil fertility, higher biomass and biodiversity, better ground water recharge and important for the rangelands higher carbon sequestration.

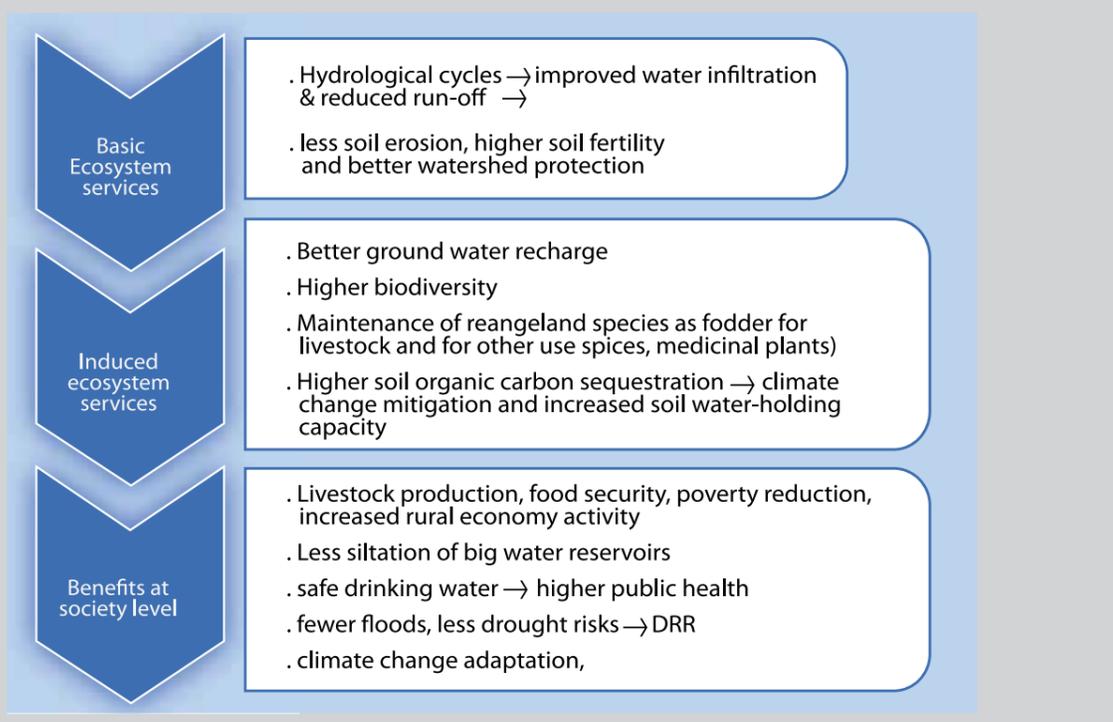


Figure 6. The “value chain” of ecosystem service benefits

In the case of the Jordan rangelands, on the basis of the natural capital vested in its ecosystem services, further investments in livestock services (veterinary and artificial insemination) would lead to reduced mortality and further increases of livestock production. This in turn will lead to increased economic activity in rural range areas with new job opportunities created, and most probably contributing to a reduction of rural –urban migratory flows and social urban tensions.

The important question here is how to give value to these ecosystem services, to the cost of their maintenance or if this is not taken care of to the cost of land degradation and the loss of rangeland productivity. The next section will explore what valuation tools can be used or have already been used in Jordan for this purpose.

4.3 Valuation tools for the Jordan rangelands

Comprehensive economic valuation is required to demonstrate the economic value and potential, both on-site and off-site (externalities) of above mentioned ecosystem services and their benefits for SRM and society. For instance “downstream” (in terms of watersheds or value chains) consumers benefit from higher and more regular water supply, hydropower, protection from floods and draughts. They enjoy the benefits of these ecosystem services but have not made the efforts to maintain them; in sort they benefit from the efforts of others made in the “upstream” rangelands. On-site valuation can provide evidence for direct economic benefits to the local range users and positive valuation outcomes should be used as an important

rational for making local investments in physical assets and in local range governance by both governments and the private sector. In the case of rangelands, economic valuation in the rangelands needs to take into account sufficient scale and the larger landscape. In many cases valuation tools focus on the value or benefits of provided ecosystem services such as:

- Provision of range forage
- Value wild species/biodiversity;
- Ground water recharge;
- Increased surface water;
- Reduced siltation;
- Soil carbon sequestration.

In recent efforts in Jordan to explore the validity of valuation tools the following have been tried out (Westerberg and Myint, 2014):

- Valuing range restoration and subsequent increase of forage through avoided cost of purchase of imported fodder
- Valuing increased ground water recharge or surface water collection due to rangeland restoration by willingness to pay (WTP) for trucked water.
- Valuing range land restoration, resulting in reduced sedimentation of downstream dams, by avoided cost of extra water storage (reservoir) replacement.
- Valuing additional carbon sequestration due to rangeland restoration by estimating avoided Social Cost of Carbon as a discounted value of damage by climate change in terms of decreased agricultural production, harm to human health and damage from rising sea levels.
- Valuing range land restoration by estimating the implementation, management and opportunity cost associated with restoration and surveyed use.

Important questions need still to be answered with regard to complexity, applicability of different valuation tools and the assumptions made. Further work is very much needed, especially on valuing soil carbon sequestration.

Box 5. Valuation of rangeland ecosystem services in terms of forage production			
	Valuation Tool	Notes	Estimated value
1	Monetary value of the rangelands in terms of cost of saved animal fodder purchase by its replacement by natural forage (dry matter, DM) from the rangeland (Westerberg, 2014)	Based on complex rotational grazing assumptions and formulas (see reference)	16.8 Million JD/yr
2	Monetary value of the rangelands in terms of cost of saved animal fodder purchase by its replacement by natural forage (dry matter, DM) from the rangeland (Jordan UNCCD NAP /Jabarin, 2014)	Based on saved barley/straw/wheat barn consumption per animal (times total nr of animals per year, for each year from 1990 – 2013) and grazing periods between 1 and 3 months dependent on annual rainfall in each year	16 Million JD/yr
3	Monetary value of average lost rangeland productivity (forage DM) in tons of barley equivalents over the 1990 -2013 period (barley 211 JD/ton) - (Jordan UNCCD NAP/ Jabarin, 2014)	1 kg DM forage = 0.4 kg barley; 50 % grazable area; 1990 - 2013: 200 -100 kg/ha for Steppe and 80 - 40 kg/ha for Badia; Possibly conservative estimate as % of forage/ palatable species is assumed to be only 50% of total biomass produced;	4.8 Million JD/yr

¹⁵ The 16 watersheds in the Badia identified by the GIS study (Al Bakri, 2015) have a total surface area of 20,170 km², which is 28.5 % of the total estimated Badia rangelands (7.1 Million ha or 71,000 km²) http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf

¹⁶ It is assumed that a similar 30 % of the Steppe land can be added as realistically to be used for productive rangelands (especially knowing that pressure of other land use (agriculture/horticulture, urbanization, industry) will be higher here than in the Badia) http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf

4	Steppe Area (200-350 mm/yr): Monetary value of improved forage (DM) production due to range management (206 kg/ha as compared to actual productivity in open access grazing (100 kg/ha) in barley tons equivalent (220 JD/ton); average for Eyra and Bani Hashim range sites – (the author based on ground truthing activities conducted by Dr. Mahfouz Abu Zanat 2015)	Production assuming moderate rainfall (50 % of production at high rainfall) and 50 % allowed grazing of area and 80 % palatable forage of total biomass - (206 -100 kg/ha) * 50% = 53 kg/ha * 0.4 = 21.2 kg barley equivalent/ha * 0.22 JD/kg = 4.7 JD/ha *1 mlj ha Steppe range = 4.7 mlj JD/yr	4.7 Million JD/yr
5	Badia Area (< 200mm/yr): Monetary value of improved forage (DM) production due to range management (100 kg/ha as compared to actual productivity in open access grazing (40 kg/ha) in barley tons equivalent (220 JD/ton); average for Hussineyeh and Wadi Al Fraishen range sites – (the author based on ground truthing activities conducted by Dr. Mahfouz Abu Zanat 2015)	Production assuming moderate rainfall (50% of production at high rainfall) and 50% allowed grazing of area and 80 % palatable forage of total biomass - (100 - 40 kg/ha) * 50% = 30 kg/ha * 0.4 = 12 kg barley equivalent/ha * 0.22 JD/kg = 2.6 JD/ha *7.1 mlj ha Badia range = 18.46 mlj JD/yr	4.7 Million JD/yr
6	4+5 for all Steppe and Badia rangelands (Peter Laban/CEM)	8.1 mlj hectare	23.2 Million JD/yr
7	4+5 for 30% of all Steppe and 28.5 % of all Badia range lands (Peter Laban/CEM)	Assuming that only 28.5 % ¹⁵ of the Badia and 30 % ¹⁶ of the Steppe lands can realistically be used for productive rangelands	6.7 Million JD/yr

For 1 to 6: Values estimated for all rangelands in Jordan: 7.1 Million ha (71,000 km²) of Badia (< 200 mm/yr) and 1 mlj ha (10,000 km²) of Steppe (200-350 mm/yr).

Recent valuation studies in Jordan have notably focused on valuing rangeland restoration through avoided cost of purchase of imported fodder thanks to increased forage production in the range (Jabarin, 2014 and Abu Zanat, 2015). Box 5 provides a summary of the outcomes of these different valuation exercises.

From the last calculation (7) in Box 5, taking a rather conservative approach¹⁷, it could be concluded that:

- (a) the value of forage productivity increase due to good range grazing management can be estimated as 6.7 Million JD/yr (expressed in the value of barley equivalents), assuming that over time such productivity increase can be realized on around 29% (20,170 km² in the Badia) and 30% (3,000 km² in the Steppe areas) of the total land area that is classified as rangeland; or reversely that
- (b) the opportunity cost of not investing in good range management in these areas is 6.7 Million JD/yr, with as a result a lost forage productivity increase.

If the 6.7 Million /JD forage productivity increase is added to the value of 7.8 Million JD/yr thanks to enhanced ground water recharge due to good range management (Westerberg et al, 2014¹⁸ it can be concluded that the opportunity cost of not investing in SRM in Jordan amounts to 14.5 Million JD/year (**say 15 Million JD/year**), without counting other evident ecosystem benefits such as replacement cost of water reservoir volume due to siltation and without counting the value of lost biodiversity and of reduced carbon sequestration. As such values are not yet taken into account; it follows that still more in-depth work needs to be done on economic valuation of rangeland ecosystems, and especially on designing tools that are simple, practical and accessible to many professional staff in the domain of rangeland management.

From the recently acquired research data presented in Box 5 above, also a very general estimation – in a very indicative way – can be made of carrying capacity for small ruminant livestock in the Badia and Steppe Areas (see Annex 1).

Noting that the two last scenarios reflect a situation of total restoration, they are as follows:

¹⁷ Increased forage production is calculated for years with moderate rainfall, production being estimated at 50% of the production of high rainfall such as in 2014/2015. Data from the ground truthing range site studies (IUCN Sustainable Drylands landscape project 2015) are used as they reflect more accurate measurements of biomass production, while providing a good indication of the % of palatable forage (80% iso of 50% in earlier valuation calculations)

¹⁸ Based on ArcSWAT model analysis that predicts a shallow aquifer recharge increase of 24.2 m3/ha/yr thanks to a Hima land use scenario against a willing to Pay (WTP) value of 2 JD/m3.

Box 6. Carrying capacity in the Badia and Steppe areas for small livestock				
Carrying Capacity (maximum # of animals) (at 50 % allowable grazing – see calculations in Annex 1)	Steppe	Badia		
	Per dunum	For 10,000 km ²	Per dunum	For 71,000 km ²
At Moa 1990 reference and 30 grazing days/year (20 kg and 8 kg/dunum forage for Steppe and Badia)	0.063	0.67 Million	0.027	1.89 Million
At MoA 2013 reference and 30 grazing/days/year (10kg and 4 kg/dunum forage for Steppe and Badia)	0.033	0.33 Million	0.013	0.95 Million
At IUCN/Bani Hashim 2014 reference and 30 grazing days/yr For moderate rainfall year: 50% of 48 kg/dunum-high rainfall	0.16	1.60 Million		
At IUCN/Bani Hashim 2014 reference and 30 grazing days/yr For moderate rainfall year: 50% of 48 kg/dunum-high rainfall			0.073	5.21 Million

4.4 Rationale for financing rangeland investments

Direct local investments in SRM

Direct investments in local activities in the rangelands, such as “Hima” grazing management, medicinal and aromatic plant production and ecological livestock production (see Tables in chapter 3) need to be and probably are economically feasible even for local community organizations (e.g. herder and women cooperatives). Such local investments in the rangelands need to contribute to GDP or to minimize losses to GDP, be sustainable, improve rural livelihoods and ensure sustainable use of rangeland resources on an economically sound basis, while functioning on the basis of a rather straight forward business model without need for subventions.

The geographic scope for such direct investment in SRM seems to be quite important; the area suggested in this report to be realistically available for productive range management is in the order of 25,000 km². At the same time, according to the recent studies carried out (described in section 2.6) forage production and grazing periods can be substantially increased (resp. at least two-fold and from 1 to 3 months) when adequate “Hima” kind of rotational grazing management is introduced. Nevertheless further economic analysis, following a value chain analysis, needs to be carried out for each selected specific Rangeland Ecological Economic Zone (REEZ) to determine financial and economic feasibility of these proposals in more detail and to see how profitable these activities indeed are for different actors in the value chain.

However, other investments are necessary that may not so easily provide economic returns at a short- or mid-term time span. This relates notably to investments in soil and water conservation locally needed to sustain forage and biomass production. As mentioned in section 4.2 such S&WC investment provide critical ecosystem services that need to be paid for not only by the rangeland direct users but also by other beneficiaries of such services. In order to accommodate for such indirect payments the concept of “Payment for Ecosystem Services (PES)” will be introduced in a subsection below. Valuation of these ecosystems services is a prerequisite for defining levels and modalities of such PES.

Enabling investments in SRM

As has been mentioned in many if not all of the meetings for this study with stakeholder representatives, resource persons and policy decision makers, the complexity of SRM, the intricate interactions between direct and society benefits and the complex social and institutional settings call for other type of investments in the social and organizational domain at local community and Governorate and possibly national levels. The consultations for this study all emphasize that a much larger role needs to be given to local community organizations as the direct beneficiary of but also the most credible steward for SRM. Chapter 5 will elaborate especially on issues related to local ownership and accountability for SRM, strengthening of local governance, stakeholder dialogue and concerted action and the regulatory and institutional frameworks needed. Apart from that important organizational and stakeholder efforts need to be made for value chain analysis and development. It is anticipated that also here important investments in terms of staff, time and institutional

resources are required.

For an important part such investments fall in the domain of public responsibility, as part of a Government's Good Governance requirements, and need to be coordinated, initiated if not implemented by the relevant government agencies. However, where such enabling investments are specifically tuned to enhance and support sustainable range management, and where the benefits of large scale SRM also have global dimensions, there is a point in exploring financing modalities that may alleviate the investment burden of the national government. The next sections on "Financing Investments" and "Payment for Ecosystem Services" will further elaborate on such potential modalities.

A particular case however for a PES modality that could be implemented directly in Jordan may be found in the livestock sector and would rest within the competence and financing capacity of the Government. At the moment the Jordan Government is heavily subsidizing the livestock sector by important subventions up to 85% of the purchase of dried fodder grains. Where the commercial price of barley is around 210 JD/ton, the subsidized price is 175 JD/ton. The total cost to the Government of this subsidy to herders is substantial and amounts to, according to Jordan NAP/ UNCCD Jabarin (2014), 13,5 Million JD per year. This government subsidy on purchased fodder grains could be converted into a reward to herders for good SRM as a subsidy that not only serves livestock production but also sustained management of the rangelands. Such a subsidy could in fact be considered as a local PES. Depending on number of sustainable grazable days each year the PES could pay herders an amount equal to saved fodder purchase (see section 3.3).

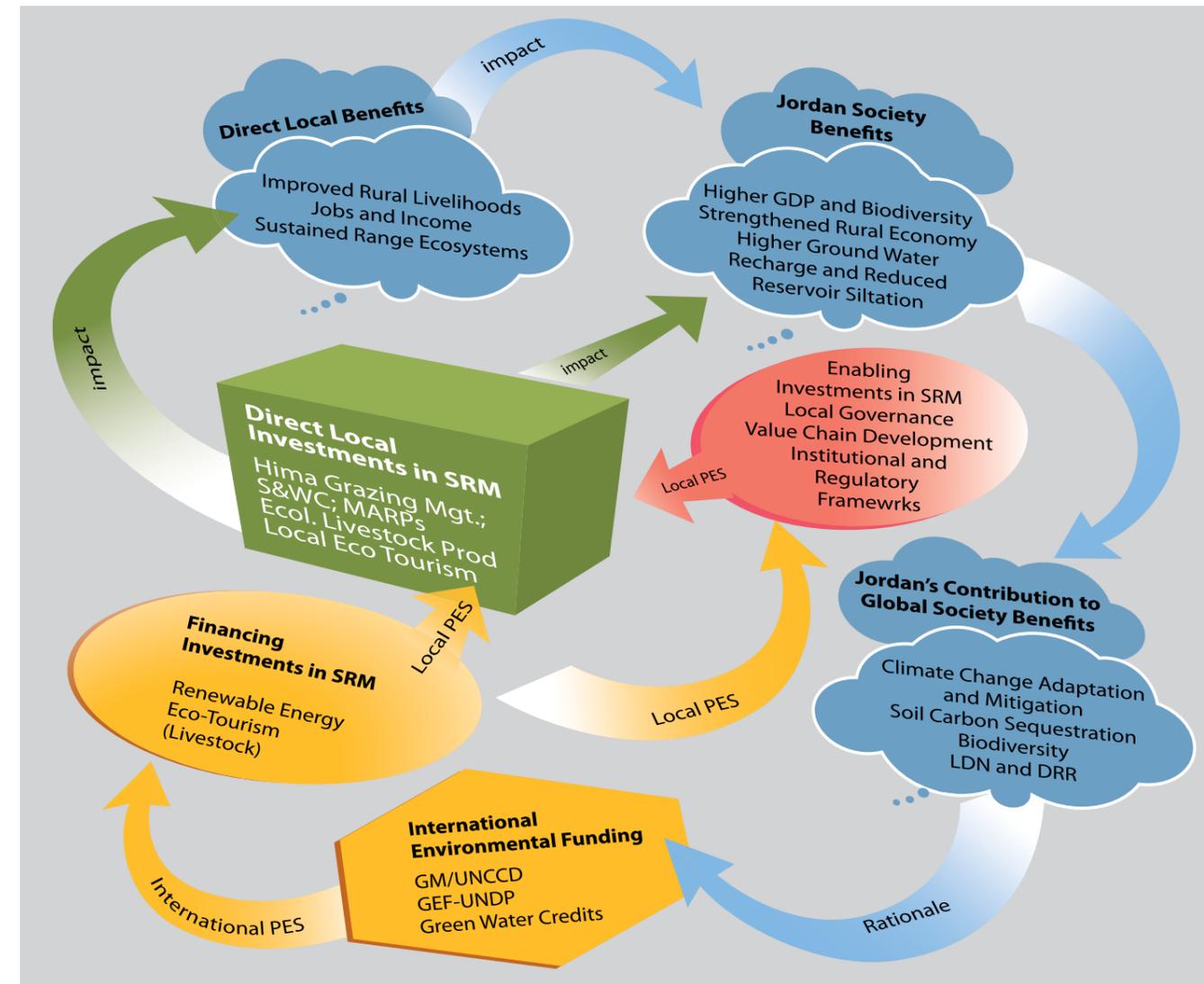
"Financing Investments" in SRM

Two critical components of the investment packages proposed in Chapter 4 are local ecotourism and the provision of renewable energies at the local level. They have an important function in creating economic activity in rural range areas, through job creation, demand for services and inputs and the provision of cheap additional electricity. Ecotourism will bring in the area new initiative and resources and income alternatives while involving actively local communities and preserving traditional practices and handicrafts. Installing renewable energy capacity, making use of wind and solar resources, can provide cheap electricity to different actors in the livestock or MARP value chains for production, processing (slaughterhouses, milk cooling, dairy production), packaging and transportation (for hybrid cars) and to members of livestock and MARP cooperatives.

At the same time these two types of investments can play an important leverage in financing direct local investments in sustainable range management as mentioned here above. Ecotourism charges and fees can be levied in the form of a PES as a reward to the SRM cooperatives who ensure that the ecological capital that attracts tourists will be maintained. Where this could be done directly between ecotourism organizations and SRM cooperatives, it will require accountability, legal and institutional arrangements in which government agencies need to be involved. Similarly the Jordan Government could levy charges as part of investment and operational licences to local and national companies engaged in renewable energy delivery or to SRM value chain enterprises to install solar/wind energy plants at their premises. The revenues of these charges and licences can then be used to finance SRM investments, either those directly undertaken by SRM cooperatives or enabling investments as discussed above. Also here clear regulation and implementing modalities need to be defined. Renewable energy production and use should in these cases be marketed and labelled as an intrinsic production element of SRM products, be that ecological livestock, MARPs or ecotourism. Production of renewable energy to the public grid (by renewable energy plants) could be heavier charged than electricity production for directly SRM related activities.

Figure 7. Investment Financial Flws for SRM¹⁹

SRM=Sustainable Range Management



Payment for Ecosystem Services that benefit society

In the above sections mainly local/national examples are given for possible PESs.

Figure 7 above provides a visual picture of how such PES connect different categories of investments (direct local, enabling and "financing" investments) and how national and international financial flows could be organized to support the necessary investments in SRM.

¹⁹ author

The economic rationale to invest in SRM and to develop such financial flows through Payment for Ecosystem Services is the fact that SRM can provide important benefits to society as has been mentioned in section 4.2. The cost of direct local on-site investments cannot be carried alone by local range users. That would be greatly unfair. Modalities have thus to be implemented to ensure that investments are made and that other “downstream” beneficiaries are paying a price for the off-site benefits they enjoy, such as better ground water recharge and availability and reduced reservoir siltation and the avoided cost of land restoration²⁰.

Moreover, there is a critical need to “unlock” private sector investments (community and business) by government initiated enabling investments. This will also be important for finding responses to increasing concerns about high rural-urban migratory flows and the social consequences this has for urban life (such as in avoided cost of re-location to cities, of social unrest and conflict due to unemployment especially in urban areas). Investments in SRM in rural areas can trigger increased rural economic activity and job and income opportunities, and hence contribute to reduce such rural-urban migration. Government agencies should therefore be constructively engaged in a process that can be justified by economic valuation and analysis and possibly covered by international PESs.

An important rationale for mobilizing international funding to trigger PES financial flows to invest in SRM is to be found in the fact that many societal benefits at the country level also contribute to environmental benefits at the global level as illustrated in Figure 7 above: higher biodiversity, conservation of genetic resources, higher soil carbon sequestration due to soil conservation²¹, and climate change adaptation and mitigation in general. In turn international PES financial flows may provide the leverage for government agencies to engage in and review the regulatory and legal frameworks that are important to create the enabling environment necessary for SRM investments. Another incentive to come to possibly necessary policy changes in favour of SRM is the increasing international pressure to come to Land Degradation Neutrality at the country level (see Box 5).

Box 7. Land Degradation Neutrality: current status, challenges and opportunities

The notion of a ‘zero net loss’ goal for action against land degradation was raised in the Rio+20 report *The Future We Want*, where the international community agreed to aim for “a land-degradation neutral world in the context of sustainable development”. This has been encapsulated in a global aspiration to halt and reverse land degradation by 2030. The Intergovernmental Working Group’s current working definition of Land Degradation Neutrality (LDN) is a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales, and ecosystems.” LDN has a dual focus on two complementary approaches, pursuing both sustainable land management practices and the ecological restoration of degraded lands.

Because of land’s underpinning support for people and life, LDN is inextricably linked with food and water security, poverty reduction, biodiversity, land rights and justice. Significant economic, legal, political and social barriers to the uptake of better land management exist and need to be addressed in tandem with strong institutional support for LDN approaches. By the same token, LDN-based holistic governance will help to provide these multiple benefits through sustainable livelihoods, increased productivity and better protection of the soil-water-food nexus. This calls for synergistic actions to be undertaken between the Rio conventions to address desertification, climate change, and biodiversity loss (UNCCD, UNFCCC, and CBD).

Sustainable land management (SLM) is promoted as a core aspect of LDN. Traditional and localised knowledge has much to offer in regards to SLM and SRM, although often major socio-economic changes are also required. SLM improves land value primarily through the empowerment of land managers, using community-based approaches that account for environmental variability. The prevention of land degradation through the implementation of SLM is cost-effective, offering promising investment opportunities.

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A potential and provisional investment proposal

As discussed in section 4.3 there is **at the minimum around 15 Million JD/year** of cost (or a loss in GDP) to the Jordan Government that can be saved/recovered by structural investments in SRM. This amount, as is estimated by economic valuation methods, reflects the cost of **6.7 Million JD/yr** for imported saved grain fodder (for a very important part subsidized by the government) when replaced by **forage produced in the designated watersheds set aside for SRM** (2.3 million hectares; roughly 30% of the total of Jordan’s rangelands; see section 4.3). As mentioned also in section 4.3 the benefit of SRM in terms of **increased groundwater recharge** is valued at **7.8 Million JD/year** for suitable rangeland areas in Zarqa Governorate (Westerberg, 2014). As a highly conservative estimate this amount of 7.8 Million JD/year could be applied to the 30 % of the rangelands in the designated watersheds suggested in this report. The here mentioned **15 Million JD/year** does not yet take into account economic benefits in terms of increased biodiversity, reduced water reservoir siltation, increased soil carbon sequestration and reduced cost as related to rural-urban migration.

This minimum amount of 15 Million JD/year could be used at the national level by the Government of Jordan as a rationale for Payments of Ecosystem Services to herder local communities (cooperatives) in charge of SRM in the designated watersheds. This could be in the form of a **SRM subsidy for forage production** (as a credit for saved imported fodder) and in the form of **green water credits for increased ground water recharge** with reference to global initiatives taken in this domain (see below). As improved SRM have also global benefits to society, international funding mechanisms could facilitate international Ecosystem Service Payments in reward of Jordan’s contribution to such global benefits. This could for instance be done in a doubling of the amount that the Jordan Government may allocate for SRM in the designated watersheds. This international PES (of at least 15 Million JD/year) could possibly be best used for the investment needed in the SRM enabling environment such as for local range governance, and the necessary policy and institutional frameworks. These **enabling investments** are critical as they may “unlock” **investments by both local range users and private sector** in the further value chains.

This **highly preliminary proposal** could mean a substantial investment in Jordan for SRM in the form of Payments for Ecosystem Services of roughly **30 mlj JD/year** that could possibly be managed by a designated SRM National Fund. Such an investment moreover could be justified as the Jordanian and international commitments to comply to different Rio conventions to address desertification, climate change, and biodiversity loss (UNCCD, UNFCCC, and CBD) and notably to international proposals for country commitments to Land Degradation Neutrality as will be discussed September 2015 in the UNCCD COB in Istanbul.

Enhancing international PES flows

To enhance international financial flows that could be used as PES there are a number of important funding windows that could cater for this. The Global Mechanism of the UNCCD manages a **Land Degradation Neutrality (LDN) Fund** that has as its goal to neutralize the footprint of land use activities by turning 12 million hectares of degraded land into profitable assets each year, globally. Specifically, the Fund is being structured for blended investments in sustainable business models across all land-use sectors worldwide, with a focus on large-scale land restoration and rehabilitation projects. By financing these activities, the LDN Fund will also contribute to food security, climate change mitigation/adaptation, biodiversity protection and poverty alleviation. The approach is by design one that optimizes natural asset management and maximizes positive impact at landscape level (Global Mechanism, 2015). In short, the LDN Fund could provide important leverage in designing PES financial flows for investments in SRM in Jordan.

The new **Verified Conservation Approach (VCA)**, as initiated by the VCA Office at IUCN in Switzerland, establishes a new, international platform for verified sustainable land management which connects to the demands of stakeholders including local communities and public authorities. As further explained in Box 8 below, the VCA Approach provides a mechanism for innovative conservation initiatives and investments beyond legally protected areas to be recognised, celebrated and supported. In many (or important parts) of the Range Ecological Economic Zones that could be assigned in Jordan for SRM, the investment packages here proposed could well form part of Conservation Areas that could be registered with the VCA Alliance, being a platform for facilitating funding for a good part of investments proposed.

The Green Water Credits (GWC) is an investment mechanism that enables upstream farmers to practise water management activities that have both upstream and downstream benefits. The GWC Team facilitated by “ISRIC – World Soil Information” based in Wageningen, The Netherlands assists downstream investors that are establishing programmes and funds for farmers by performing scenario studies and cost-benefit analyses (ISRIC, 2015). In view of the importance that needs to be

²⁰ Overall rationale for Sustainable Rangeland Management (SRM): $\Delta B/\Delta C$ of preventing land degradation is higher than $\Delta B/\Delta C$ of Land Restoration, while complying with Land Degradation Neutrality (LDN)

²¹ Note that worldwide more carbon is stored in soils than in vegetation and air together; by conserving its rangelands Jordan can importantly contribute to carbon sequestration.

given to soil and water conservation it would be interesting to explore what GWC or other similar initiatives could offer for strengthening investment decisions for the rangelands in Jordan. Other funding mechanisms may be explored through GEF and UNDP and several bilateral agencies for development cooperation.

Box 8. Verified Conservation Areas (VCAs)

A new approach to scaling up, investing and financing conservation

Under the international Strategic Plan for Biodiversity, governments have committed to conserve 17% of terrestrial areas and 10% of marine areas, and to restore 15% of degraded ecosystems by 2020. There is broad agreement that current conservation efforts are not enough to mitigate the ever increasing ecological footprint of humanity. Even these targets are unlikely to halt the loss of biodiversity. Reliance on legally protected areas is insufficient. With the growing human population and its increasing levels of prosperity, the pressures on biodiversity are great. We need to expand our conservation efforts across all parts of the planet. The area-based VCA approach scales up conservation efforts, allows new stakeholders to engage, channels new financing towards conservation, and provides the assurance that money invested is well spent.

Some Core elements of the VCA approach

1. A Verified Conservation Area is a geographically-defined area listed on the VCA Registry and managed to conserve nature and use living natural resources sustainably, taking into account human needs for the services nature provides.
2. The **VCA Registry** is a voluntary, public listing of area-based conservation management and a place for managers of VCAs to communicate their projects to the public and to investors.
3. VCAs can be managed publicly, privately or communally; and they may be managed for profit or not-for-profit.
4. VCA management plans, reports and audits are published on the VCA Registry providing visibility, accountability and assurance.
5. VCAs enable companies, public agencies, NGOs, foundations, and individuals to invest directly in verified conservation by providing standardised, transparent, monitored, and effective conservation management.

A new alliance for verified conservation

Source: The VCA Office at IUCN in Gland (conserve@v-c-a.org)

Compensating for extractive use of rangelands

Efforts to come to Sustainable Rangeland Management have obviously to take into account other interests and land uses that may compete with SRM. This is especially true for exploitation of the rangelands of other natural resources than those delivered by the range, such as by stone and phosphate quarries, oil shale exploitation and over-irrigation from ground water reserves. Many of these natural resources are non-renewable and exploitation is often led by short-term financial interests. Where such exploitation may serve also the national economy (even if this is only short-term), priorities have to be balanced and compromises be made. Nevertheless, it will be important at the national level to come to overall land use planning where these different interests, including sustainable range management are taken into account. Clear decisions on where which kind of resource exploitation are allowed, will help investors to make their investment decisions on the long-term. Such overall land use decisions would preferably take into account future global commitments to Land Degradation Neutrality as discussed in Box 7 above, where extractive land use leading to land degradation is compensated by investments in land restoration and in sustainable management of non-degraded rangeland. Moreover overall land use decisions should be informed by Environmental Impact Assessments (EIAs) of different land uses and as a consequence by the development of Environmental Management Plans (EMPs) for different parts of the country.

5

Investments in Local Rangeland Governance

5.1 Local community organizations as stewards for SRM

The investment packages proposed in the consultation workshops with stakeholder representatives and resource persons (Chapter 3) mention the proposed technical and bio-physical interventions and their expected direct on-site impact and societal level impact.

In the different workshops and consultations held for this study there has been a strong voice from many calling for a greater role of local community organizations in the sustainable management of the country's range resources. As stressed in these meetings, the ownership of involved communities for range management stewardship and associated arrangements has to be maintained and strengthened; this is more important than close cooperation with and any concessions to the private sector. The point of view of the communities (involving their ownership) has to have preference and must be specifically considered during the decision-making process. The private sector might cooperate well and business would therefore have a main interest, but this might also create difficulties in guaranteeing of the sustainability of range management efforts.

Where such community-based organizations (CBOs) can have different legal forms, there seems to be high consensus in Jordan that such CBOs could be best organized in local cooperatives. There is a strong point in favour of this especially as such CBOs also need to work in a more business-minded way. Cooperatives have in essence a mandate for this. As mentioned by many in Jordan cooperatives could have an effective and useful role in enhancing SRM in well demarcated and large areas of ecological and economic interest. In view of not always positive experience elsewhere with the cooperative movement, it is however important to review and analyse the basic modalities of cooperative organization to ensure they can play the role that is expected. SRM cooperatives probably will be best organized within the herder communities that have traditionally taken care of the rangelands and for who the rangelands form an essential part of their livelihoods. Herder cooperatives need to engage in SRM notably with a business-minded perspective as well as with a perspective that puts stewardship²² for the sustainable management of rangeland resources on the foreground.

²² Stewardship is understood here as the de facto and entrusted management of a resource (for the rangelands this can be seen in analogy to what is meant with stewardship within the Forest Stewardship Council - FSC).

5.2 Local level accountability for SRM

An emphasis on local community organizations for assuming responsible stewardship for SRM, however, also calls for their greater ownership and accountability for the management of the rangeland areas they are using. From experience in other places with management of natural resources and notably natural resources with unclear ownership arrangements (community forestry, water resources) it has become clear that a number of preconditions need to be in place for local range users to assume ownership for the implementation and management of the proposed interventions (Laban, 1994; Laban et al, 2009). This is important for the sustainability and future impact of investments in the specific assets of the rangeland (land, water, vegetation and biodiversity). In turn these preconditions will indicate what specific local governance modalities are required and that need to be considered and often invested in.

For local communities to engage in SRM investments it is important that they can assume ownership and have a sense of accountability with regard to use and management of the rangelands within their “community” domain. It needs to be emphasized here that ownership for management practices is not the same as land ownership that is vested in Jordan and many other countries in the State. In many cases local people will not assume such management ownership because they do not feel that the activity, investment and/or its results are really theirs (ownership). If essential pre-conditions for such ownership and accountability are not fulfilled, this will adversely affect resilience of the social-ecological system and hence sustainability and impact of necessary SRM investments.

Important preconditions for local range users and their communities to assume such ownership and accountability are (i) assured benefits, (ii) resource rights, (iii) appropriate knowledge and capacity, and (iv) claim-making power ((Laban, 1994; Laban et al, 2009).



Figure 8. Framework for assessing pre-conditions for local people to assume accountability for sustainable range management. Source: Laban and Haddad, 2015.

An initial analysis of preconditions that are needed to entrust management, ownership and local accountability for specified rangeland areas is made for the different interventions within the different investment packages proposed by the consulted stakeholders and reported in this document. This initial analysis needs to be further elaborated – in a transparent and participatory process - in each specific area where these investment packages are proposed to be implemented. This initial list of preconditions for rangeland cooperatives to assume ownership is mentioned in the following Local Range Governance Tables for each of the Investment Components proposed: Hima Grazing Management, Soil and Water Conservation, Ecological Livestock Production, Protection and Production of Medicinal and Aromatic Range Plants (MARPs) and Ecotourism. Similar preconditions are mentioned for Renewable Energy and Value Chain Development and Marketing; these apply to primary actors responsible for these interventions.

On the basis of these preconditions an analysis is made in the consultative workshops of what local governance measures are needed to be taken to ensure that these preconditions are fulfilled. These local governance measures, mentioned in the same table below, form an important part of local range governance arrangements that will be discussed in Section 6.2.

T A B L E 7

Investment Component: “Hima” Integrated Grazing Management

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Livestock/ range cooperatives - Other livestock/ range user groups 	<ul style="list-style-type: none"> - Secure grazing access and use rights and benefit shares of traditional users; - Assured resource benefits 	<ul style="list-style-type: none"> - Municipality councils - Development and Environmental NGOs - Rangeland Department / MoA (governorate and national level) - Jordan Cooperative Association - Other relevant Ministries 	<ul style="list-style-type: none"> • Designated range areas only for use by members cooperatives/ range user groups • Set-up grazing/ hunting fees and permits; and fine system for violations • MoA grazing/hunting fees returned to range user groups/ cooperatives • Ensure equality and equity in using the range \ resources by basic cooperative membership fees + benefits proportional to resource use • Govt. guidance for grazing share and structured mechanism and legalizing for sharing benefits

T A B L E 8

Investment Component: Soil, Carbon & Water Conservation and Improvement

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Livestock/ range cooperatives - Other livestock/ range user groups 	<ul style="list-style-type: none"> - Secure grazing access and use rights and benefit shares of traditional users - Assured benefits from Soil & Water Conservation actions 	<ul style="list-style-type: none"> - Municipality councils - Local contractors - Development and Environmental NGOs - Rangeland Department / MoA (governorate and national level) - Jordan Cooperative Association - Other relevant Ministries 	<ul style="list-style-type: none"> • Set-up grazing/ hunting fees and permits • Reduced livestock drinking water cost for members range user groups/cooperatives • Ensure equity in benefit sharing (see under rotational grazing management)

TABLE 9

Investment Component: Improved Ecological Livestock Production

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Livestock/ range cooperatives - NGO/Govt Vet services (mobile clinics where necessary) - Governorate level veterinary labs - SMEs/NGOs for ram and lamb production 	<ul style="list-style-type: none"> - NGO or private sector initiatives to create economies of scale in service delivery - Government technical, legal and institutional support - Modified mandates of local authorities 	<ul style="list-style-type: none"> - Municipality Councils - Dev. and Env. NGOs - Vet. + Rangeland Departments/MoA (governorate and national level) - Jordan Cooperative Association - Jordan Investment Commission 	<ul style="list-style-type: none"> • Organization of users; strengthening, capacity building and vocational training of cooperatives and/or voluntary or agricultural societies; • Representative election of the administrative bodies of the cooperative to avoid dominance • Building partnerships with all stakeholders in the location.

TABLE 10

Investment Component. Value chain development and Marketing for Ecological Livestock Products

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Rangeland livestock cooperative - SMEs and NGOs providing value chain relevant services - Governorate level rural credit entities - Governorate level certification and marketing entities 	<ul style="list-style-type: none"> - Conducive pricing and taxation policies - Concerted and focused interaction among value chain actors - Enabling environment for rural economic activity triggered by ecological livestock niche products 	<ul style="list-style-type: none"> - Jordan Cooperative Association - Ministry of Economy and Trade - Ministry of Agriculture - Chambers of Commerce - National level investors - Export private sector - Jordan Investment Commission 	<ul style="list-style-type: none"> • Preferential government support for ecological niche products • Set-up of value chain actor platforms at local/district/national levels • Planning and regulatory frameworks

TABLE 11

Investment Component. Value chain development and Marketing for Ecological Livestock Products

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Women Cooperatives and Associations 	<ul style="list-style-type: none"> - Secure access and usufruct rights and benefit shares of traditional users (esp. women) - Appropriate knowledge for MARP management - Well organized women CBOs 	<ul style="list-style-type: none"> - Development and Environmental NGOs - Rangeland Department / MoA (governorate and national level) - Jordan Cooperative Association - Other relevant Ministries 	<ul style="list-style-type: none"> • Develop guidelines and community regulations to ensure equity in using the MARP resources, while legalizing the sharing of benefits (see under livestock) • Set-up usufruct fees and permits • set-up fine system for violations

TABLE 12

Investment Component: Value chain development and marketing of MARPs

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Women cooperatives and associations - SMEs and NGOs providing value chain relevant services - Governorate level rural credit entities - Governorate level certification and marketing entities 	<ul style="list-style-type: none"> - NGO or private sector initiative to create economies of scale in value chain delivery - Ensure government technical, legal and institutional support - Conducive pricing and taxation policies 	<ul style="list-style-type: none"> - Jordan Cooperative Association - Ministry of Economy and Trade - Ministry of Agriculture - Ministry of Social Affairs - National level investors - Export private sector - Jordan Investment Commission 	<ul style="list-style-type: none"> • Organization of users; strengthening, capacity building and vocational training of the organization (women association); • Representative election of the administrative bodies of the association to avoid dominance • Building partnerships with all stakeholders in the location.

TABLE 13

Investment Component: Install renewable energy facility for low-cost energy consumption and production

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Solar/wind energy local Small & Medium Enterprises (SMEs) (providers, workshops) - Local investors 	<ul style="list-style-type: none"> - Commercial benefits to finance SRM activities - Subsidy agreement with national energy providers 	<ul style="list-style-type: none"> - Governorate electricity services - National investors - Jordan Investment Commission 	<ul style="list-style-type: none"> • Transparent coordination mechanisms between energy investors and local stakeholders and range cooperatives

TABLE 14

Investment Component: Management of eco-tourism sites with historic, cultural and archaeological value

Investments and Local Range Governance (indicative)			
Local Actors	Preconditions for local actors	Supporting/ enabling actors	Local Governance Measures
<ul style="list-style-type: none"> - Livestock/ range cooperatives - Women Cooperatives and Associations - Small & Medium Enterprises (SMEs) and/ or NGOs for running eco-tourism facilities - Local investors 	<ul style="list-style-type: none"> - Secure use rights and benefits shares (esp. of women and youth in local eco-tourism associations) - Increase knowledge of local CBOs for local eco-tourism 	<ul style="list-style-type: none"> - Municipality Councils - Jordan Cooperative Association - Development and Environmental NGOs - Ministry of Tourism - Ministry of Environment - Rangeland Department / MoA (governorate and national level) - National investors - Jordan Investment Commission 	<ul style="list-style-type: none"> • Organization of users; strengthening and capacity building of cooperatives and/or voluntary and agricultural associations • See other investment packages for CBO strengthening • Policy framework for enabling local eco-tourism initiatives

5.3 Local Range Governance as a prerequisite for SRM

Local range governance is understood here, at its simplest, as the set of systems that control decision making with regard to rangeland resource development and management; it is hence about the way decisions about resources are made: how, by whom, and under what conditions. It covers both the manner in which decisions about the allocation and regulation of rangeland resources are made, and the formal and informal institutions by which authority is exercised²³. As indicated in the Local Range Governance Tables above, many of such local governance measures have to respond to important issues such as: how to deal with benefits from investments; how to regulate resource rights; and how to develop systems of representation and delegation that give due attention to providing influence and claim-making power at the most adequate level (principle of subsidiarity).

It may be obvious that respect for and building on local knowledge and practices, rules and institutions adapted and contextualized to the reality of today would be important ingredients of such investments in local governance. Indeed, many of the here proposed local governance measures are traditionally known as part of the set of management rules that were practiced in the age-old **“hima” local governance systems** in use in the Middle East for the sustainable management of natural resources. In Jordan the “Hima” concept is generally accepted as model to build on for community based management of natural resources. On May 6th, 2014 “The Amman Declaration on Innovating Hima” was signed by HRH Prince El Hassan Bin Talal. Box 9 below provides an excerpt of this Hima Declaration.

However, to revive and adapt to actual contexts such traditional management systems and measures within a larger frame of local range governance, it will be necessary to invest time in the facilitation of a Stakeholder Dialogue and Concerted Action (SDCA) process as discussed in section 6.4.

5.4 Stakeholder Concerted Action, Roles and Responsibilities

For local range governance to become institutional sustainable this needs to be embedded within Government institutional settings. As recommended by the rangeland stakeholder and resource persons meeting on May 5th 2015, a successful SRM strategy is only guaranteed if the governance aspects at political level are integrated. Suitable SRM governance has to be developed, and local and political levels have to mutually strengthen themselves for that purpose. A political framework has to be created to get to wider scales than with only a local “pilots” modality. For this needs also support is needed to the development of a national policy for SRM. As a first important step to come to such a SRM political framework, it might be most practical to start at the level of a number of to be selected SRM intervention areas that could maybe be designated as “Range Ecological Economic Zones (REEZs).

²³ Adapted from Moriarty, Laban et al, 2007: Guidelines for Local water Governance; INWRDAM, EMPOWERS, Amman

Box 9. Excerpt of the Amman Declaration on Innovating Hima; May 2014

Al Hima (الحمى) is an Islamic tradition that has governed and conserved natural resources in Arabic countries for thousands of years. Hima is a broad concept with a diversity of applications, but at its heart is the recognition of nature as a living system and not merely a commodity. Hima is a comprehensive package of governance, conservation, science and markets that builds on and reinforces social, cultural and human capital.

Rangeland Himas provide a multitude of overlapping benefits including improvements in livestock production, conservation of biodiversity, maintaining habitat and connectivity for fauna and flora, protecting hydrological cycles, capturing atmospheric carbon, and reinforcing local culture. Rangeland Himas can therefore contribute to poverty reduction and economic growth as well as protection of habitat and conservation of endangered species, and they have benefits to people outside their boundaries and to the world as a whole. Revival of Himas has also been used to promote social justice and gender equality.

To move from scattered good practices towards more systematic scale up of Hima requires:

1. Strengthen land stewardship and communal tenure;
2. Strengthen scientific and economic evidence and local knowledge to provide systematic monitoring for quality assurance;
3. Create an enabling environment of policy and institutional support and address the cross-sectoral nature of Hima;
4. Develop incentives and rewards for the multiple and diverse benefits of Hima;
5. Build capacity and awareness in public institutions and communities, with particular focus on the skills of participation, empowerment and monitoring;
6. Build partnerships and networks for experience sharing, knowledge and capacity building, and to maximise the transboundary and international benefits of Hima;
7. Initiate appropriate steps for resource mobilisation.

For each of these to be selected SRM intervention areas it will be necessary to engage in a Stakeholder Dialogue and Concerted Action process that would first of all identify the key relevant stakeholders in all involved sectors, agree on shared interests and legal frameworks. Such a SDCA process would engage in needed dialogues to come to common agenda for SRM in the selected zone. Local companies and CBO's have to be involved regarding the agreements on livestock, ecotourism and energy facilitation and use as well as on their interactions with proposed Hima grazing management concessions and schemes.

There is already quite some experience developed in Jordan with such SDCA processes as this has been facilitated in Jordan in other natural resource management programmes such as in the Integrated Water Resource Management Programmes in Balqa and Zarqa Governorates (CARE/EMPOWERS, IUCN ROWA). For SRM, specific attention needs to be given to a good number of the following:

- Participatory, stakeholder planning and decision-making processes (SDCA);
- participatory learning and action-research, knowledge development that makes both use of traditional and scientific knowledge through herder field schools;
- wise resource tenure, not necessarily property rights (by appropriate modifications in legal and indigenous rules and frameworks)
- vocational training programmes for strengthening knowledge in technical and organizational/financial management aspects (CBOs, Cooperatives)
- Creating financial modalities for local management and sharing of resource benefits and cost (grazing/hunting fees, reduced water cost for range user groups/cooperatives, equal basic membership fees but benefit proportional to use of the range resource (e.g. number of animals)
- Supporting local institutions and networks and enhancing delegation and empowerment structures at community levels
- Supporting local leaders in lobbying for local governance and local asset investments and necessary policy/legislation review

- Exploring win-win situations with different actors in the value chains around the proposed investment packages.
- revisiting actual formal legislative frameworks in order to come to an organizational and local governance setting that is both acceptable and workable with local communities as in accord with government rules and legislation

Such a SDCA process is an investment in itself in staff and time resources, however experience elsewhere has demonstrated that the value of such an investment is high in term of understanding, coordination, concerted agenda's and sustainable impact. Such a SDCA process will especially clarify how local empowerment, influence and institution building can be inserted in actual processes of government authority and delegation. There is a wealth of experience in how to tackle such local governance issues and IUCN ROWA has notably acquired experience with these process following guidelines for local governance of water and other natural resources, as were developed earlier in the EU funded EMPOWERS programme (Moriarty et al, 2007). Experience in EMPOWERS has learned that an initial participatory process of stakeholder-led planning and decision-making would need about 3 months of experienced facilitation; an investment that is worth the effort as it may indeed create the conditions under which the above investment packages in the rangeland assets can be made sustainable and have impact.

A SDCA process, if well facilitated, will also clarify and create understanding about the different roles and responsibilities different actors have in the different Investment components as is provisionally indicated in the Tables presented in section 6.1. It needs to be stressed that the suggestions made in this report need to be further worked out and applied by preference in the "real life" situations of each Range Ecological Economic Zone where SRM investments as proposed here can be implemented.

As experienced in similar stakeholder processes for water resource management in the Middle East and elsewhere, a good SDCA process is one that provides space for change. To create such space as well as ownership and mutual understanding of each actor's role and responsibilities a number of principles are mentioned in Box 10 underlying such a SDCA process (Laban, 2015):

Box 10. Principles for a well facilitated SDCA process

- Principle 1: Include vulnerable groups
 - Principle 2: Include the environment as a "stakeholder"
 - Principle 3: Get the Support of those in Power
 - Principle 4: Institutionalize the process
 - Principle 5: Facilitate respectful listening and shared solutions through open dialogue
 - Principle 6: Create ownership
 - Principle 7: Build capacity and persevere
 - Principle 8: Know that a good social process is a good investment
- Laban, P., 2015. Social organization around ground water management. IN: SPRING, IUCN Global Water Programme, Gland (in preparation)

6

Strengthening an enabling environment for SRM investments

6.1 Main drivers of investment in the rangelands

The Jordan rangelands are important for pastoral animal production and, as in other dry countries, contribute importantly to Agricultural GDP (the livestock sector as a whole contributes 55% to agricultural production; MoA Rangeland Strategy, 2013) and hence the national economy. With growing demand for healthy livestock products the rangeland resources are still under-exploited. New investments in this under-used sector could be triggered also by emerging niche markets and an increasing willingness to pay (WTP) for high quality notably **ecologically produced livestock (meat and dairy) and other range products** and for that matter other ecosystem services.

Apart from these economic considerations, there is increased awareness of the need to preserve the country's ecosystem integrity and the important contribution rangelands can make to preservation of biodiversity, genetic resources and carbon sequestration. World- wide concerns on environmental degradation have led to increasing international pressure (**UNCCD, UNCOB, UNFCCC**) on national governments to invest in sustainable development and ecosystem services (hydrology, biodiversity, climate change mitigation/adaptation) and especially in impoverished areas (MDGs, SDGs). Also the increasing cost of natural disasters is calling for investments in Disaster Risk Reduction (DRR) through investments in Sustainable Range Management. This aligns with the understanding that the incremental benefit/cost ratio ($\Delta B/\Delta C$) of preventing land degradation is higher than that of land restoration.

Important progress has been made already by the Jordan Government in terms of its very serious commitments to comply with the different RIO Conventions (UNCBD, UNFCCC, UNCCD) as reflected by recently revised Strategy Documents on Biodiversity, Combatting Desertification and Rangelands. In short, an increase of investments in the rangelands would serve both socio-economic and environmental development objectives, while aligning well with current government strategies such as the Updated Rangeland Strategy (MoA, 2013) and the National Action Plan for Combatting Desertification (MoE, 2015). Moreover, investing in sustainability of the rangeland/livestock sector will also create job opportunities and income in rural areas and potentially reduce rural –urban migration (an important concern in Jordan's long-term development plans) and contribute to higher political stability. Increased investments in the Jordan Rangelands would be notably in line with Operational Objective 5 of the Aligned NAP to Combat Desertification on "Financing and Technology Transfer; increased financial resource mobilization mechanisms and frameworks necessary to fund the NAP".

6.2 Enabling investments necessary to support SRM

It is urgent and critical that important enabling investments are made by the Government of Jordan to **"unlock" and incite investments by the private sector**, both by local range users (cooperatives) and private enterprise. An important argument to invest and strengthen local governance structures is already developed in section 5.3. Investments in local governance would principally mean investments in social/organizational processes by government agencies and NGOs to build local range user organizations (CBO's, Cooperatives) and creating local ownership for above investment packages, empowerment and building capacities of local communities, fee systems for grazing and hunting rights, resolving resource tenure issues, regulate grazing and hunting activities, facilitate sharing of benefits, and institutionalizing of local community organizations (cooperatives, other CBOs). They would have as a principle objective ensuring sustainability and long-term impact of investments, and increasing rural jobs and income in locally initiated economic activity. Investing time and efforts here would

also mean reviewing mandates of local authorities, building partnerships with all stakeholders in the location, and ensuring government commitments to allocate necessary resources.

Strengthening local governance for sustainable range management need to be accompanied by **vocational training programmes** (technical, local organizational management, networking), participatory learning and research about adapted grazing management through **herder field schools** and by **support systems to local production and marketing** such as technical support and input services, processing (meat, dairy, herbal plants), quality control, labelling, marketing; one-stop-shops).

Enabling investments may also entail improved infrastructure to increase access to remote locations (agricultural roads and mobile networks) for opening markets and input and service supply, review legal frameworks and administrative support structures. Investing in above aspects would not only serve more sustainable range management but could at the same time contribute to employment and income in the rangeland rural areas, while creating incentives for local and other investors.

6.3 Potential investors in the rangelands

Three rather different categories of investors need to be involved in different parts of the value chains around the investment packages proposed in Chapter 3. A very indicative list of local actors and other actors needed to support investments by local actors is provided in the “Local Range Governance” tables in section 5.2. In general terms a distinction can be made between different categories of investors as follows:

- **Central and local governments** for enabling a business and governance environment, education, water infrastructure, participatory stakeholder planning, marketing support, infrastructural access and the necessary enabling legal and policy frameworks. Important Government Agencies are MoA, MOPIC, MWI, MoE, MTA, MEMR, MoF, MoI but also the Hashemite Fund for the Development of the Jordan Badia, the Treasury Lands Directorate in the Department of Land and Survey of the Treasury of the Hashemite Kingdom of Jordan and Municipality Councils.
- **Community investors** such as local range users and their communities (traditionally having a long-term resilience aim such as creating and preserving social capital relationships), range users associations, cooperatives and other CBOs, supporting NGOs, but also local livestock and other value chain entrepreneurs. Such investments may not always be expressed in money but could very well be also in terms of time for negotiations and implementing activities.
- **Private sector** (both big business and community investors); for instance in ecological livestock services, processing (slaughterhouses for ecological meat; dairy) and production, marketing of high value ecological rangeland products, provision of renewable energy and eco-tourism, financing and local credit.

In-depth value chain actor analysis is needed to identify which actors and investors are best placed for which element of the chain. This will also address specifically gender dimensions and opportunities for women to play a role in each selected value chain. Such value chain analysis should not just look to the different steps in the production towards consumption process, but also look into questions of market demand, consumer preferences, possible new niche markets, quality control and certification, input and service supply, **who does what best**, win-win arrangements between different actors in the value chain.

For instance in the livestock value chain - as came up in the stakeholder consultation meetings - who is best placed to provide which veterinarian services? Can certain veterinarian tasks be delegated to private sector or NGOs. Is there any private sector organization available to do all this? What about quality service provision in remote areas that may not be easy to commercialize. What about risks of narrow commercial-only veterinary packages? Same questions for quality veterinary laboratory analysis. Inspiration may be drawn in this domain from more than 10 year experience in this domain in Palestine. Can slaughterhouses be privatized under government quality and sanitary control? What regulatory modifications would be needed to outsource and allow and incite private sector (commercial enterprises and NGOs) to engage in these activities. What are pro's and con's for handing over more task to the private sector. Are in some cases Public-Private-partnerships a solution? What about participatory research? Is this a Government task, a task of Universities or of development NGOs? The stakeholder consultations held for this study quite clearly indicated that it is important to involve more and better the private sector but many questions need still to be addressed.

6.4 Enabling conditions to engage different investors

Different investors being that government, private sector or local range users will engage and invest from different viewpoints. How to attract them or in other words how to convince them that the decisions to make investments in the rangelands are worthwhile and are in their interest? A government will not consider only short-term benefits but also look to the long-term economic perspectives of the country. Where the well-being of range users and increased economic activity in the rangeland areas is important on the short as well as the long term, other concerns and objectives also need to be taken into account. Sound water resource management, sustainability of land use, overall economic development, contributing to the protection of biodiversity as a natural resource and to climate change mitigation and adaptation are such long-term objectives. Chapter 5 on economic valuation of on-site but especially off-site externalities of sustainable range management has dealt in more detail with such considerations.

Local range users will make other decisions on investing time and possibly money to invest in the resources that are basic to their livelihoods. Where the short-term is important, especially for the poorer amongst them, traditionally Bedouin and other range resource users have kept the long-term in their decision-frame. Nevertheless especially uncertainty about resource rights has often re-framed them from making long-term investments in the range. As discussed in this report it is of utmost importance that such resource rights are secured, not only for the sake of their livelihoods, but also from a long term society objective to conserve the environmental assets embedded in the range ecosystems. Chapter 6 reflects a good number of proposals for securing in practical ways such resource rights, made by those involved in the stakeholder consultations that form an important basis for this report. A nuanced review and possible modifications of **actual legal frameworks on such “rights to use”**, within the context of defined state ownership is of urgency. As mentioned also in chapter 6 modalities to enhance local governance around SRM is another key issues that need to be seriously considered even in the short-term.

How to attract investors from the private sector is another question and a distinction needs to be made between large often corporate enterprises and SMEs operating more at the local level. As mentioned in section 5.1, the three investment packages are developed from a value chain point of view in which different actors have different roles to play, from local range users and their organizations through cooperatives and other SMEs for processing and packaging to possibly other SMEs and larger companies for trading and marketing. In order to ensure equity between local range users and private sector entrepreneurs and to enhance as much as possible **local ownership** for activities necessary in such value chains a preference for SME activities seems to be preferable. All the same, **more detailed value chain analysis for these three investment packages needs to be done** to decide what private sector activities can best be taken care of by whom and what barriers would stay in the way for them to engage in SRM investments. It is not impossible that for instance ecological slaughter house activities would be better done by bigger companies. For a start such value chain analysis would probably and practically best focus on areas that will be selected for further investments in SRM.

Nevertheless from the discussions in the rangeland investment option workshop it seems that important attention needs to be given to privileged trade agreements, a certain liberalization of marketing processes, economic incentives and tax exemptions so as to open-up niche markets for ecologic livestock and other range products. This can incite (small and big) private sector actors to engage in an economic activity that is still underdeveloped and with returns that do not seem yet to be very short-term. Such privileged agreements can be justified by the long-term economic benefits for the country as discussed in Chapter 5. Alleviating bureaucratic red-tape could for instance be enhanced by the **set-up of One Stop Shops**, where multiple government services can be dealt with in one location creating a more customer-friendly environment for investors.

There is apparently also a need to strengthen and **review legal and regulatory frameworks to support local investments in SRM**. This concerns, among others updating and clarifying rules and regulations related to government partnership with communities especially in decision making processes and local governance arrangements for range management This may result in practical policies, strategies, and national action plans to support range investment opportunities.

6.5 Strengthening the knowledge basis about SRM

Where this is beyond the scope of this study, it is observed that more study and review is needed for:

- resource tenure/rights regulations and governance (matching the indigenous with the formal);
- customary governance, indigenous knowledge, local practices and institutions;
- understanding rangeland ecology dynamics for land degradation and restoration;
- extent and risks of rangeland degradation;
- countering short-term gain tendencies of private investors to engage in extractive use of non-renewable natural resources (such as stone and phosphate quarries, oil shale exploitation, over-irrigation from ground water reserves);
- enhancing sustainable rotational grazing management
- Review and adapt (if necessary) land use planning (allocating specific areas for rangeland use) at national and governorate levels
- Review and adapt (if necessary) fiscal and price regulation to support production and marketing of local products
- Effective decentralization of government support and decision-making

7 Required Policies and Strategies

This report will not re-iterate what has already been mentioned in related policy documents. Moreover a comprehensive overview of needed policies is mentioned in Jordan's Updated Rangeland Strategy (2013) and Jordan's NAP to Combatting Desertification that substantially deals also with Jordan's rangelands. Nevertheless, the subjects dealt in this report may call for further elaboration or specification of the strategies and policies mentioned in the above documents, so as to further support the policy orientations already taken and strive for a contextualized framework for Sustainable Rangeland Management in Jordan. This section, on the basis of the subjects and arguments developed in this report, will attempt to formulate a number of key recommendations and suggestions (i) to enhance the involvement of local communities in SRM; (ii) to enhance SRM investments by the private sector; and (iii) to enhance an enabling SRM policy framework.

7.1 Enhancing involvement of local communities in SRM

As is emphasized in this report and well supported by a large group of stakeholders in the range a strong call is made for higher and effective involvement of local herder communities in the investments for SRM. Two important axes are recommended to be followed:

1. Strengthen and empower herder and women cooperatives²⁴ and enhance the necessary local range governance systems in which they can play their role.
 - Internal organizational strengthening of both herder and women SRM cooperatives is a must; vocational training programmes (technical, local organizational management, finance, /bookkeeping) would be an important component of this. Apart from such more practical training also training and coaching will be necessary in strategic planning, networking, lobbying and dialogue with other stakeholders, in order to empower them in the political arena around SRM.
 - Strengthening local governance through creating local ownership for the interventions proposed for the three investment packages: empowerment, fee systems for grazing and hunting rights, and institutionalizing of local community organizations (cooperatives, other CBOs) that will lead to resolve resource tenure issues, facilitate sharing of benefits, provide security of investments, regulate grazing and hunting activities and increase rural jobs in locally initiated economic activity; etc.
2. Strengthen the role of such CBOs and in particular cooperatives in the different value chains proposed for SRM.
 - Develop the value chain modalities and market support necessary for ecological livestock products (meat, dairy, leather, wool) and for high value MARP products so as to occupy larger shares on the domestic market (and eventually on the export markets) – this means amongst others: technical production support and input services, veterinary and artificial insemination (local breeds) services, processing (meat, dairy, herbal plants), quality control, labelling, marketing; one-stop-shops.
 - Develop with local organizations local rangeland eco-tourism activities near cultural and natural heritage sites; this can include amongst others: eco-range sites for wildlife, eco-lodges, guided eco-walks, ecosystem training activities for schools and others, handicraft and other tourism activities.

For both axes there is most probably an important role to play for **development NGOs and the Jordan Cooperative Association** as an umbrella organization.

²⁴ or when not yet ready or feasible: voluntary or agricultural associations

7.2 Enhancing SRM investments by the private sector

As mentioned in the meeting with the business community for this study, it is time to **“turn an impasse situation into an opportunity”**. This means however that the **“SRM business case for investors”** needs to be made more clearly and convincingly. This is important for the Jordan economy in general, for developing financing flows for SRM, but also to push government agencies to revisit the regulatory and legal frameworks and to make the institutional investments that should unlock investments from the private sector. Investments in the rangelands need to contribute to GDP, be economically viable and ensure sustainable use of rangeland resources. To make this business case the following two axes could be followed:

1. Provide the financial and economic rationale for the business sector to invest in SRM in general. If such an economic rationale is developed and embraced **by the business sector itself**, this will importantly support the policy rationale for the Government of Jordan to invest in its rangelands. Initiative here needs to be taken by the business community and most probably the **Jordan Investment Council** can play an important role here. Activities that can be undertaken by the business sector itself for scoping of own business opportunities:
 - Conduct economic comparative analysis for SRM and other land use (such as extractive mining, irrigation, etc) - How to calculate opportunity cost?
 - Undertake assessment of cost of land degradation versus cost of SRM in degraded and non-degraded areas – what is the business fall-out of further land degradation for the Jordan private sector?
 - Take initiative in mitigating risks for the rangelands of extractive investments, through participating if not initiating in Environmental Impact Assessment (EIA) and the development of an Environmental Management Plan (EMP) for the different designated REEZs
2. Engage in exploring business opportunities within the recommended investment packages as proposed in this report
 - Conduct value chain analysis with local cooperatives for each designated SRM location (REEZ) and different investment packages, considering input/output and direct/indirect benefits for the business sector
 - Undertake further economic valuation together with the JCA for on-site and off-site positive impact (externalities) of SRM, notably to investigate business opportunities in good use of available ecosystem services (water, biodiversity, SRM), through the investment packages as proposed in this report, and maybe others.

It would be interesting to see to what extent the business sector in Jordan could take the pro-active initiative to come with proposals for Land Degradation Neutrality (LDN) and Payment for Ecosystem Service (PES). An underlying rationale for this would be that: $\Delta B/\Delta C$ of preventing land degradation is higher than $\Delta B/\Delta C$ of Land Restoration; and that actions would comply with Land Degradation Neutrality (LDN).

Box 11. Economic valuation of ecosystem services from a business perspective

More study and experience is needed to come to a set of practical, easy to use economic valuation tools that can be systematically applied to develop the economic rationale for sustainable range management. An emphasis should be given to the testing and development of such tools that are practical and straightforward without the necessity of using complex formula, while making the right assumptions. To note that guidelines for the assessment and economic validation of ecosystem services will be developed under the GIZ- EKF-ESS project as part of a national policy document, on behalf of the Ministry of Environment. These guidelines will create the political framework to enable and structure the support of the government regarding investments in a SRM and incentives for the private sector. A systematic assessment and monetary validation of ecosystem services, provided by rangeland, is urgently needed on the national scale – to be applied on the local level. Local stakeholders and investors have to be convinced through economic arguments and calculations that investments in the rangelands are more sustainable, attractive and profitable than in other use of land. It is recommended that the business sector (possibly through the Jordan Investment Commission) is actively involved in such an exercise.

7.3 Enhancing an enabling policy framework for SRM

As discussed in this report SRM has potentially high benefits for the country: Improved livestock production, better ground water recharge, lower siltation of water reservoirs, higher biodiversity, higher soil carbon sequestration and increased economic activity in rural areas. This “wealth” should be tapped. It is critical for the government to design PES financing flows both within the national economy and in conjunction with international funding mechanisms as GEF, UNDP and GM/UNCCD. Also here two axes can be distinguished:

1. Strengthen the policy environment to foster local range governance
 - Initiate national land use planning in which substantial areas are assigned to SRM (the watershed areas in the Badia and others in the Steppe areas could form a basis for this) and designate specific rangeland areas as rangeland Ecological Economic Zones (REEZs) as target areas for financing SRM along national and international PES flows.
 - Enhance transparent participatory stakeholder planning and decision-making processes at the local and REEZ level
 - Put in place the regulatory and institutional frameworks to enable local range governance systems in the above designated REEZs.
 - Strengthen and review legal and regulatory frameworks for local governance;
 - Review and propose innovative matching arrangements between formal landownership and Hima-kind of resource use and access right systems.
 - Promote studies and research that will reduce the knowledge gaps between policy and implementation as listed in section 6.5. Match local knowledge and practices with scientific insights in new technology
 - Work towards effective decentralization of government support and decision-making
2. Engage with the business community to enhance SRM
 - Develop the modalities for budget allocations to SRM with a PES perspective
 - Put in place a Rangeland Ecosystem Management Fund that draws on national and international PES financing flows.
 - Review and adapt (if necessary) fiscal and price regulation to support production and marketing of local products
 - Engage with the private sector to promote rural renewable energy provision and eco-tourism in support of SRM in the designated REEZs.
 - Identifying how Jordan can commit to Land Degradation Neutrality (LDN) commitments (see Box 7 above)
 - Monitor of SRM investments and their impact.

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ANNEX 1

ANNEX 1		
Carrying Capacity Small Livestock in Jordan Rangelands		
Feed Unit (FU): daily feed need/animal=1 kg barley/day	1	
Total Range Area Badia (in km ²)	71,000	
Total Range Area Steppe (in km ²)	10,000	
Basic data	Badia	Steppe
Estimated Total Dry Matter (DM) production (in high rainfall year)		
MoA 1990 reference (kg/dunum)	8	20
MoA 2013 reference (kg/dunum)	4	10
IUCN/DANIDA reference, Bani Hashim, 2014 (kg/dunum)		48
IUCN/DANIDA reference, Al Fraishheen, 2014 (kg/dunum)	22	
Grazable forage production in moderate rainfall year (25% of total DM in high rainfall year (2014/2015)*)		
MoA 1990 reference (kg/dunum)	2	5
MoA 2013 reference (kg/dunum)	1	2.5
IUCN/DANIDA reference, Bani Hashim, 2014 (kg/dunum)		12
IUCN/DANIDA reference, Al Fraishheen, 2014 (kg/dunum)	5.5	
Grazing forage barley equivalent (1 kg DM = 0.4 kg barley)		
MoA 1990 reference (kg/dunum)	0.8	2
MoA 2013 reference (kg/dunum)	0.4	1
IUCN/Bani Hashim reference, 2014 (kg/dunum)		4.8
IUCN/Al Fraishheen reference, 2014 (kg/dunum)	2.2	
Carrying capacity (required # of dunum/animal)		
# of grazing days = # of FUs/grazing forage barley equivalent (kg/dunum)		
At MoA 1990 reference/30 grazing days (dunum/animal)	37.5	15
At MoA 2013 reference/30 grazing days (dunum/animal)	75	30
At IUCN/Bani Hashim2014 refer/30 grazing days (dn/animal)		6.25
At IUCN/Al Fraishheen 2014 refer/30 grazing days (dn/animal)	13.64	
Carrying capacity (maximum # animals/dunum)		
At MoA 1990 reference/30 grazing days (animals/dunum)	0.027	0.067
At MoA 2013 reference/30 grazing days (animals/dunum)	0.013	0.033
At IUCN/Bani Hashim2014 refer/30 grazing days (animals/dn)		0.160
At IUCN/Al Fraishheen 2014 refer/30 grazing days (animals/dn)	0.073	
Carrying capacity total range area		
At MoA 1990 reference/30 grazing days (total # of animals)	1,893,333	666,667
At MoA 2013 reference/30 grazing days (total # of animals)	946,667	333,333
At IUCN/Bani Hashim2014 refer/30 grazing days (tot. animls)		1,600,000
At IUCN/Al Fraishheen 2014 refer/30 grazing days (tot. animls)	5,206,667	
*(25 % of weight of palatable forage/dunum = 50% (of production in high rainfall year) * 50% (for allowed grazing)		

ANNEX 2

Overview Investment packages: Interventions, local and society impacts; local and supporting actors, preconditions and local governance measures.

This annex combines the information provided in the Tables in Chapter 3 and 5

ANNEX 2						
DETAILED DESCRIPTIONS OF INVESTMENT PACKAGES						
INVESTMENT PACKAGE 1. Ecological livestock production/"Hima" integrated range management (including soil, carbon, water and energy conservation measures)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
A. "Hima" Integrated Grazing Management						
Prepare plans for improved rotational grazing management according to carrying capacity of land;	Improved vegetation quality and density and hence forage productivity;	Improved biodiversity Improved soil carbon sequestration	Livestock/range cooperatives Other livestock/range user groups	Secure grazing access and use rights and benefit shares of local and traditional users; Assured resource benefits	Village and Municipality councils Development and Environmental NGOs Rangeland Department / MoA (governorate and national level) Jordan Cooperative Association Other relevant Ministries	<ul style="list-style-type: none"> Designated range areas only for use by members cooperatives/range user groups Set-up grazing/hunting fees and permits; and fine system for violations MoA grazing/hunting fees returned to range user groups/cooperatives Ensure equality and equity in using the range resources by basic cooperative membership fees + benefits proportional to resource use Govt. guidance for grazing share and structured mechanism and legalizing for sharing benefits
Setting-up participatory herder experimentation in rangelands management through Herder-Field Schools and enhancement of local knowledge (where necessary and feasible): seeding with preferred grass species; developing technologies for seed-dispersal – e.g. manual or live-stock-managed	Increased livestock production (quality and quantity) Enhanced local ownership and community accountability for range management (see section 4.5) The age-old "Hima" range management arrangements revived	Increased economic activity in rural range areas with new job opportunities created rural-urban migration and social urban tension minimized				

INVESTMENT PACKAGE 1.

Ecological livestock production/"Hima" integrated range management (including soil, carbon, water and energy conservation measures)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
B. Soil, Carbon & Water Conservation and Improvement						
Stone terraces and walls, gully control/check dams, hafer and earth dams	Reduced soil erosion and increased soil moisture	Improved ground water recharge Reduced siltation in water reservoirs	Livestock/range cooperatives Other livestock/range user groups	Secure grazing access and use rights and benefit shares of traditional and local users Assured benefits from Soil & Water Conservation actions	Municipality councils Local contractors Development and Environmental NGOs Rangeland Department / MoA (governorate and national level) Jordan Cooperative Association Other relevant Ministries	<ul style="list-style-type: none"> Set-up grazing/hunting fees and permits Reduced livestock drinking water cost for members range user groups/coops Ensure equity in benefit sharing (see under rotational grazing management)
Amendments with Phosphorus fertilizer to stimulate leguminous species	Improved soil fertility and increased carbon sequestration	Safer drinking water and higher public health				
Construction of cisterns, micro-catchments, stock ponds; maintenance of existing ponds; Rehabilitation of ground water wells; check quality	Increased water harvesting for livestock drinking water	Improved biodiversity Increased soil carbon sequestration Increased economic activity in rural range areas, minimizing rural-urban migration				
C. Improved ecological livestock production						
Organize and deliver (mobile clinic) livestock services to herders (veterinary and artificial insemination –local breeds)	Improved animal health; reduced mortality and abortion rates Increased productivity	Improved herder livelihoods and incomes Increased economic activity in rural range areas, minimizing rural-urban migration	Livestock/range cooperatives NGO/Govt Vet services (mobile clinics where necessary)	NGO or private sector initiatives to create economies of scale in service delivery Government technical, legal and institutional support Modified mandates of local authorities	Municipality Councils Dev. and Env. NGOs Vet. + Rangeland Departments/ MoA (governorate and national level) Jordan Cooperative Association Jordan Investment Commission	<p>Organization of users; strengthening, capacity building and vocational training of the organization (cooperative);</p> <p>Representative election of the administrative bodies of the cooperative to avoid dominance</p> <p>Building partnerships with all stakeholders in the location.</p>
Set-up effective veterinary laboratories	Improved disease diagnosis and preventive animal health care	Improved ground water recharge, biodiversity, soil carbon	Governorate level veterinary labs			
Raise genetically high quality rams (local breeds) for breeding purposes	Increased productivity and reduced mortality	sequestration and reduced siltation in water reservoirs	SMEs/NGOs for ram and lamb production			
Establish fattening feedlots (lambs and kids)	Increased productivity					

INVESTMENT PACKAGE 1.

Ecological livestock production/"Hima" integrated range management (including soil, carbon, water and energy conservation measures)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
D. Install renewable energy facility for low-cost energy consumption and production						
Solar /wind electricity provision of processing and storage houses	Reduced electricity consumption cost	Less CO2 emissions Reduced national energy budget	Solar/wind energy local SMEs (providers, workshops)	Commercial benefits to finance SRM activities	Governorate electricity services National investors Jordan Investment Commission	Transparent coordination mechanisms between energy investors and local stakeholders and range cooperatives
Solar / wind energy plants to connect to grids	Reduced electricity production cost	Financial resources for SRM in range lands (Payment for Ecosystem Services)	Local investors	Subsidy agreement with national energy providers		
Solar / wind energy provision to SRM villages	Reduced electricity consumption and production cost					
E. Value chain development and marketing						
Adapt slaughtering houses for producing ecological meat products	Improved processing of quality animal products	Strengthened rangeland ecological livestock sector	Rangeland livestock cooperatives	Conducive pricing and taxation policies	Jordan Cooperative Association	Preferential government support for ecological niche products
Facilitate credit facilities for productive loans	Strengthened economic positions of herders	Improved livelihoods, rural incomes and rural economic activity	SMEs and NGOs providing value chain relevant services	Concerted and focused interaction among value chain actors	Ministry of Economy and Trade Ministry of Agriculture	Set-up of value chain actor platforms at local/district/national levels
Organize and train women groups in quality processing of dairy products	Improved processing of quality animal products	Contributions to Agricultural Sector GDP	Governorate level rural credit entities	Enabling environment for rural economic activity triggered by ecological livestock niche products	Chambers of Commerce National level investors	Planning and regulatory frameworks
Organize labelling/certification of ecological livestock products	Increased added value of quality livestock products	Reduced rural-urban migration and social urban tensions	Governorate level certification and marketing entities		Export private sector	
Improve [local] marketing channels and outlets	Increased income, jobs , livelihoods and product credibility				Jordan Investment Commission	

INVESTMENT PACKAGE 2.

Protection, management, production and marketing of medicinal and aromatic rangeland plants (including soil, carbon, water and energy conservation measures)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
A. Enhanced biodiversity protection, management and ecological production of valuable medicinal and aromatic range plants (MARPs)						
Prepare local plans for designation and management of sites with valuable plants	Improved growth, quality and density of valuable plants	Improved biodiversity Increased economic activity in rural range areas with new job opportunities created	Women Cooperatives and Associations	Secure access and usufruct rights and benefit shares of traditional local users (esp. women)	Development and Environmental NGOs	<ul style="list-style-type: none"> Develop guidelines and community regulations to ensure equity in using the MARP resources, while legalizing the sharing of benefits (see under livestock) Set-up usufruct fees and permits set-up fine system for violations
Enhance natural regeneration of selected MARPs	Increased biodiversity Increased production					
Develop harvest protocols for sustainable production	Ensured long-term production					
Natural fencing against animals (where necessary in selected sites)	Increased biodiversity Increased production					
Reviving and if necessary re-introducing native indigenous species	Increased biodiversity and added value to MARP production					
B. Soil, Carbon & Water Conservation and integrated site management						
Bench terracing/ gradonies, gully control/check dams, micro stock ponds (where necessary in selected sites)	Reduced soil erosion, increased soil moisture and improved soil fertility	Improved biodiversity Improved ground water recharge	Women Cooperatives and Associations	Secure usufruct rights and benefit shares of traditional local users (esp. women)	Development and Environmental NGOs	Set-up usufruct fees and permits Ensure equity in benefit sharing in community (see above)
C. Install renewable energy facility for low-cost energy consumption						
Solar /wind electricity provision of processing and storage houses	Reduced energy consumption	Financial resources for SRM in range lands (Payment for Ecosystem Services)	Solar/wind energy local Small & Medium Enterprises (SMEs) (providers, workshops)	Subsidy agreement with national energy providers	Governorate electricity services Jordan Investment Commission	Agreements between energy investors and local MARP Women Associations

INVESTMENT PACKAGE 2.

Protection, management, production and marketing of medicinal and aromatic rangeland plants (including soil, carbon, water and energy conservation measures)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
D. Value chain development and marketing of MARPs						
Market analysis (domestic and export markets)	Ensured niche outlets for MARP products	Developed MARP niche sector Improved livelihoods, rural incomes and rural economic activity	Women cooperatives and associations	NGO or private sector initiative to create economies of scale in value chain delivery	Ministry of Economy and Trade	Organization of users; strengthening, capacity building and vocational training of the organization (women association); Representative election of the administrative bodies of the association to avoid dominance Building partnerships with all stakeholders in the location.
Create storage, laboratory (for quality assurance) facility at CBO levels plus packaging machine	Improved storage, processing and packaging of quality MARP products					
Organize and train women groups in quality processing of MARP products	Empowered women groups and increased women incomes					
Organize labelling/certification of ecological livestock products	Increased added value of quality MARP products					
Improve (local) marketing channels and outlets	Increased income, jobs and credibility					
		Contributions to Agricultural Sector GDP	Governorate level rural credit entities	Ensure government technical, legal and institutional support	Ministry of Agriculture Ministry of Social Affairs National level investors Export private sector Jordan Investment Commission	
		Reduced rural-urban migration and social urban tensions	Governorate level certification and marketing entities	Conducive pricing and taxation policies		

INVESTMENT PACKAGE 3.

"Hima" integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
A. "Hima" Integrated grazing management						
<p>Prepare plans for improved rotational grazing management according to carrying capacity of land;</p> <p>Setting-up participatory herder experimentation in rangelands management through Herder-Field Schools and enhancement of local knowledge</p> <p>(where necessary and feasible): seeding with preferred grass species; developing technologies for seed-dispersal – e.g. manual or livestock-managed</p>	<p>The age-old "Hima" range management arrangements revived</p> <p>Improved vegetation quality and density (biodiversity) and hence forage productivity;</p> <p>Enhanced local ownership and community accountability for range management (see section 4.5)</p>	<p>Improved biodiversity</p> <p>Improved soil carbon sequestration</p> <p>Increased economic activity in rural range areas with new job opportunities created</p> <p>rural-urban migration and social urban tension minimized</p>	<p>Livestock/ range cooperatives</p> <p>Other livestock/ range user groups</p>	<p>Secure grazing access and use rights and benefit shares of traditional users;</p> <p>Assured resource benefits</p>	<p>Village and Municipality councils</p> <p>Development and Environmental NGOs</p> <p>Rangeland Department / MoA (governorate and national level)</p> <p>Jordan Cooperative Association</p> <p>Other relevant Ministries</p>	<ul style="list-style-type: none"> • Designated range areas only for use by members cooperatives/ range user groups • Set-up grazing/ hunting fees and permits and fine system • MoA grazing/ hunting fees returned to range cooperatives • Ensure equality and equity in using the range resources (see under livestock package) • Govt. guidance for grazing share and structured mechanism and legalizing for sharing benefits

INVESTMENT PACKAGE 3.

"Hima" integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
B. Soil, Carbon & Water Conservation and integrated site management						
Stone terraces and walls, gully control/check dams, hafeer and earth dams	Reduced soil erosion and increased soil moisture	Improved ground water recharge	Secure grazing access and use rights and benefit shares of traditional and local users	Secure usufruct rights and benefit shares of traditional local users (esp. women)	Municipality councils	• Set-up grazing/ hunting fees and permits
Amendments with Phosphorus fertilizer to stimulate leguminous species	Improved soil fertility and increased carbon sequestration	Reduced siltation in water reservoirs	Assured benefits from Soil & Water Conservation actions		Local contractors	• Reduced livestock drinking water cost for members range user groups/ coops
Construction of cisterns, micro-catchments, stock ponds; maintenance of existing ponds;	Increased water harvesting for livestock drinking water	Safer drinking water and higher public health			Development and Environmental NGOs Rangeland	• Ensure equity in benefit sharing (see below)
Rehabilitation of ground water wells; check quality		Improved biodiversity			Department / MoA (governorate and national level)	
		Increased soil carbon sequestration			Jordan Cooperative Association	
		Increased economic activity in rural range areas, minimizing rural-urban migration			Other relevant Ministries	
C. Install renewable energy facility for low-cost energy consumption and production						
Solar /wind electricity provision of processing and storage houses and eco-tourism facilities	Reduced electricity consumption cost	Less CO2 emissions	Solar/wind energy local SMEs (providers, workshops)	Commercial benefits to be ploughed back to finance in SRM activities	Governorate electricity services	Transparent coordination mechanisms between energy investors and local stakeholders and range cooperatives
Solar / wind energy plants to connect to grids	Reduced electricity production cost	Reduced national energy budget	Local investors	Subsidy agreement with national energy providers	National investors	
Solar / wind energy provision to SRM villages	Reduced electricity consumption and production cost	Financial resources for SRM in range lands (Payment for Ecosystem Services)			Jordan Investment Commission	

INVESTMENT PACKAGE 3.

"Hima" integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
D. Limited ecological livestock production						
Organize and deliver (mobile) livestock services to herders (veterinary and artificial insemination –local breeds)	Improved animal health; reduced mortality and abortion rates Increased productivity	Improved herder livelihoods and incomes Increased economic activity in rural range areas, minimizing rural-urban migration	Livestock/ range cooperatives NGO/Govt Vet services (mobile clinics where necessary) Governorate level veterinary labs	NGO or private sector initiatives to create economies of scale in service delivery Government technical, legal and institutional support Natural reserve mandate	Municipality Councils Dev. and Env. NGOs Vet. + Rangeland Departments/ MoA (governorate and national level) Jordan Cooperative Association Jordan Investment Commission	Organization of users; strengthening, capacity building and vocational training of cooperatives and agricultural societies ; Representative election of the administrative bodies of the cooperative to avoid dominance Building partnerships with all stakeholders in the location.
Other livestock production interventions (as above) could possibly be considered, dependent on scale and range objectives (in case of high biodiversity and minimum grazing, to be limited and mainly for niche quality dairy production)	Improved range biodiversity and high quality dairy production	Improved ground water recharge, biodiversity, soil carbon sequestration and reduced siltation in water reservoirs	Small & Medium Enterprises (SMEs) and/ or NGOs for ram and lamb production			

INVESTMENT PACKAGE 3.

"Hima" integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
E. Enhanced biodiversity protection, management and ecological production of valuable medicinal and aromatic range plants (MARPs)						
Prepare local plans for designation and management of sites with valuable indigenous plants	Improved growth, quality and density of valuable plants	Improved biodiversity Increased economic activity in rural range areas with new job opportunities created	Women Cooperatives and Associations	Well organized women CBOs Secure usufruct rights and benefit shares of traditional users (esp. women) Appropriate knowledge for MARP management	Development and Environmental NGOs Rangeland Department / MoA (governorate and national level) Jordan Cooperative Association Other relevant Ministries	Develop guidelines and community regulations to ensure equity in using the MARP resources, while legalizing the sharing of benefits (see under livestock) Set-up usufruct fees and permits set-up fine system for violations
Enhance natural regeneration of selected MARPs	Increased biodiversity Increased production					
Develop harvest protocols for sustainable production	Ensured long-term production					
Natural fencing against animals (where necessary in selected sites)	Increased biodiversity Increased production					
Reviving and if necessary re-introducing native indigenous species	Increased biodiversity and added value to MARP production					
E. Enhanced biodiversity protection, management and ecological production of valuable medicinal and aromatic range plants (MARPs)						
As under ecological livestock and MARP investment packages						

INVESTMENT PACKAGE 3.

“Hima” integrated range and eco-tourism management (including soil, carbon, water and energy conservation measures) near historic and archaeology sites (as SCAs, IBAs or MoA Rangeland Reserves)						
Intervention	Direct local Impact	Societal Impact (externalities)	Local Actors	Preconditions for local actors	Supporting/enabling actors	Local Governance Measures
G. Management of eco-tourism sites with historic, cultural and archaeological value						
Enhance CBO management of eco-tourism facilities	Increased ownership and local jobs and incomes	Strengthened local livelihoods	Livestock/range cooperatives	Secure use rights and benefits shares (esp. of women and youth in local eco-tourism associations)	Municipality Councils	Organization of users; strengthening, capacity building and vocational training of cooperatives and/or voluntary and agricultural associations;
Promoting local eco-tourism infrastructure and services (eco-lodges, visitor centres; bird observatory points;)	Increased income and local job opportunities;	Increased economic activity in rural range areas with new job opportunities created	Women Cooperatives and Associations	Increase knowledge of local CBOs for local eco-tourism	Jordan Cooperative Association Ministry of Tourism and Antiquities	See other investment packages for CBO strengthening
Promote traditional handicrafts and cultural/heritage events	Enhanced cultural heritage and increased income and local job opportunities	Contribution to GDP by increased tourist flows Increased visibility of Jordan in terms of cultural and natural heritage	SMEs and NGOs for running eco-tourism facilities Local investors		Development and Environmental NGOs Ministry of Environment Rangeland Department / MoA (governorate and national level) National investors Jordan Investment Commission	Policy framework for enabling local eco-tourism initiatives