

# Report on CEM Workshop on Sustainable Management of Rangeland Ecosystems in the West Asia Region;

Amman, September 13<sup>th</sup> 2018

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October 13<sup>th</sup> 2018



## 1. Introduction/background

Bi-annual Steering Committee meetings of the IUCN Commission on Ecosystem Management (CEM) are often accompanied by a technical workshop on a thematic issue that is relevant to the work of the CEM. For this second 2018 SC meeting that took place in Amman in the West Asia Region, a decision was made to focus in the technical workshop on the rangelands, a dominant land use in this region. The CEM Dryland Ecosystem Specialist Group (DESG) has played over the last 4 years an important support role to the IUCN Global Dryland Initiative (GDI) of the Global Ecosystem Management Programme, and the DESG Lead was requested to organize and facilitate this workshop. The IUCN rangeland programme in Jordan formed one of the cornerstones of the work done by the GDI.

The rangeland ecosystem management workshop has highlighted progress made over the last 5 years in dryland and rangeland management and explored how to foster higher political and financial support for a biome that has general been neglected by IUCN in spite of the important contributions rangeland and drylands make to economic development, livelihoods, biodiversity and climate change adaptation and mitigation. A field visit to a Hima<sup>2</sup> pilot site on rangeland protection and management and their rangeland community formed part of the workshop programme.

The workshop was attended by high level representatives and key personalities involved in Rangeland Ecosystem Management from Jordan and other countries in the West Asia region, as well as by CEM Steering Committee members and IUCN ROWA staff. The workshop contributed to foster IUCN and CEM objectives in managing wisely and sustainably this important part of the earth surface (42 %). The rangeland ecosystems workshop and the CEM SC meeting celebrated this year the 70 years of existence of IUCN.

## 2. Aim and flow of the workshop

Within an overall frame of global challenges and opportunities faced by rangeland ecosystems, the triple aim<sup>1</sup> of this workshop is to (i) underscore progress made by IUCN/GDI and CEM/DESG in sustainable Rangeland Ecosystem Management; (ii) profile better the IUCN work done on

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<sup>2</sup> Hima is an age-old pre-islamic community management system of natural resources, be that rangelands, wetlands, forests or other natural resources

rangelands within IUCN; and (ii) enhance policy dynamics to invest in the West Asia Rangeland Ecosystems.

Introductions and technical sessions sketched what was already done and in progress and focused on the content of Technical Briefs developed by GDI/DESG<sup>3</sup>: (1) the potential leverage of soil biodiversity and soil organic carbon for enhancing sustainable rangeland ecosystem management and Land Degradation Neutrality (LDN); (2) studies on how to invest sustainably in the rangelands and in Jordan in particular; (3) introducing methods for typology of ecosystems and rangeland ecosystems in particular; and (4) the thrust and scope of the new IUCN regional project in Egypt and Jordan, Healthy Ecosystems for Rural development (HERD).

Building on these inputs, the workshop broke in five different focus groups to discuss and propose priority measures and high level policy messages for global policy opportunities and challenges for SRM (FG1); national policies, and SB and SOC as leverage for LDN (FG2); Typologies for rangeland ecosystems (FG3); financial flows for Investments (FG4); and putting policies into practice (priorities for up-scaling and local governance; FG5). The workshop concluded by a short wrap-up as summarized at the end of this report. After the workshop a field trip was made to Hima Bani Hashim, east of Amman, to share practical insights from experiences with community management of rangeland and social fencing.

### **3. Short summaries of technical presentations**

#### **3.1 Potential leverage of soil biodiversity and soil organic carbon for enhancing sustainable rangeland ecosystem management and Land Degradation Neutrality (LDN) – Jon Davies**

This technical session develops the argument for giving more attention to management and restoration of rangeland ecosystems in the West Asia and North Africa region. Although rangelands occupy up to 50% of all land on the planet, and up to 80% of the West Asia region they are neglected for many reasons. Under estimation of their ecosystem service values (such as biodiversity, carbon sequestration, quality water provision, food from livestock and medicinal plant production, cultural services) and of traditional pastoralist knowledge are among them. All analyses agree that there is a major land degradation risk in the rangelands, but we don't have good figures for the cost of land degradation in this region. Land Degradation Neutrality (LDN), as reflected in Target 15.3 of the SDGs is a great opportunity to generate support for restoring rangelands. What is LDN is described in more detail in the short paper (Davis and Laban, 2018) posted on [this web page](#) . One of the three SDG indicators to measure achievements in LDN is '*trends in carbon stocks above and below ground*'. Soil Organic Carbon is also a good indicator for the extent of carbon sequestration. The discussion on LDN has become important globally and IUCN and [associated CEM experts have contributed heavily to this](#) (Davies (ed) and contributors, 2015). The dry rangelands are an important biome for LDN, not in the least by their large extent, but also by their high value in terms of ecosystem services and because of the important

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<sup>3</sup> References to Technical Briefs published by GDI and DESG, as well as the IUCN/MoA publication on "*Sustainably investing in the Jordan Rangelands*" are provided in Annex 1.

degradation taking place in these lands. Conserving soil biodiversity and soil organic carbon in the rangelands to avoid or restore land degradation should get important attention, as soil biodiversity drives ecosystems, while [SOC can be used as its measurable indicator](#) (Laban et al, 2018). Such attention could leverage necessary financing. Nomadic and semi-nomadic livestock rearing is a dominant use of the rangelands, and hence understanding the dynamics of such use is critical to mitigate rangeland degradation. Herd movements are vital for pasture management and careful timing of grazing allows desirable plants to recover and allows preferred seeds to be grazed and distributed. Pastoralists often have a strong understanding of how livestock and rangelands interact. To enable them to (re)take ownership over rangeland management, strengthening local governance modalities for SRM is necessary such as the age-old Hima systems in the Arab world. While these are low cost approaches, they are highly demanding in human resources and require lot of patience. Key principles of governance are rather known, in rangelands however, being able to work on scale is critical. As the presentation in the workshop indicates there are many and increasing opportunities to invest in sustainably managing or restoring rangelands. It is time to trigger these investments, use the available finance and go to the necessary scale to achieve impact.

### **3.2 Studies on how to invest sustainably in the rangelands and in Jordan in particular – Peter Laban**

As mentioned in the first presentation of this workshop there are very good reasons to invest at scale in rangeland ecosystems (Davies et al, 2015). This presentation is based on studies on GIS/watershed potential, vegetation dynamics in community protected rangeland sites and economic valuation in the Jordan rangelands, followed by stakeholder concertation for recommending sustainable investments in the Jordan rangelands ([Summary brief of the rangeland investment study](#)). Investment packages have been identified around (i) **Hima**, integrated rangeland management; (ii) soil, carbon and water conservation; (iii) ecological livestock production; and (iv) use and management of medicinal and aromatic high-value range plants. These measures capitalize the multifunctional ecosystem services provided by rangelands. It was recommended to accompany these direct investments by investing in local governance modalities, value chain development of rangeland commodities, eco-tourism and renewable energies such as sun and wind. Insights are given in economic valuations of direct and externalized (on /off-site) benefits.

These first valuation studies reveal that a value of 48,4 JD/ha/yr can be estimated for shallow aquifer increase (Westerberg, 2014<sup>4</sup>). To this can at least be added a value of 4.7 JD/ha/yr in the steppe areas and 2.6 JD/ha/yr in the Badia/desert areas) for improved forage production through

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<sup>4</sup> Westerberg, V., and Myint, M. (2014). Policy Brief adapted from *an Economic Valuation of a large-scale rangeland restoration project through the Hima system within the Zarqa River Basin in Jordan*. ELD/IUCN, Amman.  
[http://www.iucn.org/about/work/programmes/ecosystem\\_management/about\\_work\\_global\\_prog\\_ecos\\_dry/](http://www.iucn.org/about/work/programmes/ecosystem_management/about_work_global_prog_ecos_dry/)

community protected (Hima) ranges (Jabarin<sup>5</sup>, Abu Zanat<sup>6</sup>, Laban, 2015<sup>7</sup>). Together, extrapolated to ca. 23,000 km<sup>2</sup> (or 30% of the Jordan rangeland watersheds that on the basis of GIS studies have potential for rangeland management<sup>8</sup>), this would amount to an average annual value of 52.3 million JD/yr over a 25 year period. These estimates do not take into account potential additional value due to increased carbon sequestration, biodiversity and reduced siltation of river dams.

High society benefits at national and global levels, justify external financial flows and up-scaling to cover long-term ecological and governance investments. This is further elaborated in [Laban, 2015](#). These papers also elaborate on how better local governance modalities, value chain development of rangeland commodities and modalities for Payments for Ecosystem Services (PES) could be envisioned. The studies indicate that that are good opportunities to restore rangelands in Jordan, but that the right triggers have to be identified for scaling-up investments in the rangelands.

### **3.3 Introducing methods for typology of ecosystems and rangeland ecosystems in particular- David Keith**

This technical session discusses the need and the how for a universally accepted typology of ecosystems, and in this occasion for rangelands. Coming to a Red List of Ecosystems (RLE) is triggered by an urgency to assess the risks ecosystems are facing today: what risks, which ecosystems are most at risk; how do risks to ecosystems change over time? and how will alternative policy & management options reduce risks? Two concepts for RLE are risk (the probability of a bad outcome over a specified time frame) and ecosystem collapse, the 'bad outcome' (a transformation of an ecosystem so that it cannot sustain anymore its *defining features*). While ecosystems do not go extinct, unlike species, they can undergo major transformations that involve loss of biodiversity and ecosystem functions. Ecosystem collapse affects capacity to deliver ecosystem services and it is thus important to understand risks of ecosystem collapse as this will inform sustainable management of services. The [RLE methodology](#) is described to assess spatial and functional symptoms and the probability of collapse, as well as Red List risk criteria for ecosystems, to determine by quantitative thresholds the risk category in which an ecosystem is found. The Introduction and Application Guidelines for RLE categories and criteria provide further detail. In IUCN's Ecosystem Typology, ecosystems are differentiated according to functional differences and categorized at three major levels (realms, biomes, and

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<sup>5</sup> Jabarin, A., 2014. *Situation analysis of economic valuation of rangelands in Jordan*. Background Paper (3) for the preparation of the UNCCD/National Action Plan to Combat Desertification in Jordan (2015-2020). Ministry of Environment, Amman

<sup>6</sup> Abu Zante, M., 2015. *Ground Truthing of Rangeland Areas in Jordan with High Potential for Investment*. Study in the framework of the "Sustainable Dryland Landscapes: Closing the Knowledge-Policy Implementation Gap" Project. IUCN/GDI, IUCN-ROWA, MoA and MoPIC, Amman

[http://cmsdata.iucn.org/downloads/rangeland\\_20ground\\_20truthing\\_20report\\_20\\_20jordan\\_202015\\_1.pdf](http://cmsdata.iucn.org/downloads/rangeland_20ground_20truthing_20report_20_20jordan_202015_1.pdf)

<sup>7</sup> Laban, P., 2015. *Sustainably Investing in the Jordan Rangelands*. Full report of a study on rangeland investment options. commissioned by IUCN-ROWA

[http://www.iucn.org/about/union/secretariat/offices/rowa/iucnname\\_resources/our\\_publications\\_library/](http://www.iucn.org/about/union/secretariat/offices/rowa/iucnname_resources/our_publications_library/)

<sup>8</sup> Al-Bakri J. 2015. *Using geo-spatial techniques for selecting high potential rangeland sites for investment*. Study in the framework of the "Sustainable Dryland Landscapes: Closing the Knowledge-Policy Implementation Gap" Project. IUCN/GDI, IUCN-ROWA, MoA and MoPIC, Amman.

[http://cmsdata.iucn.org/downloads/mapping\\_20rangeland\\_20in\\_20jordan\\_20gis\\_2015.pdf](http://cmsdata.iucn.org/downloads/mapping_20rangeland_20in_20jordan_20gis_2015.pdf)

functional groups) and according to compositional differences that distinguish between biogeographic ecotypes, ecosystem types and local ecosystem types. The drylands (from hyper arid to sub-humid) can thus be differentiated in quite a range of different ecosystem types.

Key steps in a Red List assessment of Ecosystems are: from Ecosystem typology and description (1) and ecosystem mapping (2) through diagnostic models (3), identifying indicators of decline and collapse (4) and assembling indicator data (5) to calculating RLE metrics & application of criteria (6) and documenting (7). For instance, the functional implications of ecosystem collapse due to climate change and over grazing in a specific ecosystem could be the following: reduced soil stability, increased erosion, reduced infiltration & increased runoff, and/or reduced nutrient retention & cycling, and reduced resilience to drought, and hence reduced vegetation productivity & recruitment, reduced carbon sequestration and reduced habitat complexity & species diversity.

Apart from the potential of ecosystem typology the RLE diagnostic process is important for understanding causes & symptoms of ecosystem change, which is a fundamental requirement for developing ecosystem management & restoration strategies. Systematic risk assessments for RLE can be used for identifying ecosystems that are most at risk, informing conservation and management priorities and regulatory action and informing environmental impact assessment.

### **3.4 Thrust and scope of the new IUCN regional project in Egypt and Jordan, Healthy Ecosystems for Rangeland Development (HERD) – Samar Taha**

This technical session shared with the workshop the action agenda of the recently started Healthy Ecosystems for Rangeland Development (HERD) project in Egypt and Jordan. A key problem in the region is rangeland ecosystem degradation with decreasing productivity of rangelands. Rangeland management is context specific and long-term trends and conditions need to be well understood and considered while taking into account policy, economic and climatic drivers. Pastoralism is the most widespread land use system in this predominantly dry region with limited arable land. The Bedouin, like most traditional pastoralists, used to be nomads and represent a strong cultural heritage in the Arab world. The exact number of Bedouin people living in the MENA region is uncertain but is estimated at around 21 million (with the largest number in Sudan and Algeria). The Bedouin economy is based on livestock herding in rangelands. HERD will contribute to tackle rangeland ecosystem degradation through Sustainable Rangeland Management (SRM) approaches, including traditional HIMA management and effective local governance for SRM. Rangelands are considered as 'social ecological landscapes' that - when healthy - provide livelihoods for hundreds of millions of people.

The HERD project is implemented and executed by UN Environment and IUCN with funding from GEF, and co-finance from partners as the Hashemite Fund for Development of the Jordan Badia, GIZ and the Ministry of Environment in Jordan, and CEDARE and the Desert Research Centre in Egypt. Total GEF Grant is US\$ 3,515,982 for a total budget of US\$ 13,442,982. The project aims to realize Jordan and Egypt national goals of SRM and expand learning and networking so as to scale-up to regional and global levels. Key components of the project are (i) Technical assistance for adaptive management & learning; (ii) Strengthening of Rangeland Governance Institutions;

(iii) document and up- scale good practices in SRM, based on participatory approaches; and (iv) knowledge management to promote an enabling environment for regional scale up of SRM. An important question for the project to pursue is to see what the priorities are to ensure that rangeland restoration strengthens national scale-up of local range governance in the light also of Eco-DRR and Climate Adaptation.

#### **4. Outcomes of focus group discussions**

After the technical sessions as summarized above, the participants of the workshop divided in 5 subgroups to discuss a number of key questions and make recommendations. Apart from the central question proposed to each subgroup, each subgroup was proposed to reflect, with regard to sustainable rangeland ecosystem management, on:

- **What are priority actions through national/regional and global initiatives?**
- **What are key messages for IUCN, UNCCD, UNCBD, UNFCCC and others?**

Unfortunately, time given for this workshop was constrained and it would have been beneficial to discuss the outcomes of this focus group in a final plenary session.

##### ***4.1 How can we move rangelands to centre stage in international policy and national/global investment? (Focus Group 1).***

The following key messages came to the foreground: Good management of rangelands can improve people's livelihoods positively, while such management – in view of their very large extent (40% of the planets terrestrial surface) - will help to cope with climate change. For this investing in awareness raising about social and global benefits of healthy rangelands and related capacity building is a must.

There are important global opportunities to do so by engaging in the revision process of CBD and Aichi Criteria for the CBD strategic Plan 2050. Case studies could be developed around a crosscutting issue as related to achieving SDG targets that will evidence the need to focus on rangelands. Such case studies could be presented in high level political forums, such as a.o. the IUCN Congress 2020. Good use can be made here of the scientific capacities available in IUCN, in cooperation with other institutions.

There are nevertheless important challenges signaled: such as access and availability of relevant information, and - in some countries - lack of national rangeland policies and qualified staff to work on sustainable rangeland ecosystem management.

Priority actions were identified as follows: mainstream rangeland ecosystem functions in inter-sectoral policies, package better the scientific information and knowledge on rangeland ecosystems and engage in capacity building of stakeholders in rangeland management.

#### **4.2 What is needed – at the national level - to push the policy agenda for SRM in West Asia, with emphasis on LDN and rural livelihoods (economic, social, cultural heritage) (FG 2)**

Important messages to be emphasized at global fora are: Importance of Soil Biodiversity (SB) and Soil Organic Carbon (SOC) need to be put on the global agenda (UNCBD, UNCCD, etc.). Emphasize the multi-functionality of rangeland ecosystems and link rangeland ecosystem biodiversity better into CBD discussions; make use of UNCCD financing mechanisms through LDN targeting and signal to UNFCCC the importance of rangelands in terms of droughts (frequency and severity) and the need also here for early warning systems. Mobilize for this through IUCN's networking and convening strengths to clearly communicate the links between biodiversity, ecosystems and human wellbeing.

Opportunities to capitalize on the importance of Soil Biodiversity and Soil Organic Carbon could possibly be found in strong links to the food security discussion, by defining more clearly the economic value of soils and hence SB and SOC (values to include those inherent in preserving rural employment) and by developing capacities to mobilize and implement necessary funding to invest in these basic resources.

Challenges for rangeland ecosystem management, in many countries, lay in the absence of or insufficiencies in rangeland policy or legislation, the lack in clarity of definitions (of rangeland ecosystem structure and function), and undefined or not clearly defined rights of access to rangeland resources and the related responsibilities for rangeland management.

Priority actions are considered to be the following: include rangeland management also in other national frameworks; lobby for amendment to existing legislation; define rangeland hotspots and priority areas (mapping); engage in participatory approaches and discussions with local pastoralists and their CSOs, so as to support them in a transparent way to manage their rangeland ecosystems.

#### **4.3 How can we better facilitate regional and international (PES) financing flows for soil carbon storage, biodiversity protection and rangeland restoration (FG 3)**

A key message from this Focus Group with regard to financial flows for rangeland management is that it is high time for international organizations (such as FAO, IUCN and ICARDA) to combine efforts in order to maximize ecosystem benefits from the rangelands. This could be done, amongst others, by regional transboundary initiatives among neighboring countries to manage rangelands and share ecosystem services in shared watersheds.

Opportunities are seen here to be found in developing eco-tourism and renewable energies potential (especially solar and wind) in such a way that revenues from such interventions is triggered to be "plowed back" into funding of long-term investments in sustainable rangeland ecosystem management. This needs to be combined by attractive packaging of local natural quality products from the rangeland (herbs and livestock products) that respond to (urban) quality demand.

Prerequisites to capitalize on these opportunities, being at the same time a challenge, are (i) tackling the land and resource tenure issues so that local communities are encouraged to take

ownership for rangeland ecosystem management; and (ii) to properly value the multiple benefits of goods and services that can be produced and delivered by sustainable rangeland management.

Priority initiatives at national and regional levels should focus on eco-tourism, quality Livestock production, medicinal and aromatic herbs, and developing rural power and energy in rangeland areas, capitalizing on above mentioned opportunities. Such priority action should emphasize that this has important global benefits in the domain of conserving biodiversity and carbon sequestration. Action should be accompanied by conducive policy, institutional capacity, knowledge and capacity building.

#### **4.4 What can be done on RLE for the Rangelands (FG 4)**

A key message here that decision-makers have to realize that not taking care of rangeland management implies risks and notably the financial and social cost of ecosystem collapse at local, national and regional levels.

Working on a Red List of Rangeland Ecosystems (those that are threatened by collapse) while at the same time categorizing and describing all other rangeland ecosystems would provide an opportunity to highlight the actual status of rangeland ecosystems and synthesize the analyze and typology of these ecosystems, to create a scientific platform for scenario building to strategize rangeland ecosystem management, and hence to trigger development activities in the rangelands.

Priority actions are to undertake a RLE analysis of rangeland ecosystems as a key data basis and decision support system for decision and policy makers to make sound decisions for sustainable rangeland ecosystem management and provide the information to value social and ecological benefits of rangeland ecosystems, at local, national and global levels. Such valuation can also be tied to the metrics of SDG targets.

#### **4.5 What are the priorities to ensure that rangeland restoration strengthens national scale-up of local range governance (FG 5)**

The key message from this focus group is that to scale-up rangeland ecosystem management, protection and restoration, this should first of all enhance local/rural community sustainability and their quality of life (them being livestock holders or not), while it is necessary to raise awareness in urban communities on the importance and benefits rangeland ecosystem services provide for them.

Priority actions should encompass the following:

- ensure active community involvement in planning, decision making and action;
- ensure sustainability and ownership of community actions by facilitating local governance modalities and long-term planning, engaging adequate authority at both local and government levels;
- make sure that gender equity and local knowledge are respected;

- defining alternative options for sustainable investments in rangeland ecosystems, taking into account their carrying capacity, and especially in situations where climate change is affecting land use, also in view of Eco-DRR and EbA action;
- develop more cases and good data for the valuation of ecosystem services and benefits
- Defining the role of private sector to support investments through Payment for Ecosystem Service modalities.

#### **4.6 How can the CEM contribute to all this?**

In a final reflection at the end of the workshop the following ideas are mentioned (in a non-exhaustive way):

- Prepare high level messages at IUCN that highlight the importance of rangeland ecosystems in terms of livelihoods, biodiversity and climate change
- Related to above, develop a motion for the IUCN Congress in 2020 that captures our discussions and initiatives in this workshop to inform decision makers on the relevance of rangeland ecosystems at the global level
- Develop case studies on rangeland ecosystems in collaboration with different CEM technical groups
- Develop the data base for 2030 targets
- Increase CEM membership in the West Asia Region.

### **5. Conclusion: A possible Theory of Change for the dry rangeland ecosystems**

This workshop has called for more attention at global and national levels for the wise and sustainable management of the dry rangeland ecosystems through higher profile in global agendas, and priority actions of which a good number are indicated in Section 4 of this report. Sustainable management of rangeland ecosystems is complex and has to take into account many facets. The following could provide a short narrative or a kind of theory of change around key facets that need to be considered in order to manage, protect, or in cases, restore the different ecosystems within the dry rangeland biome. Where this provisional theory of change below expresses a first line of thought, it will be further developed and operationalized in further work on rangeland ecosystem management.

#### ***A provisional theory of change for the dry rangeland ecosystems in West Asia***

*Rangelands are the dominant land-cover type in the West Asia region. They are heterogeneous socio-ecological landscapes consisting of grassland-dominated ecosystems as well as dry woodlands and shrub lands, wetlands, riparian areas and other ecosystems and habitats. The label ‘rangelands’ emphasizes the presence of ranging animals (wild and domestic) and underscores the importance of herding practices and associated cultures. The overarching goal of our theory of change is that rangelands in the West Asia region are maintained in good health by livestock keeping populations, providing ecosystems services and generating economic and social benefits for the wider society.*

*To sustainably manage **rangeland ecosystems** will need direct involvement of local communities that can “own” the management process, including planning, decision-making, gender equity, access to direct benefits and their rights/tenure to resources. This will require to strengthen modalities for **local***

**governance**, embedded in national governance frameworks for sustainable rangeland ecosystem management. In order to enhance **resilience** and sustainability of such community management, actions and decisions, it is important to recognize the ecological complexity of these ecosystems and the social complexity of the people who make use of these rangelands as well as their (ecosystems and communities) capacity to respond to change or in a worst case to calamities. Critical is to increase our understanding and knowledge of these complexities. A good tool for the ecosystem part is the comprehensive **typology of rangeland ecosystems**, following the methodologies proposed for assessing and categorizing ecosystems by the Red List for Ecosystems (RLE) framework. Social complexities need to consider also the **cultural practices** of the people, often nomadic pastoralists such as the Bedouin in the Middle East, who have been using these rangeland ecosystems since time immemorial.

Proposed **Nature-based Solutions** for protection, management, and if necessary restoration of rangeland ecosystems need to acknowledge these ecological and social complexities. Nature-based Solutions (NbS) we could think of in the reality of the West Asia rangelands are, amongst maybe others: Hima<sup>9</sup>integrated range management practices in drylands and wetlands; soil, carbon and water conservation; ecological livestock production; and use and management of medicinal and aromatic high-value range plants. In many cases NbS need to be accompanied by **Non-NbS**, interventions that support NbS to become sustainable. These Non-NbS can refer to the strengthening of local governance modalities, but also to the development of value chains for commodities that are produced (in a sustainable way) by the rangeland ecosystems to add value to rural rangeland economies, or for instance to ecotourism activities around rangeland hotspots and sites of historic and archeological significance. The introduction of renewable energies (solar and wind) as a Non-NbS may be used both to support value chains and to insert capital in the management of rangeland ecosystems through levies and taxes. Certainly, depending local context, other NbS and Non-NbS can be initiated.

Sustaining rangeland ecosystem management needs **investments** in knowledge, capacity, time and resources: physical resources as land, soil, water, soil biodiversity and soil organic carbon, vegetation and biodiversity, as well as social and human resources. Investments are not only needed to regain direct productivity of rangelands and local ecosystem services, but also to ensure that the potential of multifunctional ecosystem services for benefitting society at national and global level is captured in terms of biodiversity, hydrology and carbon sequestration. To esteem the value of this potential, economic and social valuation is needed. Being able to give measures to the value of rangeland ecosystem services and their benefits will facilitate policy action and the **financial flows** to make such investments possible. Payments for Ecosystem Services are one among other tools to transfer value of external benefits to those making the physical and social investments in their rangeland ecosystems.

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<sup>9</sup> Hima is an age-old pre-Islamic community management system of natural resources, be that rangelands, wetlands, forests or other natural resources

## Annex 1: links to relevant publications (see also CEM – DESG web page)

- ❑ Davies J., Laban P., Ogali C., Metternicht, G., (2015). *Technical Brief. Homing in on the Range: Enabling Investments for Sustainable Land Management*. IUCN Global Dryland Initiative and IUCN Commission on Ecosystem Management, Nairobi [www.iucn.org/drylands](http://www.iucn.org/drylands)
- ❑ Davies. J. (ed), and Contributors, (2015). *Technical Brief. Land Degradation Neutrality: implications and opportunities for conservation; Nature Based Solutions to Desertification, Land Degradation and Drought*. IUCN Global Dryland Initiative and IUCN Commission on Ecosystem Management, Nairobi [www.iucn.org/drylands](http://www.iucn.org/drylands)
- ❑ Peter Laban, 2015. *Sustainably investing in Rangelands – Jordan – Policy Brief*. MoA and IUCN, Amman, Jordan. [Summary brief of the rangeland investment study](#)
- ❑ Peter Laban, 2015. *Sustainably investing in Rangelands – Jordan*. MoA and IUCN, Amman, Jordan. [www.iucn.org/publications](http://www.iucn.org/publications) and [www.moa.gov.jo](http://www.moa.gov.jo)
- ❑ Peter Laban, Graciela Metternicht, and Jonathan Davies, 2018. *Soil Biodiversity and Soil Organic Carbon: keeping drylands alive*. Gland, Switzerland: IUCN. viii + 23p; ISBN: 978-2-8317-1889-7 (PDF) - DOI: <https://doi.org/10.2305/IUCN.CH.2018.03.en>
- ❑ Davies, Jonathan and Peter Laban, 2018. *Potential leverage of soil biodiversity and soil organic carbon for enhancing sustainable rangeland ecosystem management and Land Degradation Neutrality (LDN)*. Short paper presented in CEM Rangeland Workshop Amman, September 2018. [this web page](#).