The Hashemite Kingdom of Jordan
Ministry of Environment

The Fifth National Report on the Implementation of the Convention on Biological Diversity





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List of Abbreviations

ASEZA	Aqaba Special Economic Zone Authority
BRP	Badia Restoration Program
CA	Country Assessment
CAP	Community Action Plan
CBD	Convention on Biological Diversity
CBRR	Community-based Rangeland Rehabilitation Project
CITES	Convention of International Trade in Endangered Species
DOS	Department of Statistics
FAO	Food and Agriculture Organization of the UN
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEF	Global Environmental Facility
IUCN	International Union for the Conservation of Nature
JD	Jordanian Dinar
JREDS	Royal Marine Conservation Society of Jordan
LaMME	Laboratory for Molecular Marine Ecology
MCM	Million Cubic Meters
MDG	Millennium Development Goal
MWI	Ministry of Water and Irrigation
MoA	Ministry of Agriculture
MoEnv	Ministry of Environment
MoMA	Ministry of Municipal Affairs
MoPIC	Ministry of Planning and International Cooperation
MoTA	Ministry of Tourism and Antiquities
NAP	National Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
NCARE	The National Centre for Agriculture Research and Extension
NEP	National Executive Program
NGO	Non-Governmental Organization
NVH	National Virtual Herbarium
OECD	Organization of Economic Cooperation and Development
PA	Protected Area
PDTRA	Petra Development and Tourism Authority
PGR	Plant Genetic Resources
RBG	Royal Botanical Garden
ROWA	Regional Office for West Asia
RSCN	The Royal Society for the Conservation of Nature
SCA	Special Conservation Area
SGP	Small Grants Program
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development

Executive Summary

The status of biodiversity in Jordan remains unsatisfactory and facing numerous challenges and constraints. This is the fifth national report on biodiversity reporting the kingdom's progress on the implementation of the convention on biological diversity. The report addresses the country biodiversity on three levels. The first level reports on the status of biodiversity, its trends and associated threats with particular focus on the changes which took place since the submission of the fourth national report in 2009. The second level covers an update on the implementation of the National Biodiversity Strategy and Action Plan (NBSAP), including a preliminary review of the progress made on the achievement of the various themes of the 2003 plan and the proposed projects. It also addresses the framework for the update of the plan as part of the country's commitment towards the alignment of the plan with the global biodiversity strategy 2011-2020 and its associated Aichi targets. The third level presents a preliminary compilation of the national progress against the achievement of the global Aichi targets 2020 and the foreseen approach to systemize the process of their national alignment and integration.

Biodiversity status, trends and threats

This reporting period updated and reconfirmed the total number of species recorded for Jordan from the various biodiversity groups. Jordan embraces four bio-geographic regions, namely: the Mediterranean, Irano-Turanian, Saharo-Arabian and Sudanian. The four regions comprise thirteen vegetation types which provide the natural habitats for over 4,000 species of fauna and flora from the terrestrial, marine and freshwater environments in addition to genetic resources. Jordan's 2,622 species of vascular plants represent 1% of the world flora. Further, Jordan hosts 644 animal species of which, 83 are mammal species, 436 species of birds, 348 species of fish and many more others. The report also presented a synthesis on the various biodiversity constituencies including wetlands, forests, red list species and important bird areas. The following table represents an example from the global IUCN database on the numbers of red list species recorded in Jordan and compared to several countries from the region:

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Mollusks	Other invert.	Plants	Total
Jordan	13	8	6	0	12	5	55	1	100
Iraq	14	14	3	1	17	1	16	1	67
Lebanon	10	8	7	0	20	8	6	2	61
Oman	10	8	8	0	25	2	29	6	88
Palestine	3	8	4	1	0	2	2	0	20
Saudi Arabia	10	13	3	0	24	1	58	3	112
Yemen	9	12	6	1	24	2	66	162	282

Changes to biodiversity since the forth national report

The report recaps a summary of updates on the various elements of biodiversity with particular focus on terrestrial flora and fauna, genetic resources, and marine diversity including the freshwater ecosystems and species. In addition, the report gives an update on the status of the national protected areas network. Three new protected areas were

established since 2009 namely, Yarmouk, Fifa, Qatar with the latter not being operationalized yet. The following table presents the up to date list of protected areas:

No	Name of PA	Date of establishment	Area ($km^{2)}$
1	Shoumari Wildlife Reserve	1975	21
2	Azraq Wetland Reserve	1978	12
3	Mujeb Biosphere Reserve	1985	212
4	Ajloun Forest Reserve	1987	12
5	Dana Biosphere Reserve	1989	292
6	Wadi Rum World Heritage Site	1997	729
7	Aqaba Marine Park	1997	2.5
8	Dibbin Forest Reserve	2004	8.5
9	Yarmouk Forest Reserve	2010	21
10	Qatar Nature Reserve	2011	110
11	Fifa Nature Reserve	2011	26
		Total	1,420

Threats to national biodiversity continue danger its long term sustainability. Most of the threats are carried on from the time of the NBSAP development 2003 with some emerging pressures during the last few years including the issue of refugees related mostly to the regional political crisis. Key current threats include land degradation, tourism, climate changes and several others. Various government, nongovernment and academic organizations and institutions are exerting significant efforts to mitigate and adapt to the impact of the different threats and their root causes. Specific national initiatives and programs have been undertaken to assess, valuate and promote the economic values of ecosystems in terms of provisional, regulatory and cultural services. This includes several strategic studies on medicinal plants, rangelands, protected areas and others. Despite the progress made, much more is needed to systematically approach the valuation of ecosystems services and mainstream results into national decision making frameworks and processes.

Update on the NBSAP

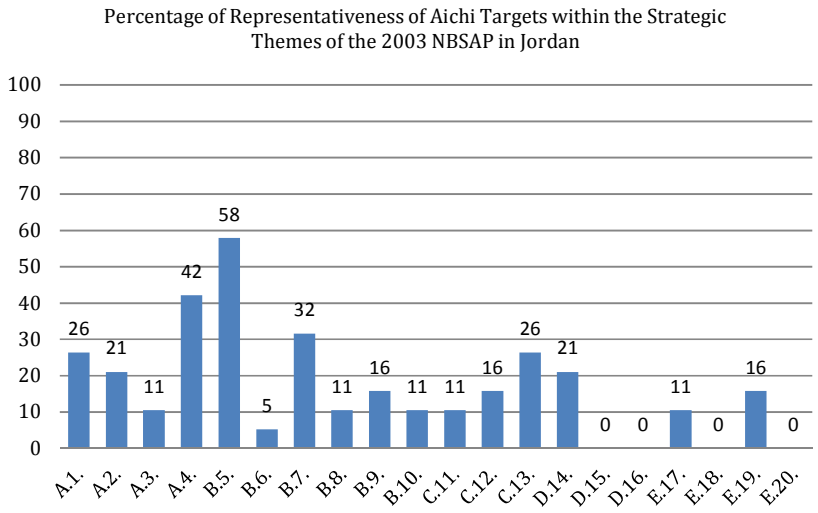
Jordan has not yet updated the NBSAP or fulfilled its alignment with the global biodiversity strategy and its associated Aichi targets. It is anticipated that the NBSAP will be updated and published before the end of 2014. Key challenges facing the implementation of the current NBSAP include:

- The absence of clear resource mobilization strategy.
- The lack of a unified knowledge management and data processing system specific for biodiversity.
- The ineffective national communication and coordination framework on biodiversity.
- The NBSAP was not well incorporated into other national sectoral plans and projects.
- The projects identified in the NBSAP do not adequately address the private sector and local communities their planning and delivery.
- The NBSAP was not accompanied with a continuous national outreach program.
- Lead implementing agencies were not clearly identified for each of the proposed projects.

The national team agreed to adopt the below process for the update of the NBSAP:

- The formulation of a national working group for the update of the NBSAP comprising all key stakeholder and interest groups. The working group will be convened by the Ministry of Environment and will be guided by the National Biodiversity Committee.
- A full review of the national progress made on the implementation of the 2003 NBSAP, including:
    - The update of the situation analysis of key biodiversity values and attributes.
    - The revision of the main threats to national biodiversity.
    - The analysis of the key direct and indirect drivers of biodiversity loss.
    - The review of the NBSAP projects implementation and their lessons learned.
- The development of a revised vision statement for biodiversity in Jordan.
- The review of the strategic goals for biodiversity alongside their midterm outcomes. These will be aligned with the global biodiversity strategy and the Aichi targets.
- The development of a revised national action plan for biodiversity.
- The development and adoption of a revised governance framework for the implementation of the NBSAP and its monitoring using global best practices and guidelines.
- The design of a national outreach and awareness raising campaign to promote national engagement in the NBSAP implementation.
- The development of a strategic framework for financing the updated plan from national and external sources.

The national team in charge of biodiversity adopted the 2003 NBSAP document to report on the progress made on the implementation of the global strategy. Further, a brief synthesis was made by the reporting team to preliminarily quantify the relevance between the current NBSAP and the Aichi Targets. The following diagram attempts to summarize the result of correlation:



National Progress towards the 2020 Aichi Targets and MDGs

This report gives a particular focus on the national progress made on the implementation of the global biodiversity strategy and its associated Aichi targets. The national approach

towards the implementation of the global strategy has not been fully systematic, however, major achievements can be reported form the various sectors and stakeholders involved in the environmental protection sector from the government agencies, nongovernment organizations, academic institutions, local communities and private sector. Although a bit delayed, a fully aligned national strategy, targets and programs with the 2020 global strategy and the Aichi targets will be a strategic goal for the ministry of environment in the update process of the NBSAP (2015-2020).

A total of 25 national initiatives were identified to contribute to the partial achievement of 13 of the global Aichi Targets since the preparation of the forth national report in 2009. The following table summarizes the national initiatives implemented under the various 2020 targets:

Aichi Target 2020 No.	National initiatives
Target 1	1-The National Alliance for Environmental Nongovernment Organizations 2-The Bergesh Forests Campaign 3-The JREDS Eco-Schools Program
Target 2	4-Mainstreaming Biodiversity in the Tourism Sector Development 5-Climate Change and Biodiversity 6-Efforts of the Forestry Department/Ministry of Agriculture on the Sustainable Use of Biodiversity 7-The JREDS FEE Program in Aqaba, Wadi Rum and Petra
Target 4	8-The Sweimeh Eco-Park on the Dead Sea Coast
Target 5	9-The New Environment Protection Law (under development as of Sept. 2014)
Target 7	10-The National Forestry Department/ Ministry of Agriculture Program
Target 9	11-Controlling the Invasive Species at Azraq Wetland Reserve
Target 10	12-The Marine Biodiversity Conservation in Aqaba
Target 11	13-The New National Special Conservation Areas Network 14-The Royal Botanical Garden SCA 15-The Petra PA Program 16-Wadi Rum World Heritage Program
Target 12	17-The National Plants Red List by RBG
Target 13	18-NCARE National Conservation and Utilization of Plant Genetic Resources (PGR) 19-The Seed Centre at the Forestry Department 20-Ecosystem Conservation- local Honeybees & Biodiversity – A case study from NCARE
Target 18	21-Community-based Rangeland Rehabilitation: A Case Study from Tall Ar-Rumman 22-The Amman Declaration on Innovating Hima
Target 19	23-The RSCN Ajloun Nature Academy 24-Jordan Environmental Information System (JEIS) 25- The National Biodiversity Information Management System (BIMS)

The report gives a brief on the progress made on the achievements of biodiversity-related MDGs with particular focus on MDG7 on environmental sustainability.

Finally, the report presents a set of strategic recommendations geared towards the improvement of the national alignment approach with the global strategy. These are summarizes as follows:

- The enhancement of the role of the national coordination mechanisms, primarily the National Biodiversity Committee.
- Encourage and facilitate the inter-institutional collaboration in the various fields of biodiversity while allowing for more specialization.
- The finalization of the review of the NBSAP and more importantly the adoption of a clear national mechanism for its implementation and monitoring. This also includes the development of a clear financing strategy for the plan implementation from local and external sources.
- The adoption of a national capacity building program for the Ministry of Environment and its associated partners and stakeholders from the government, civil society, local communities and private sector.
- Enhance the participation and involvement of national stakeholders and particularly local communities in the design, implementation and evaluation of national biodiversity strategies and programs as the central and site base levels. This should include a clear policy on sharing the benefits of biodiversity across all relevant stakeholders and interest groups.
- The adoption of an agreed upon financing plan for the implementation of the delivery on the various global targets related to biodiversity conservation. This should include both national as well international sources of funding and technical cooperation.

Part I: Biodiversity Status, Trends and Threats

Section 1: The Importance of Biodiversity for Jordan

1:1 Jordan Country Profile[1]

Jordan in it relatively small size of 89,342 sq km territory, of which 88,802 sq km is land and 540 sq km is water including a 26 km long coastline. The climate of Jordan is mostly arid desert with a relatively short rainy season between November and April. The topography of the country is highly contrasting; from more than 400 meter below sea level at the Dead Sea to 1,854 m above sea level at the southern-most boundary with Saudi Arabia in Umm ad Dami Mountain. This variation of physical environment is strongly reflected in the diversity of live in the country in terms of cultural and natural heritage and in particular as related to biological diversity.

Demographically, Jordan is home to around 6.5 million people, and is considered a young population; more than 70% of the population is under 30 years of age, which suggests that an investment in youth can be an instrument for national development and sustainability. Those between the age of 15 and 24 comprise 22% of the population, 80% of which are urbanized with literacy ratio of almost 96%, one of the highest in the region and of good reputation of educational systems, including those related to environmental education and biodiversity centered learning and sensitization.

Jordan's economy is among the smallest in the Middle East, with insufficient supplies of water, oil, and other natural resources underlying the government's heavy reliance on foreign assistance. Other economic challenges for the government include chronic high rates of poverty, unemployment, inflation, and a large budget deficit.

Jordan is an upper middle-income country, with a per capita gross domestic product (GDP) of US$6,100 with agriculture contributing around 4%, industry 30% and services around 67%. The country has limited natural resources, potash and phosphate are its main export commodities, limited agricultural land, and water is severely scarce, as the country ranks as the world's fourth poorest country in terms of water resources. Services account for more than 70 percent of the gross domestic product (GDP) and more than 75 percent of jobs. As one of the most open economies of the region, Jordan is well integrated with its neighbors through trade, remittances, foreign direct investment (FDI), and tourism. The unemployment rate in Jordan is estimated to be of around 14% with an unofficial rate reaching 30%.

Main agricultural products include citrus, tomatoes, cucumbers, olives, strawberries, stone fruits; sheep, poultry, and dairy.

The industries on the other hand comprise clothing, fertilizers, potash, phosphate mining, pharmaceuticals, petroleum refining, cement, inorganic chemicals, light industries manufacturing, and very importantly tourism.

The country's natural resources are scarce with mainly phosphate, potash and shale oil. Around only 2% of Jordan is arable land including a total irrigated area of 800 sq km. The total renewable water resources is around .94 (MCM) (2011) with a per capita withdrawal

[1] Numbers included in sub-section 1.1 are all derived from the data adopted by the Jordan Department of Statistics (DOS)

rate of around 166 (MCM) /yr divided between domestic (31%), industrial (4%), and agriculture (65%).

Drought is the main natural hazard facing Jordan in addition to potential for periodic earthquakes. The main issues related to the environment in the country comprise the limited natural freshwater resources, deforestation, overgrazing soil erosion, desertification and pollution.

Despite the development of many relevant sectoral strategies and policies, Jordan however remains one of the poorest four countries in per capita water share throughout the world.

While noting the strenuous efforts exerted by the Government in managing the limited water resources and in the search for additional resources, the per capita share is still diminishing due to the natural and imposed population growth, which occurred over the past decades as a result of political and security conflicts and instabilities in neighboring countries, which exerted pressure and affected Jordan's efforts and development plans aimed at providing water that could meet the country's development needs. Accordingly, the per capita share of available water decreased from around 3,600 cubic meters per annum in 1946 to less than 150 cubic meters per annum in 2008. This is considered as being severely lower than the World Water Poverty Line of 1,000 cubic meters per annum.

1:2 Overview of Jordan's Biodiversity

Overall Diversity of Life

Jordan is a small country, with many development aspirations and challenges coupled with extremely limited natural resources, however with a remarkable biological diversity. The varied physical characteristics of the country have yielded an unusual case of riches in land forms and biological diversity in its ecosystems, habitats and species.

At the intersection of three continents, Jordan encapsulates four bio-geographic regions: the Mediterranean, Irano-Turanian, Saharo-Arabian and Sudanian penetration each with their respective ecosystems and flora and fauna. Thirteen vegetation types are identified in the country reflecting the various climatic and geographic variations.

The total number of wild species occurring in Jordan is approximated to 4,000 species from terrestrial and marine flora and fauna. Of Jordan's 2,622 recorded species of vascular plants, representing about 1% of world flora, 100 are endemic, including *Iris nigricans*, Jordan's floral emblem, *Plantagomaris-mortui*, *Crucianella transjordanica*, *Centaurea procurrens*, *Scrophularia nabataerum*, *Tamarix tetragyn*, and *T. palaestina*.

There are a total of 644 animal species of which, 83 are mammal species, including the globally threatened *Capra nubiana*, *Gazella dorcus*, *Gazella subgutturosa*, *Gazella gazelle* and *Oryx leucoryx*. Avifauna composition is especially rich in Jordan because of its geographical location associated with the Great Rift Valley and lying on a major migratory birds route. Key bird species include *Geronticus eremita*, *Chlamydotis macqueenii*, *Nephron percnopterus*, *Serinus syriacus* and *Vanellus gregarius*.

The Gulf of Aqaba hosts more than 348 species of fish, 151 species of hard corals and 120 species of soft corals, in addition to a variety of invertebrate's species including snails, crabs and sea worms. A total of three threatened species of sea turtles were recorded in the Gulf of Aqaba. The rate of endemism is considered high among the Red Sea fishes and represents 13.7% of the total fish species recorded with seven species of fishes recognized as endemic to the Gulf of Aqaba. More than 20% of mollusks and echinodermata as well as several species of algae occurring in the Gulf may be endemic.

Freshwater diversity is also high with 15 of species recoded including the endemic *Aphanius sirhani*. Further, Jordan hosts 110 species of herpeto-fauna including three species of amphibians, 107 species of reptiles where the later constitutes of 37 snakes, one tortoise, one terrapin and 68 species of lizards; including the flagship species of the *Uromastyx aegyptia* and *Varanus griseus*.

Bio-geographical Regions

There are three main topographic features in Jordan including: the Rift Jordan valley, the mountain ranges that extends from north to south, and the desert plateau. Based on the biophysical characteristics prevailing in the country, Jordan is subdivided into four bio-geographic regions: Mediterranean, Irano-Turanian, Saharo-Arabian and Subtropical

(Sudanian). These topographic variations resulted in rich variation in flora and fauna diversifications. The southernmost part of Jordan harbors the Gulf of Aqaba with its spectacular coral reefs and their associated marine diversity.

The two opposing climatic regimes of the Mediterranean located in the western part of the country and the Desert in the eastern part surround the steppe region (Irano-Turanian) which represents a transition area between these two bio-geographical regions. A dynamic eco-tone is always present between any two bio-geographic regions.

In certain locations, three bio-geographic regions meet as in Ras Al-Naqab, causing an immense pressure on the occurrence of biological species leading to the production of endemic species resulted from acclimatization and adaptation.

Technically speaking, the classification of Jordan's biodiversity is primarily based on the diversity of the bio-geographical regions represented in the country. These are: the Saharo-Arabian and Sudanian climate, the Irano-Turanian climate, and the Mediterranean climate regions. Within each of the three climate zones, the diversity of ecosystems comes second resulting in high number of ecosystems across the regions, each with its distinctive assemblages of vegetation types, fauna and flora and other associated natural values.

The following includes a brief description of the four bio-geographical regions in Jordan:

Mediterranean: This region is restricted to the highlands extending from Irbid in the north to Ras En-Naqab in the south in addition to some isolated representation in the mountains of Wadi Rum. The altitude ranges from 700-1850 m above sea level. The rainfall ranges from 300-600 mm. The minimum annual temperature ranges from 5-10º C and mean annual maxima range from 20-30º C. Soil is dominated by the red Mediterranean soil (terra rosa) and the yellow Mediterranean soil (rendzina). This region comprises the most fertile part of the Kingdom and contains 90 percent of the population.

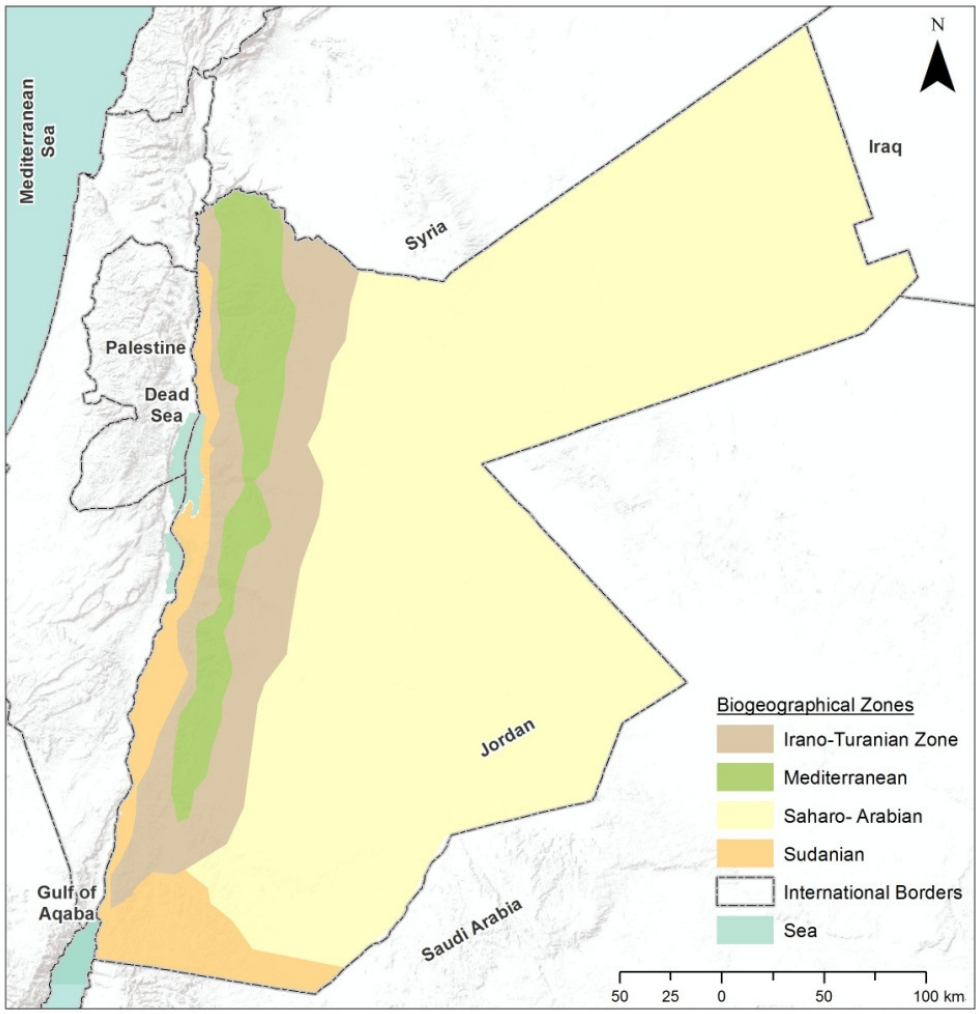
Irano-Turanian: A narrow strip of variable width that surrounds all the Mediterranean ecozone except in the north. It is characterized by being treeless. The vegetation is mainly small shrubs and bushes such as *Artemisia herba-alba*, and *Anabasis syriaca*. Altitudes range from 500-700 m, and rainfall ranges from 150-300 mm. Mean annual minimum temperatures range from 5-2º C, and mean annual maxima range from 15-25º C. Soils are mostly calcareous or transported by wind. The vegetation is dominated by chamaeophytes.

Saharo-Arabian: This is the eastern desert or Badia and comprises the largest part of Jordan encompassing almost 80% of its total area. It is flat except for a few hills or small mountains, the result of volcanic eruptions. Altitude ranges between 500-700 m. The mean annual rainfall ranges from 50-200 mm, mean annual minimum temperatures range from 15-2º C and mean annual maxima range from 25-40º C. Soil is mostly poor, either clay, hamada, saline, sandy or calcareous. Vegetation is dominated by small shrubs and small annuals in the wadi beds.

Sudanian: It starts from the northern part of the Dead Sea and ends at the tip of the Gulf of Aqaba in the south along the Dead Sea depression and Wadi Araba. The most important characteristic of this region is the altitude, considered the lowest point on earth (410 m below sea level near the Dead Sea). Rainfall ranges from 50-100 mm, the mean annual minimum temperature ranges from 10-29º C, and mean annual maximum temperatures

range from the minimal 20 to 35º C. Soils are mostly alluvial, saline, sandy and granitic. The only inland sand dunes are in this region.

The vegetation is characterized by a tropical tree element such as *Acacia spp.* and *Ziziphus spina-christi* in addition to some shrubs and annual herbs. The following map demonstrates the four bio-geographic regions of Jordan:



(Source: RSCN, 2014)

The below table summarizes the Jordan bio-geographic regions associated with their representative ecosystems and vegetation types:

Bio-geographic regions	Representative ecosystems
Mediterranean	Pine forest: *Pinus halepensis* (380)*
	Evergreen oak forest: *Quercus caliprinos* (600)
	Deciduous oak forest: *Quercus aegilops* (400)
	Juniper forest *Juniperus phoenicea* (600)
	Degraded non-forest (500)
	Hydric (120): *Arundo donax*
Irano-Turanian	Steppe: *Retama reatum* (400)
	Hydric: *Phgramites australis* (80)
Saharo-Arabian	Gravel Hamada: *Anabasis articulata* (200)
	Runoff Hamada: *Retama reatum, Artimesia herba-alba, Achillea fragrrantissima* (200)
	Pebbles Hamada (Basalt) (400): *Diplotaxis harrah, Jenandris iris, Achillea fragrantissima, Aronsonia factoroviski*
	Playa (Bjaha): *Halochnemum strobilaceum, Sueda fruticosa, Haplo phylum amplixicausle*
	Salines or Oasis: *Nitraia retusa, Tamarix passarinoides* (30)
	Hydric fresh: *Phragmitis australis, Typha anguistifolia, Juncus actuaus* (70)
	Hydric saline: *Limoium purinosum*
Tropical (Sudanian penetration)	Sandy dunes: *Haloxylon persica, Panicum turgidem* (200)
	Saline: *Nitraria retusa, Juncus maritimus* (30)
	Rocky: *Acacia tortillis* (100)
	Hydric: *Tamarix jordanica, Mauringa peregrine, Capparis deciduea, Salvadora persicum* ((70)

*numbers indicate elevation. (source: Eisawi et al, 2014)

Vegetation Types

As mentioned earlier, the classification of Jordan biodiversity is based on its eco-regions, ecosystems and vegetation types. The vegetation map of Jordan developed by Al-Eisawi in 1985 and 1996 represent the prime scientific reference to the classification of floral biodiversity. It was also the biological foundation mainly used in the development of the national protected areas network in its revised version of 2009. The original number of 12 vegetation types was updated to become 13 in light of a strategic review undertaken by RSCN in cooperation with Ministry of Environment (MoEnv), academia and other international partners.

Since its development, little was changed to the country map of the vegetation types. The following includes a recap on the main vegetation types adopted for Jordan along with the changes made to them during the last five years.

The below table summarize the key characteristics of the vegetation types along with its size, attributes, a percentage of coverage in established protected areas and their main challenges:

No.	Name of vegetation	Size (sq km)	Key attributes	% Coverage

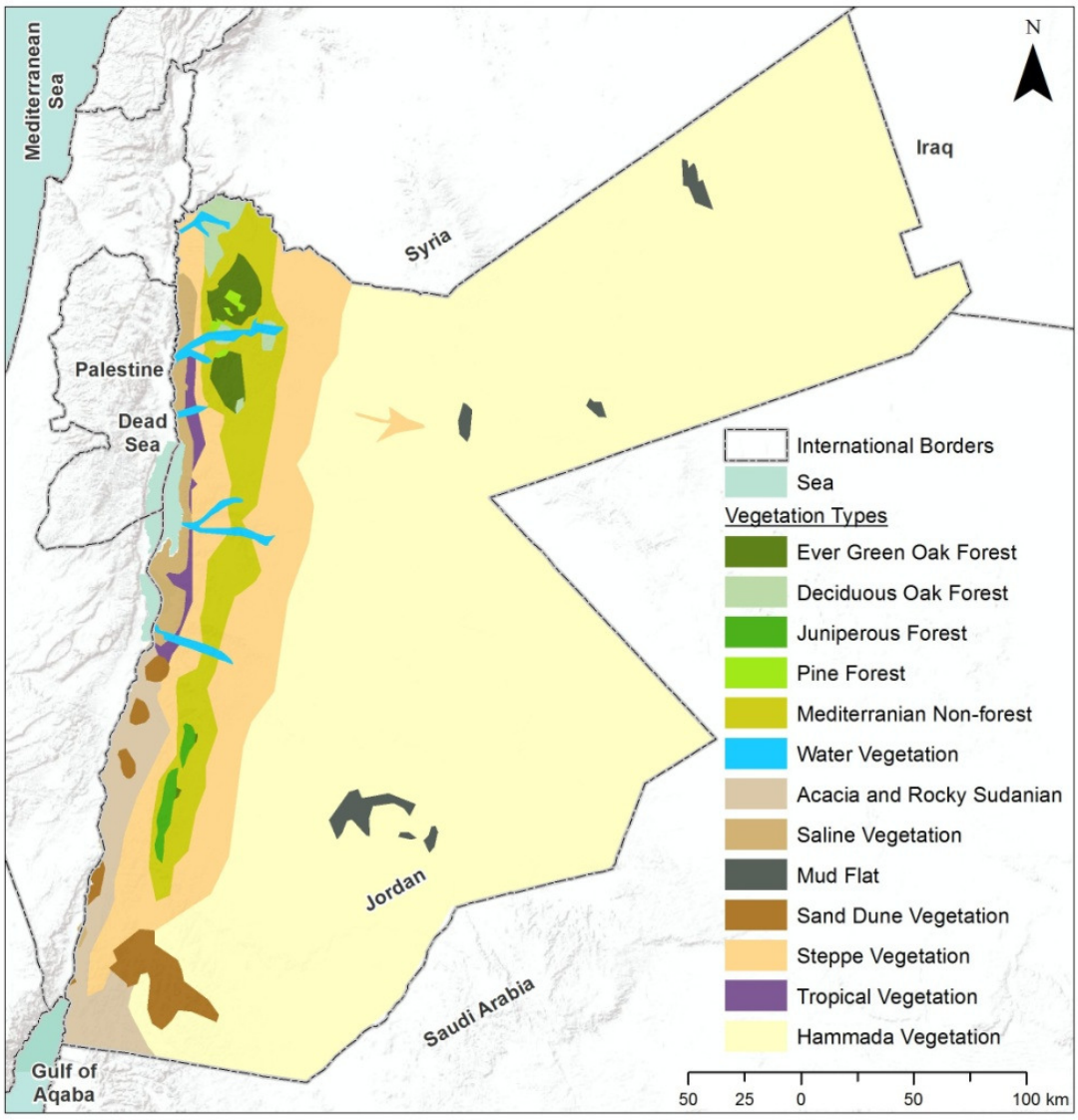
	type			in Est. PAs[2]
1	Pine forest	89	Typical Mediterranean vegetation forms the best forests in Jordan and reaches a climax in some places, with the dominant trees of Aleppo pine (*Pinus halepensis*) up to 15 meters. This forest vegetation usually occurs naturally on high altitudes, mostly over than 700m and where Rendzina and calcareous soils are present. In some places the pine trees are replaced by *Quercus coccfera* as a result of the degradation of the primary vegetation, forming a secondary succession.	9.6
2	Evergreen oak forest	747	This type of vegetation grows at high altitudes of more than 700m., and on red soil (Terra Rossa) of hard limestone parental rock, unless it is a secondary vegetation replacing Aleppo pine forest on calcareous or yellow (Rendzina) soil of soft limestone parental rock. The vegetation composition of this type of forest varies throughout the leading species including the evergreen oak *Quercus coccfera* which is the most important element	0.92
3	Deciduous oak forest	433	The deciduous oak forests in Jordan occur at a lower altitude than all other forest and mostly grow on red or brown soil of hard limestone parental rock.	4.62
4	Juniper forest	272	This occurs only in the Southern mountains of Jordan usually at high altitudes, over1,000m., and so sandy rocks. The Juniper forest formation is dominated by the leading species of *Juniperus phoenicia* associated with *Cupressus sempervirens* on the sand stone formation The Cypressus trees *Cupressus sempervirens* are very rare as wild plants and only occur in that particular locality.	0.78
5	Med. non forest	4,595	The Mediterranean region which is not covered by forests contains some shrubs and bushes. Such region is often referred to as Garigue and Batha Mediterranean vegetation the leading species of this vegetation are *Rhamnus palaestinus, Calycotome viliosa, Sarcopoterium spinosum* and *Cistus spp*. in the North, and *Artemisia herba-aiba* will be associated with others in the South.	2.14
6	Steppe	9,641	This vegetation is confined to the Irano-Turanian region and may intrude either into the Mediterranean or the Saharo-Arabian region. The composition of the vegetation varies according to the soil and other climatic differences depending on its location with respect to the Mediterranean region. For example the steppe vegetation in the Northern Ghor which links with the Northern mountains is dominated by *Retama raetam, Ziziphus lotus, Z. nummularia* and *Ferula communis* with almost no *Artemisia herba-alba*, while the steppe vegetation in the North, East and South Mediterranean borders shows other elements like *Pistacia atlantica*, *Anabasis syriaca* and *Artemisia herba-alba* which are not found in the Western steppes	2.49
7	Halophytic	1,150	This occurs in the desert (Saharo-Arabian) region	3.25

[2] The percentage number represents the amount covered from the total area of a particular vegetation type in established protected areas.

			around Azraq Oasis, in the Rift Valley around the Dead Sea, in Wadi Araba, and around the shoulders of the River Jordan on what is known locally as Katarat. The leading species vary, depending on their ability to tolerate the degree of salinity For *example Nitraria retusa* is a saline tolerant species but it does not grow if the salinity exceeds certain limits and will be replaced by other species such as *Arthrocnemum fruticosum*, *Suaeda spp. Juncus sp.* and *Tamarix spp*	
8	Sand dunes	1,266	Such vegetation is only found in the Sudanian region especially in Wadi Araba and Wadi Rum The vegetation is made up of shrubs or bushes, mainly of sand dune fixatives. In some places the vegetation has reached its climax especially in the area near to Gharandal along the road to Aqaba where the plants reach a height of three meters. The leading species is the *Haloxylon persicum*	35.54
9	Hamada	66,611	Most of the Saharo-Arabian region in Jordan is of hamada type, which comprises about 50 per cent of the total area. Three subdivisions of hamada can be recognized: 1. Run-off hamada 2.Gravel hamada 3. Pebble hamada	0.43
10	Tropical	424.16	It occurs in the Sudanian region which extends from Dair 'Alla in the North down to Aqaba Gulf in the South but it is concentrated more in the regions close to the Dead Sea, lower Jordan Valley, as in Southern Ghor, Ghor Safi and Ghor Faifa. The vegetation is confined to the alluvial soils of the Rift Valley most of which have been destroyed and used for vegetable agriculture.	12.37
11	Acacia and rocky vegetation	2621.44	This vegetation is confined to the granite mountains bases and to the rocky parts of Wadi Araba, Wadi Al-Yutum and Wadi Rum in the Sudanian Region. It is characterized by the presence of scattered Acacia trees which get to be more denser at the hard rocks of the mountains bases and they formed a pure stands of Acacia twoodlands	6.94
12	Hydrophytic	674.23	This vegetation is confined to the granite mountain bases and to the rocky part of Wadi Araba, Aqaba, Wadi Al-yutm, and Wadi Rum in the Sudanian region. Acacia trees are scattered through Wadi Araba but they get denser toward the hard rocks of the mountain bases until they form a pure stand of Acacia woodland especially 20-40 km.	5.34
13	Mud flats	642.1	This occurs around the streams and river banks and around the water pools in Azraq. The vegetation does not occur much in Jordan but still it is clear around Jordan river; Yarmuk river; Zarka river; Wadi Shuaib, Wadi Mujeb; Wadi AL-Hasa and in Azraq Oasis.	1.4

(Source: RSCN, 2013)

The below map demonstrates the different vegetation types of Jordan:



(Source: RSCN, 2014)

Important Bird Areas

The Birdlife IBAs program aims to guide the implementation of national conservation strategies, through the promotion and development of national protected-area programs. It is also intended to assist the conservation activities of international organizations and to promote the implementation of global agreements and regional measures.

In Jordan, the Birdlife partner is RSCN since 1995. Through their long terms cooperation, a regional assessment of IBAs including Jordan was undertaken and published in 1994, and as a result, 27 IBAs were identified with their associated number of bird species. The below tables summarize the key attributes of Jordan IBAs:

Total number of birds	329
Globally threatened birds	10
Landbirds	226
Seabirds	24
Migratory	270
Waterbirds	100
Number of IBAs	27
Number of EBAs	1 Levantine mountains

(Source: Birdlife/RSCN, 2014)

Red List Species

The IUCN species conservation program and commission have been assessing the conservation status of species, subspecies, varieties, and even selected subpopulations on a global scale for the past 50 years in order to highlight taxa threatened with extinction, and in response promote their conservation at all levels. Jordan started early on taking part of such assessment. These were initially related to bird and animal species. During the last five years or so, national efforts on Red Lists were extended to cover plants as well. One important development in regard to this national program is related to the specialization of organizations in addressing the different national red lists and their integration into the global red lists of IUCN.

The Royal Botanic Garden (RBG) has taken the lead in the classification of Jordanian plant species and assessing more than 1,000 plant species so far. The Red List of the Jordanian Flora aims at supporting the creation of conservation strategies which, in turn, will help protecting Jordan's plant diversity and will serve as a reference for future studies and monitoring programs. It will be updated whenever new information is available.

The Jordanian National Plant Red List assessment has five main objectives:

- To contribute to national conservation planning through provision of a baseline dataset reporting the status of Jordanian vascular plants.
- To identify those geographic areas and habitats needing to be conserved to prevent extinctions and to ensure that Jordanian vascular plants reach and maintain a favorable conservation status.
- To identify the major threats to plant diversity in Jordan and to propose mitigating measures and conservation actions to address them.
- To strengthen the network of national plant experts focused on conservation of vascular plants in Jordan (and the region) and ensure they have a role in regional and international initiatives, so that the assessment information can be kept current, and expertise can be targeted to address the highest conservation priorities.
- To strengthen the relationship between national and international plant experts focused on conservation of vascular plants in Jordan and ensure activities are fully integrated.

Further, the assessment seeks to achieve three main outputs:

- A summary report on the status and distribution of Jordanian vascular plants, their main threats and recommendations for their conservation measures.

- A *gratis* database holding the baseline data for monitoring the status and distribution of Jordanian vascular plants.
- A website and data portal showcasing these data in the form of species factsheets for all Jordanian plants that were assessed, along with background and other interpretative material.

Volume one of the Jordan Plant Red Data Book has been prepared. Volume two, which will include the assessment of all species, is being initiated along with a strategy to continuously monitor and update data.

A comprehensive bird red list is continuously updated by RSCN through its partnership with Birdlife and other national institutions, and a new marine biodiversity red list is being developed for the Gulf of Aqaba under a partnership between ASEZA and JREDS.

The following table includes an extract from the IUCN World Data Base for Red List Species presenting numbers under the various taxa for Jordan and as compared to some countries from the region. The table below shows how Jordan compares strongly with many countries of the region in spite of its small size. This is a reflection of the geography and topography variations in addition to the quality and quantity of scientific research under taken over a long period of time.

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Mollusks	Other invert.	Plants	Total
Jordan	13	8	6	0	12	5	55	1	100
Iraq	14	14	3	1	17	1	16	1	67
Lebanon	10	8	7	0	20	8	6	2	61
Oman	10	8	8	0	25	2	29	6	88
Palestine	3	8	4	1	0	2	2	0	20
Saudi Arabia	10	13	3	0	24	1	58	3	112
Yemen	9	12	6	1	24	2	66	162	282

(Source: IUCN Red-list database 2014)

Wetlands

The Convention on Wetlands which was convened in 1971 in Ramsar, Iran–known as the "Ramsar Convention" is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories.

The Convention on Wetlands came into force for Jordan on 10 May 1977. Jordan presently has one site designated as a Wetland of International Importance, with a surface area of 7,372 hectares. Jordan Ramsar site is the Azraq Oasis and Qa'a, inscribed on the list in July 1990. Azraq is formerly a permanent, spring-fed wetland and extensive (6,127ha) seasonally-flooded mudflat of a large drainage basin. Under natural conditions, the lush oasis supported reed and sedge communities restricted to Azraq Oasis. It is a valuable staging area for migrating birds and serves as an important water supply for local communities, as well as one of the main water sources for the capital city, Amman. Azraq

suffers from unsustainable groundwater extraction which led to the almost complete desiccation of the site.

This site has been almost totally destroyed except from very limited part which is manually fed by water to maintain this ecosystem. This destruction was resulted from severe water abstraction that exceeds many fold of its annual recharge. Accordingly, within the last twenty years, at least 50% of the plant biodiversity recorded in 1995 survey has been lost. Among these lost species are very rare and endemic species that do not occur anywhere else in Jordan. A rehabilitation program has been implemented for Azraq since mid-1990s including the establishment of the Azraq Wetland Reserve (around 10% of the Ramsar site) by RSCN in cooperation with the MoEnv, MoWI and international donor agencies such as GEF, World Bank and GIZ.

Forests

Jordan has limited forest resources with less than 1.5% of the country being classified as forests. Of this forest land, only 26% have forest cover with a canopy density of 10% or more and the rest is mostly composed of land sparsely covered with vegetation.

The forests in Jordan, especially natural forests, are fragmented, open in density, slow growing, of degraded conditions and, thus, of low commercial value. Commercial forests are only expected in areas receiving more than 400 mm of precipitation annually. Such lands constitute only 9% of the total forestlands. Afforestation activities can be implemented in areas receiving more than 250 mm/year which constitute 8.3% of the total forestland.

The forest vegetation in Jordan can be divided into the following categories:

- Natural forests that are composed of evergreen shrubs, pine and juniper forest as well as broadleaf forests. Artificial or man-made forests, areas are afforested artificially by the Forestry Department since the 1950s.

- The afforested areas are found in all registered forest land in Jordan. They are planted mostly with *Pinus halepensis* and *Acacia saligna*. The survival rate varies from 0 to 75 %.

- Bare forest lands, areas registered as forest land in the name of the government treasury but being presently bare of forest cover. They are characterized by rough topography, poor site conditions, soil erosion hazards, over grazing or over harvesting.

- Unsettled forest areas, areas covered completely or partially by forest trees, but still un-surveyed or unregistered. The total area of unregistered forest area is estimated at 12,200 ha. These areas are in principle governmental land at the disposition of the forestry administration.

- Roadside plantations cover about 2,500 km of roadsides. Trees planted along the roads belong to the government and are managed by the Forestry Department.

All these are government forests either registered in the name of the Jordan Government Treasury as forestland or declared as forestland according to the 1973 Agricultural Law no. 20 and to the 1974 Government property owned management Law no. 17.

Private forests are registered in the name of their private owners and are found mostly in the northern part of Jordan where higher rainfall is prevailing. They include natural forest vegetation and tree plantations on farms, in the form of windbreaks and shelter-belts. Private forests account for less than 4 % of the total declared forestland.

1:3 Socioeconomic and Cultural Values of Biodiversity

It is well accepted that biodiversity is crucial for biotechnology, pharmaceutical industries, food security including fisheries, nevertheless, there is very little established and scientifically confirmed argument for the case of biodiversity in Jordan.

Forests for example, and because if their limited commercial value in Jordan, are mostly valued for their contribution to soil conservation, watershed management, aesthetic purposes, biodiversity conservation and limited supply of firewood and animal feed The ecological and social functions of forest are thus of great importance in Jordan and take precedence over wood production and other products. Forest environment provides a habitat for a great diversity of plant and animal species and represents the largest single store of biodiversity. Jordan does not possess a forest industry as such with the exception of a limited secondary industry producing furniture and fruit boxes. Most of Jordan's requirements in forest products are imported.

On another front, tourism is of vital importance to the national economy of Jordan. It is the Kingdom's largest export sector, its second largest private sector employer, and it's second highest producer of foreign exchange. Tourism contributes more than $800 million to Jordan's economy and accounts for approximately 10% of the country's GDP. Today, Jordan is developing parallel the global tourism industry trend by having the highest growth rate in ecotourism, nature based and responsible tourism subsector with an estimated rate of 10% per annum. In addition to the country's political stability, the geography offered makes Jordan an attractive tourism destination.

Jordan's major tourist activities include ancient places including Petra, its unique desert castles and well preserved natural locations to its cultural and religious sites. Protected Areas have become a substantial proportion of today's tourism totally more than half a million visitors. Nature based revenues pay for more than one third of the running costs of the protected areas network. The latter two numbers reflect a tremendous positive impact of responsible tourism on the socioeconomic development of local communities and the general public.

Furthermore, medicinal plants are an important element of traditional systems in Jordan. These resources are usually regarded as part of a culture's traditional knowledge. Many research studies collected information from local populations concerning the use of medicinal plants of the various regions of the country; identify the most important medicinal plants used; and determine the relative importance of the species surveyed for local livelihoods and economies. To give a demonstration of such importance, NCARE has documented more than 100 edible-wild plants which are utilized by local communities as food, salad, spices and traditional medicine such as *Arum spp.*, *Eruca sativa, Cichorium pumilum, Gundelia tournefortii, Asparagus spp., Cyclamen persicum, Artemisia spp.*, and *Thymus spp.*. Jordanian scientists focus on the importance of these germplasm and have published numerous publications on this field.

Another example could be given on the assessment of cultural values of protected areas. A good case comes from Azraq area which is a destination for people settlement since early 1900s, where Chichans and Druze arrived to Azraq after being migrated from their country of origin. Chicahns and Druze, in addition to the few mobile nomadic, created a mosaic society of different cultural backgrounds. Their neighborhood to the wetland has shaped

their livelihood, where Chichan depending on their livestock brought originally from Quqasia, while Druze start utilizing the natural resources represented by salt production, hunting, and fishing. Original nomadic continue their regular livelihood patterns.

The conservation of wetland's values was strongly facilitated because it culturally linked to the local community's values. Conserving a representative sample of what was the wetland raise the appreciation by local communities for conservation efforts, even they are sharing the wetland with their domestic water, and their accesses to the remains of natural resources becomes limited. This appreciation was developed because the "less than 10 %" of the restored wetlands, is demonstrating the cultural values of this wetland with all of its biodiversity and natural resources contents.

The assessment of the socioeconomic values of biodiversity remains a big knowledge gap in the Jordan context. It require much more systemic attention as it could serve as a very important tool advising policy and decision making in regard to the adoption of up to date methodologies and tools for the natural resources management strategy to become better based on the integrated ecosystems approaches, principles and best practices.

Section 2: Changes to Biodiversity since the Forth National Report

2:1 Terrestrial Flora

The flora of Jordan constitutes a very important component of Jordan's biological diversity. Conservation of such a national resource to ensure sustainability and development is listed high on the priorities of Jordan to conserve such a valuable resource.

Flowering Plants: As mentioned earlier in the report, Jordan plant diversity is remarkably high considering its size and aridity. The total number of recorded vascular plant species in Jordan is now over 2,622 species belonging to 113 families and around 810 genera. At least 100 species of endemic plants is now confirmed for Jordan comprising about 2.5% of the total species recorded, including species of the genus Crocus, Colchicum, Iris and Verbascum, while 375 are rare or very rare, including species of the genus Orchis, Romulea, Biarum and Globularia, forming about 14% of the total flora of Jordan. More than 70 species are considered extinct.

Gymnosperms: Although, the total number of gymnosperms does not exceed three species, they confirm some of the most important forest ecosystems in Jordan, especially the Aleppo pine forest (*Pinus halepensis*) in Northern Jordan and the Phoenician Juniper (*Juniperus phoenica*) in the South. The Juniper and *Cupressus* species are considered threatened species due to the human impact on their natural habitat.

Pteridophyta: The total number of ferns in Jordan is estimated to range from 5-10 species. The status and distribution of these species is not well known.

Bryophytes: Few studies were made on the bryophytes of Jordan. About 150 species have been recorded so far. Information related to their distribution is not well known.

Lichens: An estimated number of about 150 species of lichen have been recorded. Complete and extensive surveys and specific studies have not been carried out so far.

2:2 Terrestrial Fauna

According to the IUCN Red List (2014), Jordan has 103 globally threatened species of fauna. The proportion of threatened species to the total number of species is very high, especially for mammals, where 13 out of 83 mammals 15.6 % are considered globally threatened. Jordan's location by the Great Rift Valley makes the country one of the most important flyways and resting points for migratory birds in the spring and autumn. Hundreds of thousands of birds cross the area yearly, some of which are globally.

In addition to mammals, a total of 106 species of reptiles occurred in Jordan where 6 of them are threatened. The high number of birds 436 is expected because of the Jordan's location along the migratory route between Eurasia and Africa. The invertebrate fauna of Jordan is unique in many aspects since its composition is a mixture of several faunal origins, but due to lack of comprehensive research, the exact number of invertebrate species is unknown.

Several assessments published tackled Jordan's fauna on the national, regional and international level. Mammals were assessed in the Mediterranean region including species from Jordan where a single species was listed as a critically endangered; *Gazella subgutturosa*. In addition, two species are endangered and eight are vulnerable. Moreover, several assessments from the Arabian Peninsula were published including snakes, birds, reptiles, and carnivores. Below is the table of major groups with examples of the species:

No	Category	Total species	No of red list species	Key species
1	Mammals	83	8	*Capra Nubiana, G. subgutturosa, Gazella gazella, Oryx leucoryx, Myotis capaccinii,*
2	Reptiles	107	6	*Varanus griseus, Uromastux aegyptia, Testudo graeca, Chalcides guentheri, Telescopus hoogstraali*
3	Amphibians	3	0	*Hyla savignyi*
4	Birds	436	8	*Acuila heliaca, Geroticus eremita, Neophron percnopterus, Serinus syriacus, Torgos tracheliotos*
5	Freshwater fish	15	3	*Aphanius sirhani* *Garra ghorensis* *Aphanius richardsoni*

(Source: IUCN red list, 2014)

2:3 Marine and Freshwater Biodiversity

The Jordanian coastline covers about 27 km at the northern tip of the Gulf of Aqaba, which extends for about 180 km from the Jordanian shore in the north to the Strait of Tiran in the south. It has an average width of 20 km and an average depth of 800 m. The Gulf of Aqaba consists of a series of embayments, each including comparatively similar communities including: rocky shore, reef flat, reef face, fore reef, sandy shore, sandy bottom and seagrass ecosystems. There is a discontinuous series of coral reefs and reef flats, never more than 150m wide, over a length of 13km.

The Gulf of Aqaba's global importance stems from its geographical location, as it is the only inland connection between Africa and Eurasia. The marine environment maintains more than 510 marine fish species, 5% of which are endemic. It is estimated that there are 25 endemic species of fish occurring only in the Red Sea, and these are profoundly found in reefs of the Gulf of Aqaba. Included here is the Indo-Pacific Humphead Wrasse (*Cheilinus undulates*) which is listed by IUCN as endangered, and three species of the Marine Turtle (*Chelonia mydas*, *Caretta caretta*, and *Eretmochelys imbricate*) which are globally endangered. There are also species of high economic value, including tuna and sardine.

Coral and Reef Fish: The Gulf of Aqaba sustains about 270 species of coral. In terms of relative abundance on Jordanian reefs, the five most abundant fish species are: *Pseudanthias squamipinnis*, *Chromis viridis*, *Dascyllus aruanus*, *Paracheilinus octotaenia*, and *Dascyllus marginatus*.

Seagrass: Seagrass meadows form the bulk of the biomass upon which other organisms in the benthic community depend, and are globally accepted as a good indicator of water quality. At least 3 species of seagrass occur here: including *Halodu leuninervis*, *Halophila ovalis*, and *Halophilas tipulacea*.

Bacteria and Phytoplankton: Bacterial and pico-phytoplankton biodiversity surveys in the Gulf of Aqaba are very rare, due to the lack of infrastructure and human capacity. However, in 2014, Aqaba witnessed the commissioning of the first marine microbiology and molecular biology laboratory at the University of Jordan Aqaba Branch, Laboratory for Molecular Marine Ecology (LaMME). The first set of DNA barcoding for marine life in the Gulf of Aqaba will be presented during the Aqaba International Conference on Marine Sciences and Environment in 2014.

Zooplankton: A total of 82 species of different mesozooplankton groups and larval stages of various other organisms have been identified. Copepods are, by far, the most abundant and ubiquitous mesozooplankton organisms. The seasonal and spatial distribution of mesozooplankton in the Gulf of Aqaba has implications for fishing, ecosystem health, as a baseline to gauge impacts for future developments along the Jordanian coast, and to predict the most polluted site within the coastal stations.

Freshwater diversity: The freshwater fish fauna of Jordan is very characteristic. It was formed from five different faunal origins; the Palaearctic, Indoasiatic, Afrotropical, Tethys relict and Mediterranean. This uniqueness attracted ichthyologists and biologists already in the 18th and 19th century to survey the area of Jordan basin and Yarmouk basin. A total of 15 species of fresh water fish belonging to six families and represented in 12 genera have

been recorded in Jordan. All of these species are primarily fresh water fish except the cyprinodontid and cichlid fishes that are considered as secondary fresh water fish.

There are three endemic freshwater fishes in Jordan, one of which *Aphanius sirhani* is only found in Azraq and nor where else, while the other two *Garra ghorensis* and *Aphanius richardsoni* are found in the Dead Sea basin. The first two species *A. sirhani* and *G. ghorensis* are identified as critically endangered at the global level, which promote their conservation. A detailed study was carried on both species about their life history traits were of great help to build those species conservation plan in Azraq and Dead Sea basin respectively.

2:4 Genetic Biodiversity

The national efforts on genetic resources in Jordan are focused on plant resources as they form the priority for national food security and human wellbeing. This focus is also accompanied with the presence of a specialized national center in the field, namely, the National Centre for Agricultural Research and Extension (NCARE). Many of the plant species in Jordan are adapted to desert areas. Therefore, these types of species are of extreme importance as a primary vegetation element due to their use as food for humans and animals; and for other uses including: medicinal, soil fixing, nitrogen fixing, as parents of cultivated species; and as disease, drought and saline resistant plants. Plant genetic resources of Jordan are a national and international heritage; these resources should be conserved and utilized for the benefit of humanity. Individual efforts have led to the collection, conservation, evaluation and utilization of a sizable part of these resources.

Jordan harbors a vast diversity of land races, old cultivars, wild species and wild relatives of wheat and barley. For example, there is the cultivated durum (*Triticum durum*), the cultivated bread wheat (*Triticum aestivum*), the old wheat (*T. monoccocum*), the wild einkorn (*T. beoticum*, poulard wheat), the (*T. turgidum* wild relatives (*T. dicoccoides, T. Urartu* and *Agliops spp*.), the cultivated two and six-row barley and the landraces old and improved cultivars (*Hordeum vulgare*), and wild barley (*Hordeum spontaneum* and other species).

Comprehensive evaluations have been carried out on the *Triticum spp*. in Jordan. *Triticum dicoccoides* is confirmed resistance to drought and diseases of Septoria blotch, common bunt, yellow rust, stem rust and barley yellow dwarf virus. Protein content of *T. dicoccoides* was found to be higher than the cultivated wheat varieties ranging from 13%-27%. Further, accessions of *T. dicoecum* represent important genetic characters such as earliness, short stem, high number of fertile tillers, long spikes, kernel weight per spike, protein content and drought tolerance.

Wild relatives of fruit trees are found in Jordan in the highlands from the north to the south and in the west. These include *Ceratonia siliqua, Ziziphus lotus, Ziziphus spina-christi, Caratagus aronia, Prunus mahaleb, Pistacia spp., Ficus palmata* and *Olea europaea*. Ten accessions of *Prunus* have been collected since the early 1990s. These species and genera have adapted to harsh conditions including extremes in temperatures coupled with extended drought and low soil fertility. They are excellent resources for future research after identification of rootstocks like dwarfism, drought and calcareous soil tolerance. Medicinal plants are widely distributed in Jordan and are massively used by local people in folk medicine as hot or cold drinks, and as chewed fresh or dry raw materials.

Many plants are under collection pressure to be used for domestic use and grazing, or for housing and industrial projects (such as projects that package and market wild and medicinal plants). Species collected include: *Artemisia, Achilla*, *Salvia, Paronychia*, *Ecballium*, *Ephedra*, *Ajuga*, *Marrubium*, *Origanum*, *Alcea*, *Thymus, Sarcopoterium, Hyoscyamus*, and many others. Many of these plants are endemic such as: *Iris nigricans, Cousinia dayia, Plantago maris-mortui, Crucianella transjordanica, Scrophularia nababeorum, Silene hussonii* and *Tamarix arvensis*. Collection often occurs in areas know for beauty and richness of flora, and is causing serious threats to natural habitats.

Finally, Jordan herbaria include those at Jordan and Yarmouk Universities (which are the largest with 60,000 and 20,000 specimens respectively), and the Royal Botanical Garden has launched a virtual herbarium The National Virtual Herbarium (NVH) was launched on January 12, 2012, to allow online consultation of specimens from all of Jordan's herbaria. Specimens are now available onscreen at the NVH, and specimens will continue to be added until the entire flora of Jordan is represented. The mission of the National Herbarium at the Royal Botanic Garden is to provide institutions, scientists, students and other interested parties with a collection of high-quality herbarium specimens for all the flora of Jordan. The National Herbarium of Jordan will preserve important native specimens and relevant material, and make the specimens available throughout the country.

2:5 the National Protected Areas Network

In 1979, Jordan – in cooperation with IUCN and WWF – undertook the first national assessment for its biodiversity hotspots to be proposed as a national system plan for protected areas. The later on known as the Clark Report, in commemoration of the lead author of the report Dr. John Clark. The report represented the national framework for the *in situ* conservation of biological diversity. Twelve sites were proposed in the report which was reviewed by the Royal Society for the Conservation of Nature (RSCN) in cooperation with the Ministry of Environment in 2008-2009 to include 16 sites. Today, the number of protected areas established is 10 with a total surface area of 1,443.5 sq km.

RSCN is responsible for managing nature reserves in Jordan under a mandate from the Government of Jordan. Since 1966, the RSCN has been working towards establishing a network of protected areas. The following is the update on the newly established protected areas since the forth CBD report in 2009:

Yarmouk Forest Reserve

Yarmouk was first proposed in 1998 by RSCN's review of the protected area network, since it represents the last stronghold of the deciduous oak *Quercus aegilops*, the national tree of Jordan. The reserve was established in 2010 over an area of 20.5 sq km, covering a series of hills overlooking Yarmouk River. Of the roughly 100 bird species recorded in the reserve, several globally threatened birds of prey and large migrants have been recorded migrating over the reserve and along the Yarmouk Valley which is considered to be an important 'sidetrack' leading to the major flyway of the Rift Valley.

Fifa Protected Area

Fifa was first proposed in 1998 by the RSCN in order to represent and conserve the saline vegetation in the country. The reserve was established in 2011 by the RSCN within the Sudanian bio-geographical zone. It is situated over an area of 26 sq km covering Wadi Fifa and the *Tamarix* dominated saline vegetation. Fifa is located in the middle between the southern tips of the Dead Sea and the beginning of the desert of Wadi Araba. In addition to its importance for wintering passerines, the reserve is becoming increasingly important as one of the few remaining natural breeding habitats of Dead Sea Sparrow *Passer moabiticus*.

Qatar protected Area

Qatar was first proposed in 1998 by RSCN's review of protected areas. The reserve was established in 2011 representing the Sudanian bio-geographical zone. It is situated over an area of 110 sq km and was established to conserve a representative sample of the hilly ground covered with Hamada soil type hosting the highest density of Acacia woodlands in Jordan The reserve is located along the Jordan Rift Valley just north of Aqaba. The dense Acacia trees are a major spot for migratory passerines that use the area for roosting and as a stopover site before they continue their migration journey. This protected area faces major challenges related to the activation of its management program due to local community opposition. It is established that Qatar is considered by RSCN a paper park which need to be addressed strategically in the near future with support of the ministry of environment with other national stakeholders support.

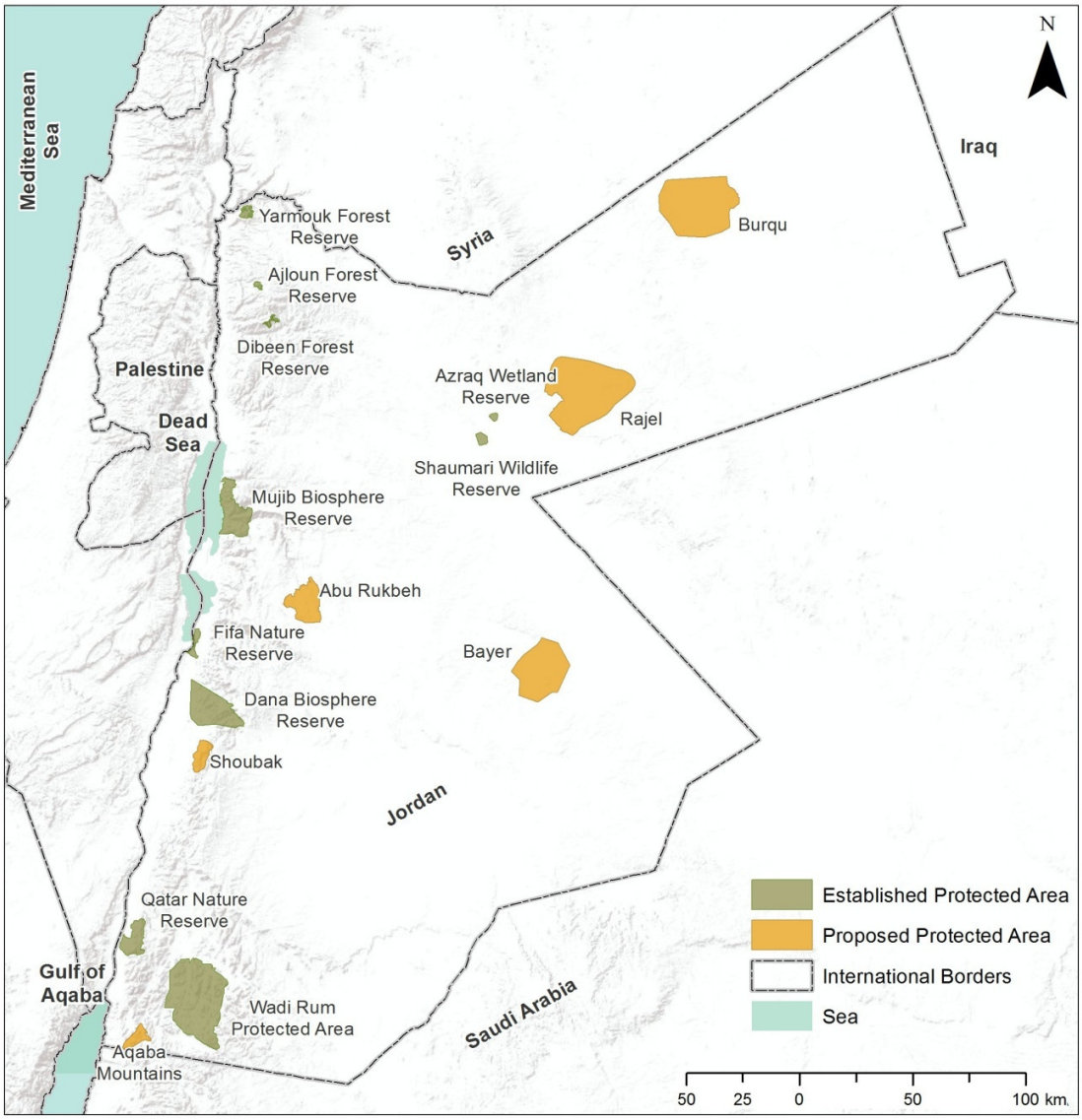
The following table illustrates the national progress made on the establishment of protected areas as identified by the 2009 national protected areas network report:

No	Name of PA	Date of establishment	Area ($km^{2)}$
1	Shoumari Wildlife Reserve	1975	21
2	Azraq Wetland Reserve	1978	12
3	Mujeb Biosphere Reserve	1985	212
4	Ajloun Forest Reserve	1987	12
5	Dana Biosphere Reserve	1989	292
6	Wadi Rum World Heritage Site	1997	729
7	Aqaba Marine Park	1997	2.5
8	Dibbin Forest Reserve	2004	8.5
9	Yarmouk Forest Reserve	2010	21
10	Qatar Nature Reserve	2011	110
11	Fifa Nature Reserve	2011	26
		Total	1,420

It is important to report that several changes were introduced to the national protected areas network including the removal of Masuda protected area, the addition the Shoubak protected area and the proposal for inclusion of the Petra Park in the network starting from 2015. A set of specific technical reports on the main changes mentioned are available at RSCN, MoEnv, and PDTRA.

These changes reflect major developments in the national and local contexts related to the network in terms of governance arrangements, local stakeholder involvement, site level impacts, all calling for national consideration of a second review of the network starting possibly in 2015.

The Map below demonstrates the protected areas of Jordan including the established and proposed ones:



(Source: RSCN, 2014)

Section 3: Main Threats to Biodiversity

3:1 Analysis of Direct and Indirect Drivers of Biodiversity Loss

Natural terrestrial and aquatic habitats in Jordan have been lost, affecting the faunal composition of these areas. Biodiversity remains exposed to several threats which has led to a sharp decline in most of the Jordanian flora and fauna numbers, including the extinction of several species.

Land degradation, conversion and urbanization

Increasing development pressures, combined with population growth, are accelerating habitat degradation, climate change, species loss and the general depletion of key natural resources, especially water as well as biodiversity. They are also affecting the livelihoods of local pastoral and agricultural communities, who now find traditional grazing areas, agricultural lands and hunting areas dissected and degraded by infrastructure and urban expansion. As a result, overgrazing, over hunting and deforestation are widespread, adding more pressure on remaining natural areas.

The above ongoing and often accelerating challenges reinforce the need for improved land use planning and management capacity. A national land use plan was a clear focus of several national policies and strategies since the 1991 National Environment Strategy (1991). All successive strategies continued to address such a need, however, with little detail on ways of specifically integrating biodiversity conservation into broader land use strategies.

Despite the above, several progressive land use planning efforts were and are being implemented by respective national and regional institutions. This includes the efforts implemented by the Ministry of Municipal Affairs (MoMA) on the development of the national land use plan which was concluded in 2006 and its ongoing follow up program on the governorates levels. The initiative includes the development of the natural heritage layer as one of the foundations for development planning. It has also introduced a specialized unit at the ministry for natural heritage planning, and equipped it with required infrastructure and technical competencies. MoMA has been making concrete efforts to involve and coordinate the program with relevant ministries including the Ministry of Environment, civil society organization such as RSCN, and local communities' organizations especially at the governorate level.

Other land use planning and management initiatives include the following:

- The ongoing implementation and monitoring of the 2004 land use plan of the Jordan Rift Valley, implemented by the Jordan Valley Authority. This included the designation of two new protected areas in the valley, Yarmouk and Fifa and several SCAs such as the Khyouf SCA in Balqa Governorate downstream of the King Talal Dam.
- The ongoing review and implementation of the ASEZA (2000) land use and master plans by ASEZA. This includes the review and update of the buffer zone around the Wadi Rum as a World Heritage Site and a Protected Area with particular focus on biodiversity conservation and sustainable tourism development.
- The ongoing implementation of the Dead Sea master plan which by the Development Zones Company associated with the Development and Free Zones Commission. This

includes a set of biodiversity guidelines and safeguards in addition to the establishment of an eco-park as the backbone for coastal development and protection.

- The ongoing updates and finalization of the Petra Region land use plan including the development of the heritage based buffer zone and the declaration of the Petra World Heritage Site as a Natural Protected Areas.

Tourism development

The tourism sector already poses a major threat to biodiversity, and given the planned exponential growth of the sector, this threat is expected to grow significantly. Although few of Jordan's current visitors are nature tourists per se, tourists do visit protected areas and high biodiversity areas. Biodiversity is being threatened by mass tourism across the landscape as a whole, and the tourism footprint on biodiversity is expected to grow over time. Threats posed by tourism may be divided into two categories: direct threats and indirect threats.

The prime direct threats from tourism activities to biodiversity are the following:

Hotel and tourism infrastructure development: Development of hotels and other tourism infrastructure in ecologically sensitive areas leading to fragmentation and loss of habitat.

High visitor numbers: High visitor numbers leads to disturbance of habitats. Visitors' activities have exerted extensive pressure on biodiversity from trampling, hunting, plant collection, uncontrolled trekking and climbing, etc.

Effluent discharges: Effluent discharges, litter accumulation and extensive abstraction of water have had an impact on animal behavior and also result in the accumulation of toxic compounds in the ecosystem, in addition to threatening the biodiversity of important habitats.

The indirect threats from tourism on biodiversity include:

Roads development: Roads provide easy access to ecologically important areas. Unless planned to incorporate biodiversity values, this could have the inadvertent effect of increasing other threats (e.g. poaching).

Encroachment by local population: Local populations encroach on natural resources and practice intensive resource use to support their livelihood needs. A further increase in agriculture and pastoralist activities is expected as the local population will aim to meet increased demand for food produce from tourism establishments, causing additional pressure on biodiversity from overgrazing, loss of the vegetation cover, wood-cutting, etc.

Climate change

There is "very high confidence" (as laid down by the IPCC) that climate change is already affecting living systems. The responses of both fauna and flora span an array of ecosystems and organizational hierarchies, from the species to the community levels. Recent scientific research on global meta-analyses revealed significant range shifts averaging 6.1 km per decade toward the poles (or meters upward), and significant mean advancement of spring

events by 2.3 days per decade. Jordan is vulnerable to climate change, and some features of projected climate change in Jordan include: (i) increase in temperature of 1-2 degrees centigrade by 2030-2050; (ii) increase in evaporation accompanied by soil moisture reduction; (iii) diminished recharge of aquifers and oases, (iv) projected shrinkage of grasslands (which extend over 10% of Jordan); and (v) projected shift of semi-arid rangeland (which extend over 80% of Jordan) to become arid desert. Improved and continued conservation planning and management in Jordan; based on an assessment of climate change implications on biodiversity is both prudent and a necessity.

Habitat Degradation and Destruction

Uncontrolled urban expansion occurs in the form of deforestation and transformation of forests into agricultural and urbanized areas, due to the increase of Jordan's population and industrial development. Overgrazing and extensive woodcutting, in addition to intensive agricultural practices, are major threats to wildlife in Jordan as they result in soil erosion and destruction of natural habitats. Unplanned mining and quarrying are leading to further habitat destruction.

Uncontrolled vehicle movement has led to habitat destruction and has caused disturbance to mating areas of migratory species, decreasing successful breeding and number of migratory birds visiting Jordan.

Unbalanced water use and unplanned water extraction from surface and underground water resources threaten many areas of Jordan and consequently, the habitats and micro ecosystems of both animals and plants.

Pollution of surface and underground water resources and aquifers due to agro-chemicals, sewage discharge and solid waste disposal causes further threat to the presence and reproduction of many faunal species.

Persecution of Wildlife, Trade and Spread of Disease

Illegal hunting has caused the extinction of several species of Jordanian wildlife, and is considered to be one of the main factors threatening faunal biodiversity in the country. The impact of this threat further increased after the introduction of modern hunting techniques.

Illegal trade of native species directly affects faunal populations. Additionally, the illegal dissemination of non-native species causes severe stress on some species and is a threat to their presence.

Little is known about the status and transmission of diseases in wild animals. Increased contact with wildlife has led to the transmission of some diseases from livestock to wild animals and vice-versa, either through direct contact or predation. Further, several wild animal species in Jordan are thought to be vectors or reservoirs for some diseases. These diseases may affect both humans and wild fauna and could be a real threat to the distribution and relative abundance of certain species.

Invasion of Alien and Exotic Species

Introduction of alien species is a major threat to native animal and plant species. Alien species and invasive exotics can become pests by adapting to habitat changes and causing destruction to natural habitats and agricultural areas. On the other hand, feral species, which invaded the country long ago, might affect their wild relatives through competition and interbreeding.

Weak Enforcement of Laws

Weak enforcement of laws is a perennial issue, despite the fact that there has been a great improvement with the designation of Protected Areas (all forms) in recent years as a result of capacity building at the national and local levels. The problem of enforcement is mainly related to the ineffective application of the bylaws and regulations by the juridical systems. This is often justified in recent years by the argument related to the sensitive regional political conditions which require a more lenient approach to law enforcement in general and to the enforcement of environment laws in particular.

The Issue of Refugees

More than one million Syrian refugees have entered Jordan during the last three years. They escaped the crisis in their country, leaving behind their livelihoods and most of their resources. The majority of these refugees were integrated into the Jordanian society, while a substantial number remained in designated refugee camps such as the Zaatari Camp in the Mafraq area. The northern governorates of Jordan have received the majority of the refugee populations, with a significant percentage distributed in the northern parts of the Rift Valley area. More specifically, this includes the western parts of the governorates of Irbid, Mafraq, Ajloun, Jerash, and Balqa.

It is not an easy task to assess or quantify the specific impacts of the refugees on the various natural resources and ecosystems in the host regions, nonetheless, some of these impacts are easier to estimate than others. These impacts include pressures exerted on water resources, agricultural areas, rangelands, and open spaces. In the case of the refugee camps, most of the impact on natural resources is represented by water use (mostly for domestic purposes). As confined territories, the camps have limited impact on rangeland and other natural resources, especially noting that they are mainly supported through international subsidies for the provision of food and other ecosystem-related goods and services.

The case for the refugees outside the designated camps is much more complex to assess in regard to interaction with ecosystems and their associated biodiversity. Nonetheless, evidence could be established on a number of associations between the influx of refugees and the impacts on natural resources. For example, many refugees who come from nomadic or rural backgrounds got involved with livestock husbandry and agricultural activities, mainly through employment by Jordanian residents who utilized the refugee work force to support their agriculture related activities, as well as the operation of tourism enterprises. It could also be noted that the skilled labor introduced by the refugees created an opportunity to improve the quality of services related to agriculture, livestock, and tourism. Consequently, this would also mean increasing pressures on ecosystem goods and services in addition to increasing the demand on consumption associated with the direct socioeconomic needs of the refugees themselves.

From another point of view, the influx of refugees has increased competition with host communities on a large set of income sources and jobs. Further, the wave of refugees caused a sudden increase in the cost of services and real estate which impacted the purchasing power of host Jordanian communities, thus forcing them to exercise more direct and indirect pressures on natural resources. One clear example is the increasing trend of illegal tree cutting to compensate for increased fuel prices, overgrazing of livestock in response to inability to secure high cost fodder, and illegal wildlife hunting as a reflection of reduced ability to procure domesticated sources of meat such as chicken and lamb.

The economic valuation of the direct and indirect impacts of the refugees on the ecosystems of host regions of Jordan requires an in-depth scientific research which would lead to a clear policy document needed to support decision making in regard to the sustainability of ecosystems, their goods and services, as well as their biodiversity, under crisis conditions such as the Syrian refugee case.

Section 4: Impacts of Biodiversity Changes (Loss) on Ecosystems and Human Wellbeing

4:1 Synthesis of the Economic Valuation of Ecosystems

Although easily recognizable, the economic and social values of biodiversity have not been well documented or utilized in informing policy and development agendas in Jordan. There are several good examples and attempts to assess the value of ecosystems services and goods. These include the several national and regional studies undertaken for the water sector in particular or the impact of the environmental degradation on the national economy. These were useful in developing sound knowledge, scenario building, informing decision making and reforming policy. The case cannot be described to be the same in regard to valuating biodiversity as an ecosystem good with its associated services.

Despite the above, few site based studies addressed the economic valuation of protected areas through focusing on tourism as an ecosystem service based fundamentally on biodiversity values and their associated natural and cultural values. One of the cases in question was developed by RSCN in 2011, using the assessment of two existing protected areas, namely Dana and Ajloun PAs and compared them to two protected areas which were proposed for establishment, the Masuda and Yarmouk PA (Masuda PA was omitted from the National PA network. The following includes a brief description of this model case of economic evaluation of biodiversity and ecosystems services on which a more systematic national program could be developed to inform effective decision making in regard to the national sustainable development agenda.

In 2012, RSCN in cooperation with the MoEnv commissioned a strategic pilot study valuation of the ecosystem services for two prime protected areas of Dana and Ajloun Protected Areas in Jordan. This assignment represented a strategic decision by the RSCN, in light of the decreasing level of support and understanding of various national and local agencies and groups to the benefits and functions of ecosystem services as represented by the protected areas, to pro-actively attempt to provide a valuation of these services.

The areas in which the valuations took place were (i) Ajloun Woodland Reserve (with the Yarmouk reserve for further application) and (ii) Dana Biosphere Reserve (with the planned Masuda or Shoubak reserves for further application). After review of the various methodologies available for valuation of ecosystem services, the Surrogate Market Approaches were selected to be the most relevant and viable ones within the scope of time and capacity available. The total value for the year 2010 for Ajloun Woodland Reserve was calculated to be 305,373.47 JD. The total value for the year 2010 for the Dana Biosphere Reserve was calculated to be 1,724,497.65 JD. The value for Ajloun seemed low as a stand-alone figure. Nonetheless, it is important to remember that these values are just a small part of the total monetary and non-monetary values of the protected areas. The value for Dana was more robust, as would be expected for a much larger reserve.

In general terms it is important to note that the figures generated in this report only represent a partial value of the ecosystems. Using the values in this report, a more detailed valuation of some of the other protected areas (all forms) remains needed, mainly to highlight the ecosystem functions provided by these areas and their association with local livelihoods and human wellbeing.

4:2 Impacts of Biodiversity Loss on Ecosystem Services and Human wellbeing

The impacts of biodiversity loss on the ecosystem services and human wellbeing are expected enormous, nonetheless, very few systematic studies have been undertaken to evaluate them and direct them to inform policies, strategies, legislations and financing priorities.

The destruction of habitats through overgrazing for example results in severe soil erosion and leads to detrimental and often irreversible impacts on the ecosystems ability to maintain the watershed and their conveyance functions as well the soil capacity to support the plant germination and regeneration. A very clear example is seen all over the country within the Irano-Turanian region which suffers from low rain fall levels, extreme levels of livestock grazing, very weak or even absent land use planning, management and law enforcement. As consequence, the local communities depending on such resources end up losing a significant part of their sources of income derived directly from ecosystems goods and services.

Several national initiatives and programs address the various elements of assessing the impacts of biodiversity loss on ecosystems services and human wellbeing. The following includes a brief description of five of these initiatives:

The National Environmental Compensation Program: the Badia Restoration Program

The Governing Council of the United Nations Compensation Council awarded Jordan in 2005 total of US $160,582,073 in compensation for the rehabilitation and restoration of the Badia terrestrial ecosystems as an aftermath of the first Gulf War. The Badia Restoration Program (BRP) was established in 2008 and housed at the Ministry of Environment to manage the financial award through the execution of projects and activities to restore terrestrial ecosystems in Jordan Badia.

The BRP prepared the Community Action Plan (CAP) to last for eight years (2011-2019) before outsourcing the implemented activities to local communities. The CAP consists of fourteen self-standing projects with well-defined activities, timetable and budget. These projects are grouped under two main components: integrated watershed management and integrated livestock and socio-economic.

The goal of the CAP is to conduct most suitable restoration approaches, including the biophysical interventions and socio-economic arrangements, to fulfill the principal objective of the BRP in restoring the damaged ecosystems in the Jordan Badia. The expected outcomes of the BRP are: restoration of terrestrial ecosystems; recovery of biodiversity and ecosystem productivity in the Badia; and establishment of a sustainable communal grazing system.

These projects are focusing on the restoration of vegetation cover and preserving the biodiversity of rangelands. The proposed tools for halting further loss in biodiversity in rangelands are summarized in the following paragraphs:

The projects are implemented at the watershed level which may harbor one or more of ecosystems. This large landscape is important to harbor large number of plant species that have different uses. The regulation of grazing at the watershed level is the most effective,

and cheap tool to enhance the productivity and diversity of native vegetation as far as local communities are willing to collaborate.

The macro-water harvesting structures (ponds) provide a water resource for the flocks and pastoralists within the Badia, closer to their habitation which is expected to minimize the movement of sheep and goat flocks in the Badia in search of water, thereby maximizing the opportunity for the rangelands to rest and recover.

The Micro-water harvesting structures (contour ridges) harness the rainwater (surface runoff) and store it into the soil profile of the ridges to increase the productivity of forage shrubs to be grown in these structures and promotes the recovery of native vegetation in the catchment and cultivated areas of the rainwater harvesting system.

Developing the water spreading structures in the rangelands enhances the environmental restoration and the recovery of vegetation through minimizing soil erosion.

Several practices were introduced to promote regulation of grazing, including: alternative energy sources such as solar units were distributed to alleviate shrubs wood collection; distribution of subsidized barley grains to local communities to promote self-destocking of sheep and goat flocks in the Badia and to abide by the instructions related to regulation of grazing, and finally, the program adopts the development of simple and balanced feeding packages to improve productivity per head to encourage farmers to cull the non-productive animals.

Valuation of rangeland biodiversity using community based approaches

The Community-based Rangeland Rehabilitation Project (CBRR) is a program developed and implemented by the Royal Botanical Garden (RBG). The program is modeled after the community participatory projects which have seen successes in Jordan. The CBRR was established in 2007 in order to facilitate this educational process. The CBRR is driven by two main themes: to assist in the development of sustainable livelihoods for local communities while rehabilitating overgrazed and degraded soil. Often these goals are considered contradictory. As such, the herding community was initially resistant to the efforts of the CBRR; and initially ignored the fencing around the protected site and would actually cut the RBG'S fence in order to continue grazing unhindered.

The CBRR offered several programs to the herding community in the form of indirect subsidies in exchange for the participation of the community in protecting the Tell Ar-Rumman site. Grazing on the site is not strictly prohibited, but is allowed to an extent which continues to supplement the diet of ruminants with healthy and diverse forage while simultaneously allowing forage to develop without threat of overgrazing.

Moreover, the CBRR acts as a middleman between the community and government agencies, which often ignore the opinions of local communities in favor of 'ivory tower' approaches to effective land management. Meetings are held with administrative officials from, for example, the Ministries of Agriculture and Environment, and are then held with community leaders and family heads to help determine suitable management practices for both parties. The CBRR is motivated to give the community a voice, in particular because participatory community-management systems have been proven effective tools in combating degradation throughout the world.

In the three years following the CBRR's initiation, from 2008 to 2010, the results are very promising. Overall biomass in the entire site doubled, and in some sectors more than doubled. The stocking rate for the entire site (calculated as 100% of food intake for 30 days) was estimated at around 1,400 sheep in 2010, nearly triple the 500 sheep estimated in 2008. The program experts analysis suggest that allowing animals to graze in the protected area for 30 days would result in improving the net income by 5%-11%, which is equal between$1,234 to $1,898 per herd per year.

Valuation of ecosystem services related to forage plants

A national initiative on the valuation of biodiversity is done on the Valuation of Ecosystem Services in Mujib Nature Reserve managed by RSCN, addressing the issue of forage plants.

The initiative worked with rural and pastoral communities which used to benefit from a wide array of goods and services from natural ecosystems. These benefits include forage plants, medicinal and herbal plants, wild edible plants, fuel wood, ornamental plants, and water. Unfortunately, these benefits are rarely valued from monetary perspective and this is one of the reasons why grazing resources are routinely listed at the bottom of priority list.

The initiative is documented in the report titled "Cooperative Management for Sustainable Use of Grazing Resources in Mujib Nature Reserve, RSCN 2014". One of the objectives of the above case study focused on the valuation of forage plants exploited from Mujib Nature Resource. The communities benefiting from the Mujib Nature Reserve (MNR) inhabit Makawir, Hidan and Sahila areas located in the northern-eastern and central parts of the reserve and Faqu' community in the southern part of the reserve.

To value the economics of forage plants of Mujib Nature Reserve, a total of 63 stock owners were interviewed from the communities benefiting from the reserve. The records of MNR showed that numbers of flocks grazing in the reserve were 156. The number of the interviewed flock owners represented about 40% of the flock owners in the area. Numbers of grazing animals totaled to 6677 heads, 2636 heads in location 1 and 4041 heads in location 2. The grazing period lasted for 8 months in location 1 and 2 months in location 2 in the study area.

The adopted approach was the indirect valuation of consumed forage during the specified period of grazing in the Reserve. The assumptions of this approach were (i) average body weight of sheep or goat was 50 kg, (ii) daily intake of forage was 1.25 to 1.5 kg DM per head (average body weight of grazing animals x 2.5%).

Estimate of forage consumed from locations 1 and 2 in MNR by sheep and goats during 8 months in location 1 and 2 months in location 2 was 1312 ton dry matter. The annual monetary value of this consumed forage plants was around US $147,000.

The main lessons learned from this brief are:

- Local communities derived substantial amounts of forage material from Mujib Natural Reserve, which represents three bio-geographical regions that accounted to US $147,000.

- The forage valuation approach is a simple tool for valuating the forage resources of other natural reserves representing different ecosystems in the country. This economic valuation is important for policy makers for scaling out the theme of establishment and sustainable management of natural reserves.
- Specific approaches are needed to value the edible, herbal, medicinal, ornamental plants and collection of fuel wood of natural reserves.

Benefiting from indigenous knowledge: using of medicinal plants

Local communities developed among years a good knowledge about the rational uses of native plants for human and animal purposes. Pastoral communities are well aware about the useful plants for treating the ailments of humans and animals.

A structured questionnaire was developed and pastoralists using the Mujib Nature Reserve were interviewed. Percentage of pastoralists using medicinal plants for treating sick animals averaged 67.6% and 56.7% in location 1 (Makawir, Hidan and Sahila) and location 2 (Faqu'), respectively.

The total number of medicinal plants that were commonly used by the pastoralists of the two locations was twenty-one; eighteen of them were used for humans. The *Artemisia herba-alba*, *Matricaria aurea, Teucrium polium*, and *Thymus spp.* were usually used for humans whereas; *Teucrium polium, Peganum harmala, Hypericum spp., Retama raetam* and *Varthemiai phionoides* were used for animals. From ecological viewpoint, there is no problem in collecting and using the different medicinal plants as far as small amounts are collected and used solely by the pastoral communities. Collection of medicinal plants for commercial marketing will result in over-harvesting and should be strictly forbidden.

Field observations indicated that the most vulnerable medicinal plants because of grazing are *Matricaria aurea, Trigonella arabica* and *Artemisia herba-alba*. The majority of the medicinal plants that were used for humans and animals contain volatile oils that reduce the palatability of these plants. In other words, the targeted medicinal plants are not expected to be affected directly by irrational grazing, but the indirect effects will be manifested by the deterioration of the habitats of these medicinal plants. The conservation and sustainable use of the important medicinal plants in the Mujib Nature Reserve requires strict regulations for both the grazing and the collection of these plants.

Documenting traditional knowledge in using wild plants in treating health problems

Documentation of the traditional knowledge on medicinal plants of Jordan in general and the Badia region in particular still needs more effort to prevent this valuable knowledge from being lost after the death of its old secret keepers and as the new Bedouin generations are not interested in these treasures of knowledge that their ancestors owned. Moreover, this is also very important due to the crucial health and economic part of biodiversity that medicinal plants signify; and to conserve the medicinal and aromatic flora of Jordan for future generations as well as ensure Jordan's sovereign rights over its genetic resources and its uses by first documenting them.

According to this, the CBRR conducted an ethnobotanical study as a part of the local knowledge study which was carried out in 2010. The target participants were livestock owners in the arid Jordanian Badia region.

This study aimed, therefore, at (1) documenting the old generation traditional knowledge of the Badia region in using wild plants in treating health problems, (2) identifying the key plant species used, and (3) calculating the Informant Consensus Factor (ICF) for each category of health disorder, the Fidelity Level (FL%) and the Use Value (UV) of a the plant species used.

The data was collected by interviewing 80 participants whom were interviewed face to face of whom 21% were women. The team designed a questionnaire that helped in the data gathering, and also recorded the procedures used by the local communities on video.

A total of 47 plant species are used by local Bedouins for medicinal purposes. The majority of these species are native to the study area, for example: *Artemisia judaica*, *Citrullus colocynthis, Ecballium elaterium* and *Rheum palaestinum*. The study showed that the plant species with the highest UV is *Artemisia herba-alba* and that *Ducrosia flabellifolia* is a remarkable native plant species with a high FL% in curing dental pain. Moreover, the highest value of ICF was scored for dental disorders, followed by gastrointestinal disorders, and jaundice which may indicate the high incidental occurrences of these diseases and/or the lack of dental care services in the rural areas.

The study showed an agreement of the local Bedouins on using certain plant species, particularly natives in their dry surroundings, in treating certain health disorders. Some plants showed high use values and fidelity levels to treat certain health problem. Further investigation should be carried out in Jordan on the pharmaceutical value and production practices of these native medicinal plants that have very low water requirements in a country with extreme water shortages.

Part II: National Biodiversity Strategy and Mainstreaming Biodiversity

Section five: Update on the National Biodiversity Strategy and Action Plan and Its Implementation

5.1 National Targets and Indicators Related to Biodiversity

Jordan has not yet developed its national biodiversity targets related to the Aichi Targets and their related indicators. A rapid assessment was undertaken on what has been done to achieve the different Aichi Targets since their global approval. The assessment presented here is considered a first step in developing the national targets related to Aichi Target, process which will be concluded during the process of updating the NBSAP foreseen for completion in 2014.

Despite the above, the set of national targets which were identified as part of the 2003 National Biodiversity Strategy and Action Plan and the National Agenda, are considered the milestones used to assess the national performance under the various themes of environmental protection including biodiversity conservation.

The National Agenda 2007–2017 represents an ambitious effort to create a master plan for the reform, future growth and development of Jordan. The Agenda initiatives were developed in three key areas:

1- Government & Policies.
2- Basic Rights & Freedoms.
3- Services, Infrastructure & Economic Sectors.

The third theme above includes the environmental sustainability as one of its key focus areas. The agenda identified several challenges in regard to the environmental sustainability sector and recommended several initiatives to address them, as follows:

- Improve the management of natural reserves and develop a master plan for land use and ensure its implementation.
- Formulate a long-term comprehensive policy to combat desertification and integrate it in national sustainable development policies.

For example, a performance indicator was established to monitor progress on the establishment of protected areas staring from the 2009 baseline of seven Protected Areas.

5.2 Current National Biodiversity Strategy and Action Plan

The NBSAP of Jordan was formulated based on the Article 6 of the CBD which came into effect in 1993. Jordan formulated the First National Biodiversity Strategy in December 2001(and was launched in 2003) as a national strategy aimed at the conservation and sustainable use of biodiversity based on the CBD.

The Jordan NBSAP provides a framework for actions at all levels that will enhance the ability to ensure the productivity, diversity and integrity of our natural systems and, as a result, the ability to develop sustainably.

The NBSAP proposed a series of priority objectives and actions that are presented according to five themes involving most sectors of society, as follows:

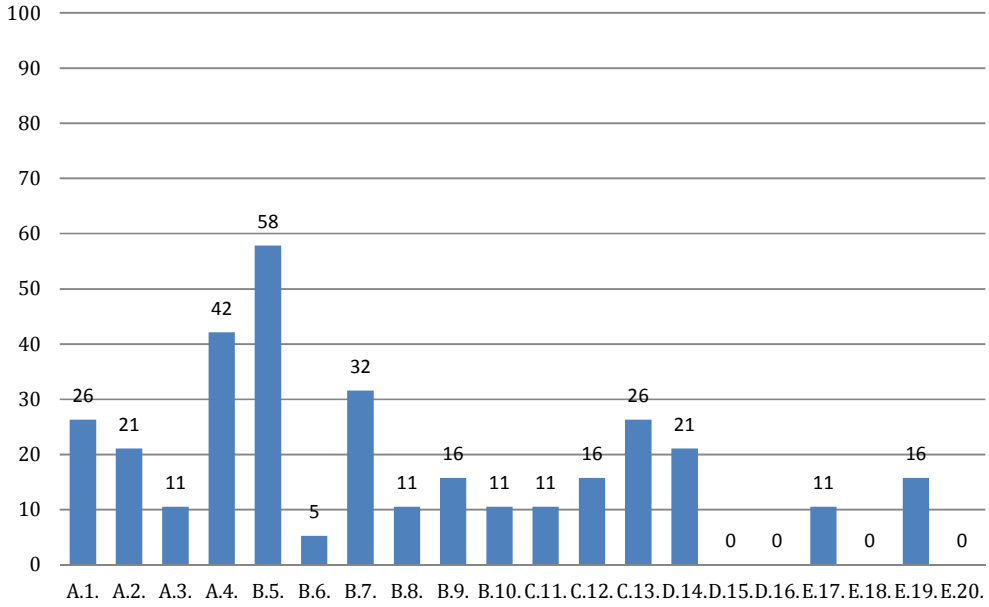
- Theme 1: protection of biological resources; includes endangered species; national red list; and protected areas.
- Theme 2: sustainable use of biological resources; includes wild plants; forests; terrestrial and freshwater wild fauna; marine life and fisheries; microorganisms; agriculture resources; plant production; animal production; and rangeland production.
- Theme 3: reducing the impact of industry on biodiversity; includes mining; industry and factory production; biotechnology and biosafety; and eco-tourism.
- Theme 4: promoting integrated land use planning and water resources development, this includes land tenure and land use planning; and water resources.
- Theme 5: towards a biodiversity-oriented society, this includes economic valuation of biodiversity; legislation and institutional structure; and public awareness and participation.

On the other hand, the Global Strategic Plan for Biodiversity 2011-2020 developed by CBD comprises five strategic targets that set out a total of twenty biodiversity targets (the Aichi Biodiversity Targets). These strategic targets consist of:

- Strategic goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society,
- Strategic goal B: Reduce the direct pressures on biodiversity and promote sustainable use,
- Strategic goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity,
- Strategic goal D: Enhance the benefits to all from biodiversity and ecosystem services,
- Strategic goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

An attempt was made by the national team working on this report to establish a general correlation between the existing NBSAP themes and the Aichi Targets. The preliminary assessment showed that most of the Aichi targets are already covered by the five national strategic themes. The below diagram demonstrates this hypothetical correlation as a mere indication of association to be used in further planned analysis intended in the NBSAP update process.

Percentage of Representativeness of Aichi Targets within the Strategic Themes of the 2003 NBSAP in Jordan



5.3 The Implementation of the Current National Biodiversity Strategy and Action Plan

The 2003 NBSAP included 60 proposed projects. A preliminary unsystematic assessment was done to measure the percentage of the projects implemented since 2003. The analysis indicates that above 50% of the projects were implemented until 2014. The rest of the projects are either under consideration for funding or are deferred due to lack of financial resources or changes to the conditions related to their execution. It is noteworthy that many of these projects were delivered through national funding.

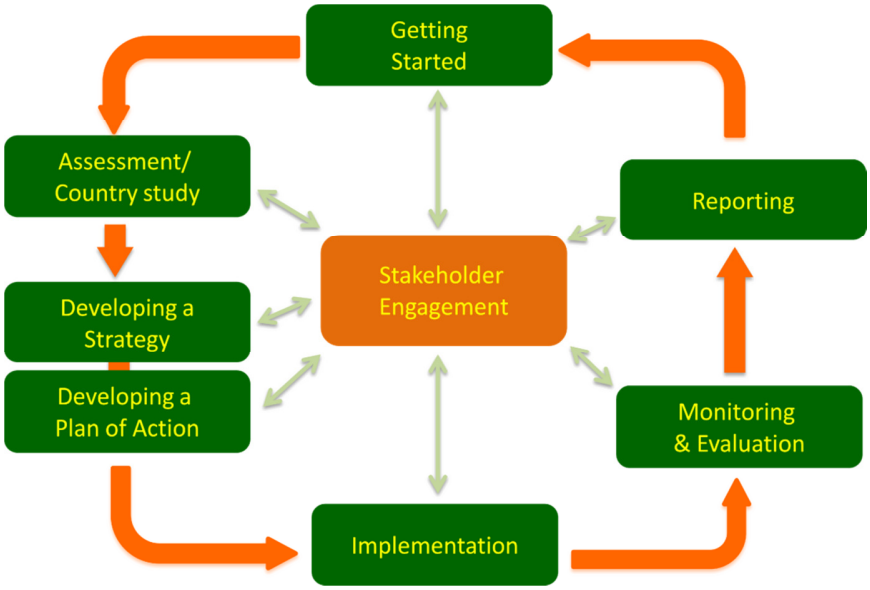
Further, the tentative assessment identified key challenges and constraints which faced – and often still are – the implementation of the projects portfolio initially intended in 2003, as follows:

- The absence of clear resource mobilization strategy.
- The lack of a unified knowledge management and data processing system specific for biodiversity.
- The ineffective national communication and coordination framework on biodiversity.
- The NBSAP was not well incorporated into other national sectoral plans and projects.
- The projects identified in the NBSAP do not adequately address the private sector and local communities in their planning and delivery.
- The NBSAP was not accompanied with a continuous national outreach program.
- Lead implementing agencies were not clearly identified for each of the proposed projects.

5.4 The Update of the National Biodiversity Strategy and Action Plan

The process of updating the NBSAP for Jordan is underway. It is anticipated for conclusion in 2015 and a revised NBSAP strongly aligned with the global biodiversity strategy is foreseen.

The process of the updating process of the NBSAP is planned to follow the methodology set by the CBD and elaborated by IUCN. The below diagram summarizes the process framework:



A set of guiding principles are considered for the development of the updated NBSAP:

- The NBSAP is the principle instrument for implementing the Convention on Biological Diversity.
- The NBSAP needs to be updated in light of the new Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets to develop a clear set of national indicators.
- The NBSAP has to mainstream biodiversity into all national sectors, and cross-sectoral strategies including economic planning sector.
- The updated NBSAP has to be turned into more strategic planning tool aiming at reflecting national development and environmental objectives more widely.

The process of update of the NBSAP will adopt the following steps:

- The formulation of a national working group for the update of the NBSAP comprising all key stakeholder and interest groups. The working group will be convened by the Ministry of Environment and will be guided by the National Biodiversity Committee.
- A full review of the national progress made on the implementation of the 2003 NBSAP, including:
    - The update of the situation analysis of key biodiversity values and attributes.
    - The revision of the main threats to national biodiversity.
    - The analysis of the key direct and indirect drivers of biodiversity loss.

    - The review of the NBSAP projects implementation and their lessons learned.
- The development of a revised vision statement for biodiversity in Jordan.
- The review of the strategic goals for biodiversity alongside their midterm outcomes. These will be aligned with the global biodiversity strategy and the Aichi targets.
- The development of a revised national action plan for biodiversity.
- The development and adoption of a revised governance framework for the implementation of the NBSAP and its monitoring using global best practices and guidelines.
- The design of a national outreach and awareness raising campaign to promote national engagement in the NBSAP implementation.
- The development of a strategic framework for financing the updated plan from national and external sources.

Section Six: Actions and Measures Taken to Implement the CBD since the 4th National Report

6.1 National Legislation, Institutional Support and Capacity Building

Several efforts can be recognized in this theme as follows:

- As biodiversity conservation is being shared by many public and civil organizations in Jordan, a national biodiversity committee was established in 2011 and will be guiding the process of updating the NBSAP. It also functions as an advisory group on biodiversity issues for the MoEnv.
- A new bylaw for nature conservation is underway.
- Special regulations for the declaration and management of SCAs were adopted in 2011.
- In 2009, the Ministry of Environment issued a bylaw for the regulation of genetically modified organisms and related products which result from research in biotechnology. These regulations were issued based on Article (4) section (D) of the Environment Protection Act No. 52 for the year 2006. The same is published on the website of the Ministry.
- In 2013 , the Ministry of Environment issued a Policy-Oriented Research, Priorities, Guidelines, Procedures, and Tools to Conduct, Promote and Support the Implementation of Rio Conventions in Jordan.
- Throughout Jordan, many examples have been developed in implementing local community- based conservation projects that link between biodiversity conservation and meeting local livelihood demands. Some of the main successes and case studies of excellence in this aspect were developed by the GEF Small Grants Program (SGP).
- In 2012 a biodiversity research group was formulated and linked to the National Biodiversity Committee.
- A national committee was formulated for plant genetic resources by MoA on 2012. This year 2014 a committee was formulated for plant genetic resources by NCARE.
- The infrastructure and staff capacity at NCARE was enhanced in the last years with a vision to improve the livelihood of local community by implementing and improving policies and national programs to enhance sustainable conservation and use of plant genetic resources for food and agriculture.

In situ Conservation Efforts

Three protected areas were declared since the 4th National Report to the CBD. These are: Yarmouk in 2010, Fifa in 2011, and Qatar in 2011. The concept of special conservation areas was introduces in the protected area system in Jordan, and a set of special regulations for their declaration and management was adopted. An elaboration on the national protected areas and special conservation areas programs is presented in part I and part III in this report.

6.2 Management of wildlife trade and use

International, regional and national efforts had been initiated to meet global conservation challenges including combating the continuous abuse of wildlife species through illegal trade in wildlife, and accommodating these species in zoos and private collections which situate them in poor conditions.

Across the Middle East, specifically focusing on Jordan, the new and modern era for zoos and sanctuaries has not yet been valorized and developed. Zoos are run as business oriented private ownerships, giving way to wildlife species being kept in poor conditions as a result of poor feeding, poor veterinary care, and limited space (Schwamer and Sakner report of zoo screening in Amman, in 2011).

Jordan is also known to be a 'corridor' for the illegal trade of wildlife; from north including Syria, Turkey, and sometimes Europe, to the Arabian Gulf Countries. However Jordan is one of the few Arab countries that complies with the Convention of International Trade in Endangered Species (CITES), resulting in a number of these animals being confiscated due to the that fact that some of these animals are being transported without proper legal documents and certificates or the transportation means do not conform with the international regulations for live animal transport. Furthermore, some of these animals are being smuggled in different ways. As a result for these situations, the animals must be accommodated in appropriate facilities where they may be treated medically and rehabilitated before being sent back to their country of origin or kept in accordance with the IUCN guidelines that deal with confiscated live animals.

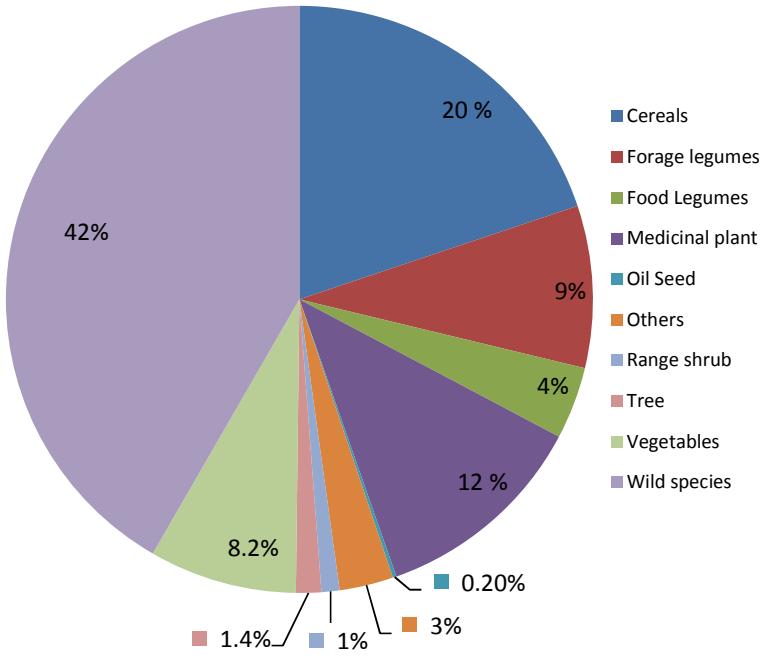
Both confiscated animals from the illegal trade, and those which are kept in bad conditions in private zoos, raise the need of finding proper, high standard, and sustainable solutions, where these animals can be accommodated and rehabilitated, then send back to their wild when possible, while the educational, research, and conservation use are promoted. Hence, Al Ma'wa was established as a regional participatory model for rescued and abused wildlife conservation and socio economic development. Al Ma'awa for Nature and Wildlife was established through a partnership between the Princess Alia Foundation and Vier-Pfoten International and will serve as a regional hub providing the much needed long term solutions for rescued wildlife.

6.3 Conservation of Agro-biodiversity

Natural rangelands have a vital role in Jordan through meeting part of the feeding requirements for livestock despite the deterioration that affected range resources over the past decades. Rangelands continued constituting a main source for livestock fodder and a major component of ecosystems in the country.

Rising to the challenge of enhancing such role, rangeland reserves were established in the different eco-regions and have been managed in accordance with sound range policies and sustainable grazing systems. Now there are about 35 rangeland reserves in different ecosystems in Jordan with a total area of about 1 million and 300,00ha established by MOA. In addition to that there are 14 nurseries belong to MOA to produce forest trees (around 3 millions in 2013) for the national restoration program and produce some shrubs for rehabilitation of range land the production potential for the nurseries about 9 Million transplants per year and distributed freely.

The National Seed Bank at NCARE was established in 1993. Since then, it has carried out ambitious national programs and activities regarding PGR; collections, conservation and utilization activities, where new crops were targeted and Global Plan of Actions were implemented. Seed gene bank was established with well equipped facilities 70 m3 cold store, in which seeds are conserved in vacuum sealed aluminum foil bags under 40 C as medium term storage. As the Bank started working, NCARE started to host again the Jordanian various germplasm held at ICARDA Seed Bank. So far, 1443 ICARDA seed samples have been delivered and stored safely at NCARE. Currently, the National Seed Bank has around 4,000 accessions of PGRFA and has loaned national and regional researchers with more than 1,700 accessions. All seed accessions are fully documented and linked with herbarium specimens. The below figure shows the types and percentage distribution of conserved PGR seeds accessions at the NCARE gene bank:



In the last years the participatory approach has been enhanced in managing range resources as to sustain natural rangelands and thus secure livelihoods for generations to come against a backdrop of challenges imposed by climate change including successive droughts that have aggravated the deterioration of natural resources and wildlife and expedited desertification.

IUCN and partners are implementing a project entitled “Securing Rights and Restoring Lands for Improved Livelihoods” in Jordan aiming at poverty reduction, sustainable management and restoration of ecosystems in drylands and rangelands.

The project plans to build the capacities of local communities and their institutions to manage and restore their ecosystems and improve their marketing activities. Four pilot areas were selected in Jordan within Zarqa and Mafraq governorates, where the project will explore economic and income generating options for rural communities based on natural resource commodities and on valuations of ecosystem services.

The project will also inform and influence policies to support sustainable management of dry lands and rangelands at local, national, regional and global levels.

6.4 Managing the Impacts of Climate Change

There is "very high confidence" (as laid down by the Intergovernmental Panel on Climate Change (IPPC)) that climate change is already affecting living systems. The responses of both fauna and flora span an array of ecosystems and organizational hierarchies, from the species to the community levels. Climate change is being observed and treated as the biggest environmental, social, economic and political challenge nowadays.

Biodiversity conservation is also facing upturn pressure to configure its priorities and interventions under climate change circumstances, therefore, Biodiversity conservation institutions start to think of building its capacity in anticipating the effects of climate change on Nature and mainstream climate change in the decision making processes at all levels.

Accordingly, the Integrated Ecosystem Management Project in the Jordan Rift Valley which was a project implemented by the RSCN (from 2008 till 2013) developed a unit that is specialized in the climate change research and strategic planning at the RSCN. The main objective of the unit component is to assess the regional impacts of climatic change on the future distribution of some major floristic groups and ecosystems dynamic in the JRV, in terms of biodiversity conservation, and incorporate the results into the conservation planning and management of PAs and SCAs.
Also, Jordan developed a national communication team for climate change and biodiversity in January 2011 including the major stakeholders from governmental, non-governmental and scientific organizations to work on mainstreaming climate change in the different programs and Plan for Adaptive Capacity assessments in Jordan.

As part of its commitment to international environmental conventions, Jordan initiated with the support of UNFCCC a National Economic and Environmental Development Study (NEEDS, 2010) for Climate Change. NEEDS initiative aims at identifying financing needs to implement adaptation and mitigation measures. Furthermore, the imitative identified linkages with financial and regulatory instruments that will support the implementation of adaptation and mitigation measures. Eventually, the initiative should provide opportunity for inputs into the national development plan. Constraints, gaps and related financial, technical and capacity needs to incorporate the climate change mitigation and adaptation issues into national policies were identified. These included the low level of knowledge on the national level, lack of financial resources, as well as the absence of the national policies that address the climate change issues.

According to NEEDS report (2010), one of the main challenges identified was the low level of knowledge and awareness of the climate change issues among the national stakeholders. This has led to the absence of climate change aspects from most of the national strategies and policies. Another challenge identified was the absence of financial resources to address the climate change.

6.5 Mainstreaming Biodiversity into National Frameworks and Strategies

In different national strategies the sustainable use of biodiversity components according to article 10 has been tackled to extent possible, but it should be complemented in fields such as inclusion of local communities and private sector into restoring nature. There are some examples where attention is paid in national policies to the main elements of the CBD.

The National Agricultural Strategy

The National Agricultural Strategy placed the "conservation of biodiversity and utilizing it in integrating and supporting agricultural development" as a general objective of the strategy. To this end, the Strategy calls for the use of local species in agriculture, and the use of local medicinal and aromatic plants for the benefit of local cooperative societies.

Updated Rangeland Strategy 2013/2014

The updated strategy complies with the recommendations of Rio conventions. It highlights the importance of local community's knowledge and skills including women in the management and protection of rangeland. The role of cooperatives in rangelands management and conservation and role of beneficiary organizations in a cooperative framework is also emphasized.

On the other hand, the updated strategy includes the necessity of reviewing relevant legislations for effective management of resources as to be managed communally. The objectives of the strategy also take into account providing the farmers and herders with incentives to improve land use practices, to ensure sustainability and reduced land fragmentation. The strategy also addresses flock management and range management in addition to curbing the expansion of crop cultivation at the expense of fragile rangeland ecosystem.

The National Tourism Strategy (2011-2015)

The National Tourism Strategy for the years 2011-2015 was built on 4 pillars one of which is product development which is intended to ensure sustainability and environmental protection. Several actions were proposed to insure the protection of environment during the tourism development process. Also, the strategy addresses ecotourism as one of the important niche market in the coming years.

Wild Socioeconomic Plant Conservation Strategy for Jordan

The RBG's recent document, 'Wild Socioeconomic Plant Conservation Strategy for Jordan' was developed with the overall goal of developing a 'road map' for plant conservation in Jordan, strengthening national capacity, and get attention of national stakeholders and decision makers for sustainable conservation of wild plants of Jordan. The strategy aims at promoting Jordan efforts to sustainably conserve the genetic diversity of wild species particularly those of socio economic importance at national and regional level. In addition, the strategy allows the implementation of several international conventions, treaties and actions like the CBD (Articles 6, 8, 9 and 18), the Nagoya protocol and the Global Plan of Action (GPA).

Scientific methodology has been used to identify priority plant species for integration in management, conservation and sustainable utilization programs, as well as to identify *in*

situ and *ex situ* conservation priorities. Among them, there are crop wild relatives (CWR) which are a key element for agriculture improvement and food security. The strategy results from the best available information, collected from national, regional and international herbaria, as well as gene banks, which was then scientifically analyzed and utilized to assess the conservation status and to make recommendations for *in situ* and *ex situ* conservation of plant species growing wild in Jordan.

Jordan Climate Change Policy 2013-2020

RSCN through it is extensive efforts in the National Climate Change Committee was able to participate in the consultancy TOR preparation and after that influencing the climate change policy formulators to include biodiversity considerations within adaptation part through the ecosystem based adaptation and within mitigation through land use considerations PAs and ecosystems role in carbon sequestration.

Biodiversity and Climate Change Adaptation Strategy

The Integrated Ecosystem Management in the Jordan Rift Valley project developed ecological climate change adaptation strategies for Protected Areas and Special Conservation Areas in the Jordan Rift Valley area. These strategies rely on three key concepts or pathways: Resistance, Resilience and Transition. The RSCN selected 3 protected areas and one special conservation area to assess the effects of climate change on biodiversity and proposed the adaptation models in the Jordan Rift Valley that can be replicated in other protected areas in the future.

Third National Communication Report to the United Nations Framework Convention on Climate Change (UNFCCC)

Jordan ratified the United Nations Convention on Climate Change in 1993 thus Jordan prepared and submitted two national communication reports to the convention till this date, the communication reports included major sectors emissions and major sectors impacts resulted from climate change. Nevertheless, biodiversity and ecosystems were not investigated as a sector in those two previous communications to the UNFCCC, therefore there was a need to include biodiversity and ecosystems sector in Jordan's UNFCCC communication reports to cover this sensitive and important sector.

Accordingly the third TNC report highlighted the climate change impact on biodiversity and ecosystems, assess the vulnerability of biodiversity and ecosystems sector in Jordan toward climate change and suggested adaptation measures in form of best fit local and national projects.

Part III: Progress towards the 2020 Aichi Biodiversity Targets and Millennium Development Goals

Section Seven: Progress towards the 2011-2020 Strategic Plan for Biodiversity and its Aichi Biodiversity Targets

7.1 General approach to the 2020 Strategic Plan and Aichi Targets

Jordan has been progressing very steadily in achieving it national biodiversity protection objectives and thus contributing to the global biodiversity agenda represented by the 2011-2020 Global Biodiversity Strategy and its associated Aichi Targets. It is important to note that the national approach towards the implementation of the global strategy has not been fully systematic, however, major achievements can be reported form the various sectors and stakeholders involved in the environmental protection sector from the government agencies, nongovernment organizations, academic institutions, local communities and private sector. The main factors influencing the effectiveness of the approach and process as well as the results of the national follow up on the global biodiversity strategy and the alignment of national strategies, programs and projects with the Aichi targets are numerous and are all being addressed by the Ministry of Environment and its partners to ensure a more systemic and systematic national program for biodiversity. These factors include:

- The national framework for governance including the legislative frameworks, institutional coordination, decision making structures and processes, and systems for monitoring and enforcement.
- The continuation and enhancement of political commitment to biodiversity conservation as national priority which is not easily superseded by other development agendas and priorities.
- The national coordination mechanism in regard to biodiversity protection and the respective roles of the ministry of environment, the other line ministries, the non government organizations and academia.
- The national knowledge management systems related to biodiversity in terms of national databases, access to information, update of data, research programs and protocol, technical capacities of institutions.
- The update of the key national strategies associated with biodiversity, primarily the national biodiversity strategy and action plan but also the other sectoral strategies needed to mainstream biodiversity in other development fields.
- The establishment of the economic value of biodiversity as a key contributor to the national economy and a tool for long term national security and sustainability.
- The sustainable financing mechanisms for the national biodiversity programs and initiatives from local and international sources and tools.

Although a bit delayed, the fully systematic alignment of national strategies, targets and programs with the 2020 global strategy and the Aichi targets will be a strategic goal for the Ministry of Environment in the new NBSAP (2015-2020) and other mandate related policies and guidelines.

7.2 National Targets and their Relevance to Aichi Targets

This section includes a summary on key national progress and achievements related to Aichi Targets categorized under each strategic goal and its targets. It is important to note that only nationally relevant global targets are included depending on the national efforts related to them. 25 national initiatives were identified to contribute to the partial achievement of 13 of the global Aichi Targets during the last four years or so.

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.

Target 1
By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably

National progress under this global target is represented by the following:

1. The establishment of National Alliance for Environmental Nongovernment Organizations

In 2008, the national environmental NGOs alliance was formally launched constituted of 10 active environmental NGOs in Jordan in 2013. The alliance aims to act as the national reference point to advocate on environmental issues. NGOs members of the alliance include the Royal Society for the Conservation of Nature, The Royal Marine Conservation Society of Jordan, the Jordan Environment Society, the Energy Conservation and Sustainable Environment Society, the Jordanian Society for Renewable Energy, the Jordan Society for Compact Desertification's, Organic Farming Society, The Arab Group for the Protection of Nature, the Jordan Green Building Council, and the Royal Botanical Garden. The establishment is a key development in the environmental governance in Jordan in general and the biodiversity conservation in particular. The alliance is currently preparing its first strategic plan and its associated plan of action. One of the main strategic goals of the alliance will be to raise the national awareness and enhance support for the protection of biodiversity against unsustainable development agendas and projects.

2. The Bergesh Forests Campaign

Bergesh is a dense evergreen oak forest located in the northern country as an extension to Ajloun forest. A military base was established in the forest several decades ago. The armed forces proposed to establish a training academy within the forest in the areas with the heaviest tree cover. The new academy is designed to over an area of 981,000 sq m. The Royal Society for the Conservation of Nature in collaboration with National Environmental NGOs alliance led a national campaign at all levels to stop this decision. The campaign was supported by all RSCN members and friends, in addition to the alliance supporters.

The campaign organizers managed to contact the military decision makers, the donors of this project, and the local communities around Bergesh, to cancel the project and to call into account those who were engaged in the illegal tree removal. The campaign managed to stop this decision, and secure what is left from this dense evergreen oak. This success was not able to be achieved without the full cooperation with all who are in charged in conservation represented by the alliance, in addition to the full engagement of local communities that

were aware about the values of the forest around their settlements and joined forces to prevent the destruction of this national asset.

3. The JREDS Eco-Schools Program

The Royal Marine Conservation Society of Jordan (JREDS) has been implementing the eco-schools program in Jordan since 2008. The program aims to raise students' awareness of sustainable development issues through classroom study as well as school and community action. With the emphasis placed on a democratic and participatory approach, the program encourages children and youth from all backgrounds, classes and areas in Jordan, whether in public or private schools to take an active role in how their school can be run for the benefit of the environment – highlighting the importance of civic values.

The eco-schools program is based on the ISO14001:2004 that specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organization subscribes, and information about significant environmental aspects. The eco-schools methodology encompasses seven steps that any school can adopt. The process involves a wide range of stakeholders, but pupils play the central role. After a period of participation, an evaluation of the success of these initiatives and the methodology is undertaken, and the whole Eco-Schools program for each school is assessed. Successful eco-schools are awarded the green flag, an internationally acknowledged symbol for environmental excellence. So far, a total of 95 eco-schools are established in three national localities including 60 schools in Amman, 30 in Aqaba and 5 in Zarqa. The awarded schools for green flag are distributed in Amman with a total of 12, and 9 schools in Aqaba.

Target 2
By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

National progress under this global target is represented by the following:

4. Mainstreaming Biodiversity in the Tourism Sector Development

This is a new national program addressing biodiversity protection in Jordan is the "Mainstreaming of Biodiversity Conservation in the Tourism Sector Development in Jordan" project. The project has started in 2014 and is expected to conclude its activities in 2017. The aim of the project is to reduce the impact of tourism on biodiversity in Jordan and it will intervene at three levels.

At the national level, it addresses the development of a regulatory and enforcement framework to reduce the impact of tourism on biodiversity, centrally (upstream); components are being be piloted at the local level, assessed and refined in preparation for being adopted nationally and to be made available for replication and up-scaling. At the regional/landscape level, the project targets public awareness and sensitivity of the value of biodiversity as a tourism drawcard and institutional capacity for planning, monitoring and enforcement so as to manage the impacts of tourism development inside and outside formally protected areas. At the Protected Area site level, the project works to enhance

capacity and management effectiveness of PAs (including revenue generation, tourism planning and management and community relations) so as to reduce impacts on protected biodiversity and benefit from nature-based tourism and ecotourism.

5. Climate Change and Biodiversity

Climate change research in relation to biodiversity was conducted in 2012 with the aim to guide the conservation sector of Jordan in regards to current and future management procedures. Four pilot sites were analyzed and monitoring programs and adaptation interventions were recommended. It was predicted that there will be an average temperature increase of 1-2°C, and decrease in precipitation of approximately 30% by the latter half of this century. Expected impacts/risks from climate change on ecosystems in Jordan according to climate exposure and sensitivity of ecosystems are droughts, forest dieback, and community composition change, expansion of drier biomes into marginal lands, habitat degradation and species loss.

The following climate change adaptation interventions have been implemented in the Jordan Rift Valley area:

- Increasing resistance to climate change through the restoration of deciduous oak forests at Al Yarmouk Protected Area and Shuleh Special Conservation Area.
- Improving water management at Mujib Biosphere Reserve.
- Improving resilience to climate change through restoration of Juniper forests at Dana Biosphere Reserve.
- Improving connectivity through agro-biodiversity and planting hedge groves between farms with native local species at Fifa Protected Area.

6. Efforts of the Forestry Department/ Ministry of Agriculture on the Sustainable Use of biodiversity

The adoption of the bylaw (G9/2008) under the agricultural law No. 44 of the year 2002 which deals with positive incentives given to communities in and around forestry areas by allowing local communities –under special regulations- to collect fruits and wood logs and to cultivate mushrooms in caves located near to their residence. Moreover, each family is allowed to make benefit of bare forest area (1,000 m2) to cultivate medicinal and ornamental plants as an income generating project. In return the local community members are expected to help in forestry resources protection efforts. Nowadays, about 50 families are benefiting from this project.

Wood collected from fallen trees and trees removed for specific reasons are sold to local communities for nominal prices, about 1/4-1/6 of their market price. Moreover and under special conditions, needy families are provided with 500 kg of wood free of charge to satisfy their needs of fuel wood, especially during winter. This is expected to reduce unauthorized trees cutting during winter to provide wood.

A national afforestation project was initiated in 1993 to incorporate private sector institutions in afforestation efforts. The project was re-launched in 2005 and recently in June 2014. The project regulations were reviewed and amended. Participating institution is expected to plant an allocated site and conserve it later on. In return this institution has the

right to name the site after the institution name and to use it for recreation purposes. Currently, more than 80 institutions are involved in the project.

An arrangement was made between the ministry of Agriculture and the ministry of industry and trade to lower customs and taxes on imported wood and coal. The purpose is to give a competitive advantage of these items of foreign origin compared to products from local origin, thus, making unauthorized wood logging and processing less appealing. This should result in forest protection as an important habitat for biodiversity.

7. The JREDS FEE Program in Aqaba, Wadi Rum and Petra

The Royal Marine Conservation Society of Jordan (JREDS) is running two international programs under the Foundation for Environmental Education, the Blue Flag and Green Key schemes for green certification. The Blue Flag program was released in 2010 as a voluntary eco-label for beaches and marinas and serves as a symbol of high quality in the area of environmental management, water quality, safety and health, and environmental awareness and information that is easily recognized by tourists and tour operators. The program aims to contribute to prevention and conservation of natural resources by promoting sustainable management and encourages local community as well as visitors to respect beaches and their surrounding areas. So far, five hotels raised the Blue Flag, four in Aqaba and one in the Dead Sea area. Recently, a public beach in Aqaba applied to obtain the Blue Flag as well.

The Green Key program is an eco-label for tourism facilities that aims to contribute to prevention of climate change and support sustainable tourism by awarding and promoting good initiatives. The Green Key aims to change the practices and behavior of tourism stakeholders including enterprises, authorities, guests, local communities, and to involve them in increasing their responsibility towards their own environment. The comprehensive demands put on the labeled businesses comprise demands on environmental management, technical measures, communication, and environmental education. So far, a total of ten hotels obtained the Green Key in Aqaba, as well as six in Amman and two in the Dead Sea area. A current success story addresses the development of a specialized set of guidelines for desert camps. This initiative succeeded to decrease the impact on the environment and increase revenues achieved by camp managers. A total of 11 camps were awarded under the green key in Wadi Rum and Petra areas during the last two years.

Target 4
By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

National progress under this global target is represented by the following:

8. The Sweimeh Eco-Park on the Dead Sea Coast

Sweimeh eco-park is a dense and connected Tamarisk wooded area located at the northern shoreline of the Dead Sea. The conservation of Tamarisk trees met the interest of Development Zone Company, a government owned company in charged in development of Dead Sea area. The Eco-park was established to protect more than 50ha of the native vegetation which lies within the restricted range Dead Sea Sparrow, and to enhance the

wild population of the endemic fish *Aphanius richardsoni*. The management of the eco-park was delegated to RSCN which implements the program in cooperation with all stakeholders including the local communities. A community based initiative is being implemented to eradicate the invasive *Prosopis juliflora* trees and use its products as livestock fodder and as fire wood. The company supports the initiative as a part of its social responsibility program included within the scope of the master plan of the southern Dead Sea area development. This approach contributes to the financial sustainability of the park, supported by the new eco-tourism activities which are proposed to enhance the income of the park to support the ongoing conservation activities.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5
By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

National progress under this global target is represented by the following:

9. The New Environment Protection Law

The Ministry of Environment has just finished reviewing the environmental law 52/ year 2006 to adapt the new challenges that impact the environment of Jordan. Specific updates were made on this law dealing with the habitats protection, establishment of the protected areas, bio-safety, and the genetically modified organisms. On the other hand, penalty system was maximized, especially for violations that directly impact biodiversity, mainly the woodcutting, encroachment upon protected areas, and coral trade. An EIA by-law was drafted to be applied on wide range of investment or development projects.

Jordan is a country with low energy resources. Most of its consumed energy imported from abroad since Jordan has no oil or gas, which loaded the total budget of the country. Therefore, the needs of alternative green energy resources emerged, and renewable energy such as solar energy and wind farms were on the top of these resources. The later attracted interests of donors and investors who were challenged by the significant importance of Jordan for the migratory birds at the global level. Based on that, the ministry of environment in coordination with all relevant stakeholders prepared a rough copy of Wind Farm Regulations where an intensive EIA studies and monitoring program were imposed. A joint work with the Ministry of Energy and Mineral Resources was carried to identify the best locations of wind investment in the context of migratory birds' sensitivity and minimal impact on the protected areas and its landscape. The ministry of power had prepared the first draft of wind farm investment regulations to be discussed in the parliament.

Target 7
By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

National progress under this global target is represented by the following:

10. The National Forestry Department/Ministry of Agriculture Program

The mandate of forestry department is to conserve forestry resources and to manage it sustainably. For that, dedicated division for forest management is founded within forestry department. The department mandate is to prepare adequate legislation to ensure proper conservation and management of forestry resources.

For example, the forestry articles are being reviewed and updated as part of the new agriculture law. In addition to legislative role, the department is responsible of forest conservation by establishing a network of forest stations and observing towers to control violations of forestry resources or their misuse.

Nowadays there are 45 forestry stations and 15 observing towers spread over the country. This network is continuously expanded as new hot zones are identified and new threats for forestry resources are emerged. In addition, a telecommunication network is used to facilitate communication between forestry officers in the field and officials in the headquarters.

Moreover, biodiversity is mainstreamed in the forestry department activities through the foundation of biodiversity and seed center division, which focus on genetic materials and biodiversity conservation. For that, genetic materials for about 100 species of forest trees and rangeland shrubs are being collected and stored. The stored material from seed center and seeds collected locally are used to propagate seedlings in 14 specialized nurseries distributed all over Jordan for proper representation of bio-geographical zones in Jordan, two of these nurseries were founded during the period 2012-2014. One of these newly founded nurseries is dedicated to propagate natural forest trees and rangeland shrubs seedlings only, and produce about 50 thousand seedlings annually. Currently, about 3 million seedlings of forest trees and rangeland shrubs are produced annually in all nurseries. Seedlings produced in these nurseries are grown in barren land or used to rehabilitate deteriorated sites.

In 2013, more than 4,00ha were planted with about 200,000 forest trees as part of the department activities. In addition, More than 1,300,000 seedlings were distributed in 2013. Seedlings were distributed free of charge to public and private institutions as well individuals to participate in greening efforts.

Target 9
By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

National progress under this global target is represented by the following:

11. Controlling the Invasive Species at Azraq Wetland Reserve

A critically endangered endemic fish species found in Azraq wetland reserve named *Aphanius sirhani* is suffering from a number of introduced species that are competing the food and breeding grounds. A long term project aimed to rescue this species and bring it back from extinction undertook the responsibility to control the invasive species.

Five invasive species were identified in Azraq namely: *Tillapia zillii, Oreochromis aureus, Acanthobrama lessneri, Cyprinus carpio,* and *Clarias gariepinus*. The specific impact on the wetland habitats and the endemic species was identified though a detailed specific research program, after which a specific action plan was taken toward these invasive species. The conservation activities managed to remove the Common Carp *C. carpio* and the Catfish *C. gariepinus* completely while significantly affecting the population structure of the two Cichlids *T. zillii* and *O. aurues* though a continuous removal of adults same as *A. lisseneri*.

In addition to the direct removal, some water bodies were completely dried then left for few months before receiving water again. After this, the endemic fish populations were re-established. With continuous monitoring; the endemic species remains the dominant species, while the invasive species are still under control.

Target 10
By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

National progress under this global target is represented by the following:

12. The Marine Biodiversity Conservation in Aqaba

The ASEZA/UNDP (2012-2015) project aims at mainstreaming biodiversity conservation in order to promote more effective and integrated management of the coastal zone in the Aqaba Special Economic Zone (ASEZA). The four main components of the projects are:

- Development and improvement of knowledge-management systems for coastal and marine biodiversity,
- Promotion of biodiversity friendly investment and development,
- Improving institutional capacity for integrated coastal zone management
- Biodiversity conservation and coral reef protection.

Main accomplishments to date:

- Corals translocated and transplanted/fixed using marine cement at Al Mamlah/ marine park:
- Completion of the translocation of coral communities from the new location of the main port to the Marine Park
- Developed the Capacity Development Plan for the institutions engaged in ICZM
- Developed the "publicity strategy" that addressed the protection and sustaining marine and coastal environment in Aqaba

Expected outputs towards the end of the project include:

- Developing the marine and coastal biodiversity database with GIS support.
- Producing a 'State of the Coast' report that covers biodiversity conservation issues.
- Evaluating Jordan's marine biodiversity (Ecosystem services).
- Developing a Marine Spatial Plan for the ASEZA.
- Implementing the coral translocation plan.

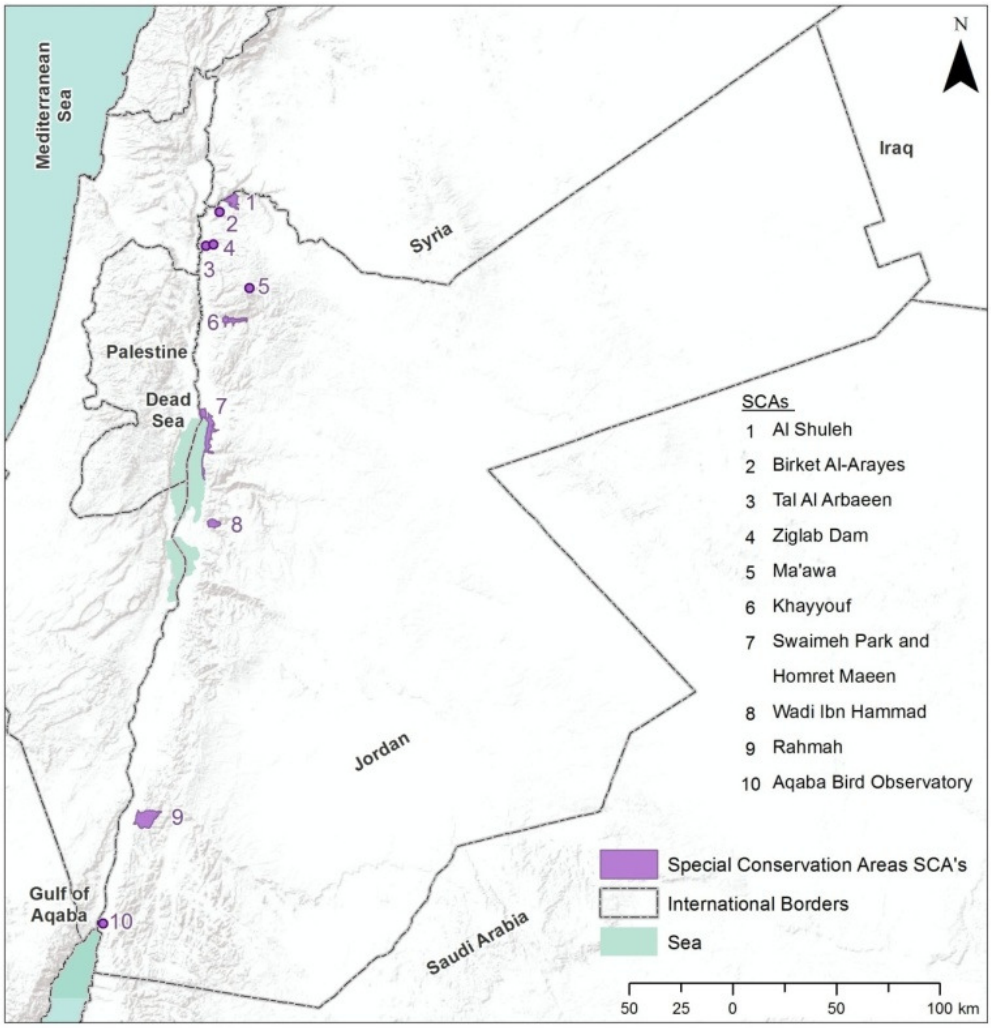
Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11
By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

National progress under this global target is represented by the following:

13. The New National Special Conservation Areas Network

During the last five years or so, new governance arrangements have arisen in the designation and management of protected areas across Jordan. In addition to the core set of nature reserves established and management by RSCN, other protected areas are being declared by the Ministry of Environment and their management mandates to other government, nongovernment and often community based organizations. These protected areas with their specific governance arrangements include several prime national sites such as Wadi Rum and the Aqaba National Park which Are managed by ASEZA, while others represent numerous add-on sites with the primary objective to establish and maintain ecological connectivity between core sites and establish ecological corridors with other non PA sites, and finally safeguard specific ecological hot spots (often smaller in size and lower in diversity) which were not included in the national system plan. A lot of these new sites are known as Special Conservation Areas (SCAs). This represents a positive development in the national governance system of the network, however with many challenges and questions emerging on national integration and management effectiveness. An elaborate discussion on the protected areas network is included in section 3:3 of Part I.



(Source: RSCN, 2014)

The following table summarizes the key characteristic of the SCAs:

No	Site	Size	Location	Vegetation type	Lead agency	Main management interventions
1.	Al-Shuleh SCA	20 km^2	Irbid (Yarmouk)	-Deciduous Oak -Water vegetation	Al-Shuleh Municipality	-Recreation and ecotourism
2.	Tal Al Arba'in SCA	.5 km^2	Northern Ghor Region	-Saline vegetation	Bab Al Salam Women Cooperative	-Sustainable agriculture
3.	Khyouf SCA	20 km^2	Al Balqa region	-Water vegetation -Steppe	Al Khair and Wafa Society	-Sustainable agriculture -Recreation
4.	Homret Ma'in SCA	40 km^2	Dead Sea region	-Water vegetation	Development Zones Company	-Tourism -Eco-tourism

				-Tropical and saline -Steppe	(JDZ)	-Agriculture
5.	Ibn Hammad SCA	15 km^2	Karak region	-Water vegetation. -Tropical	Bateer Women Society -Wadi Ibn Hammad Society	-Ecotourism -Sustainable agriculture
6.	Aqaba Bird Observatory	1 km^2	Aqaba region	-Saline vegetation	ASEZA	-Ecotourism
7.	Hima Layathneh SCA	2 km^2	Petra region	-Mediterranean non-forest -Traditional agriculture -Recreation -Nearby cultural tourism	PTDRA	-Ecotourism
8.	Al Ma'awa SCA	1 km^2	Jerash region	-Pine vegetation -Wildlife sanctuary -Natural Forest (Pine and Oak)	PAF	-Wildlife sanctuary
9.	Rahma SCA	30 km^2	Aqaba region	-Sand dune vegetation -Desert landscape -Livestock grazing	NA (currently)	NA (currently)
10.	Royal Botanic Garden	2 km^2	Jerash region	-Pine forest	RBG	-Plant conservation -Rangeland rehabilitation

14. The Royal Botanical Garden SCA

The RBG is one of the emerging nongovernment organizations in Jordan with a mission to conserving native biodiversity at the habitat level, establish a centre for scientific research and environmental education, serve as a demonstration site for sustainable development, and provide a unique ecotourism destination, in addition to the encouragement of sound applied research, the promotion of good practices and knowledge exchange.

The RBG site is located at Tell Ar-Rumman, Jordan, on around 180ha of steep slopes overlooking the King Talal Reservoir. The site comprises a selection of significant soil types, several wadi (seasonal wash) systems, a perennial freshwater stream and over 300 meters of elevation change within its boundaries, availing a wide range of possibilities for habitat development. Over 580 plant species belonging 74 families which represent 23% of the total flora species recorded in Jordan. The main programs running at RBG include:

- The ex-situ conservation of wild plant species through the national seedbank and native nursery.
- The demonstrative re-creation of five of the primary habitats in Jordan.
- National Herbarium and National Virtual herbarium

- Community Based Rangeland Rehabilitation
- Establishment of the Jordanian Plant Red Data Book
- Publishing the National Strategy for Plant Conservation
- The development and implementation of an applied research program specific to plant conservation and habitat rehabilitation.
- The socioeconomic development of local inhabitants residing within and around the SCA.
- The implementation of a targeted educational and environmental awareness raising program for local schools, youth and decision makers.
- The preparation of good practice guidelines for effective SCA management based on international best practices and knowledge.

The SCA is managed under a participatory approach by a local advisory committee headed by the local governor with members from the local communities, related ministries, and national research institutions and academic departments.

Finally, the SCA is governed by a set of agreed upon land use guidelines which are based on the site's ecological zoning plan with the objective to ensure long term ecological sustainability and maximize the local community benefits from the sustainable utilization of the area's natural resources.

15. The Petra PA Program

The Petra Development and Tourism Regional Authority (PDTRA) is the prime national authority in charge of the protection and sustainable development of the Petra Archeological Park (PAP) and World Heritage Site. A new initiative has been developed by PDTRA in cooperation with other national and local institutions with the goal to develop and implement a strategic framework for the inclusion of PAP in the national Network of Protected Areas for Natural Heritage in recognition of its natural heritage significance at the national and global levels.

The innovative program addresses key challenges facing Petra today as well harnessing emerging opportunities, including:

- The fulfillment legal arrangements for the inclusion of PAP in the national network of protected areas and its endorsement by the central government.
- The development of the Management Plan for PAP and its buffer zone and its implementation including the biodiversity research and monitoring.
- The enhancement of the technical capacities of the PAP team in the fields of natural heritage management, biodiversity monitoring and law enforcement, ecology based interpretation and ecotourism development and management.
- The contribution to the potential nomination Petra as mixed World Heritage Site for Culture and Nature.
- The development of nature based tourism products including the development of a nature based tourism strategy, the creation of nature trails, interpretation, local guide training, and information fixtures.

16. Wadi Rum World Heritage Program

The World Heritage Committee inscribed Wadi Rum of Jordan in 2011 as a mixed property displaying unique natural beauty and cultural significance. The inscription was represented a remarkable success for Jordan. The achievement to a tribute of the efforts of the Ministry of Environment, in cooperation with the Aqaba Special Economic Zone Authority, the Ministry of Tourism and the USAID/Jordan Tourism Development Project.

The Wadi Rum protected area, 300 km south of Amman, encompasses 720 sq km of desert wilderness associated with the iconic sandstone landscape that is home to Bedouin tribes and a range of desert wildlife, including the Arabian Oryx. Archaeological finds in the area indicate that Wadi Rum has been inhabited as far back as prehistoric times, with its unique landscapes and water sources offering a place of refuge for those travelling from the Gulf to the Levant. The natural landscapes, the inscriptions, and the Bedouin culture and tradition lend an intrinsic value to the site and attract hundreds of thousands of visitors from across the world. Along with nearby Petra and Aqaba, the site is part of the so- called golden triangle of tourism in the southern region.

The inscription on the World Heritage on the world Heritage list makes the property of the first mixed site to be inscribed in the whole of the Levant region and the Arabian Peninsula. The site enjoys many opportunities for sustainable tourism, local community development and empowerment, however, at the same time faces numerous challenges related to its effective management and long term sustainability. The site's management plan was updated in 2014 and a enhanced participative governance systems is being developed in cooperation with local communities.

Target 12
By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

National progress under this global target is represented by the following:

17. The National Plants Red List

The Royal Botanical Garden – in cooperation with government agencies and academic institutions – has been updating the national checklist on plant diversity. The ambitious strategic program aims to continue the update of the national data base for plant diversity.

To date some major progress has been made including:

- The updated checklist of wild plants.
- The establishment and update of the national red list for plant species. Out of the 2,622 species, 1073 were assessed based on IUCN red list guidelines, and 926 species were successfully classified on the first red list. RBG will publish the first volume of the national red list in 2014, followed by two more volumes containing the full national list in the years 2015 and 2016 respectively.
- The development of an annotated checklist starting 2015.

- The establishment of a national web-based data base for plant species. This was already initiated in 2013 and will follow a long term program.
- The identification and maintenance of a national black list of non-native plants starting 2014.

Target 13
By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

National progress under this global target is represented by the following:

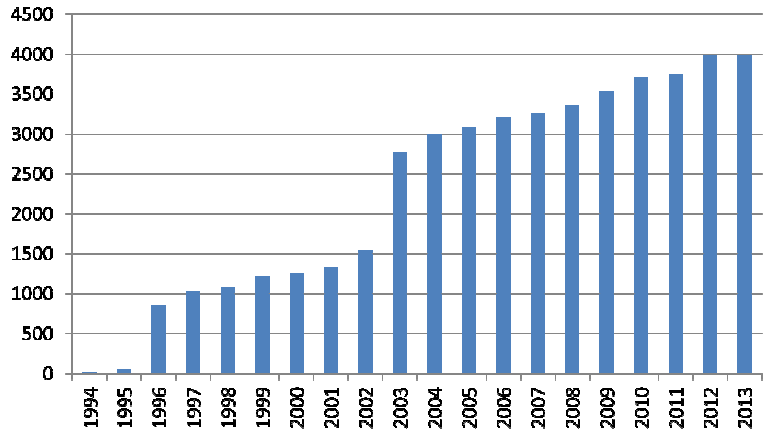
18. NCARE National Conservation and Utilization of Plant Genetic Resources (PGR)

NCARE has recently prepared a national baseline study and a strategy under an FAO project titled: "Optimizing the Use of Plant Genetic Resources for Food and Agriculture for Adaptation to Climate Change". This study aims at adopting and implementing a proper action plan for PGRFA, and includes a proposal for establishing National Information Sharing Mechanisms which will improve the ability to make decisions about plant genetic resources, improve the quality of information about plant genetic resources status and dynamics, and increase the ability to monitor changes in plant genetic resources over time. The study is expected to be adopted by NCARE biodiversity directorate and implemented in 2015.

Jordan established a Genetic Resources Unit (GRU) in 1993 at NCARE\Ministry of Agriculture. Currently, this unit has flourished into a full directorate, housing 3 distinctive departments: the Medicinal and Herbal Plant Department, the Plant Genetic Resources (PGR) Department, and the Plant Biodiversity Department. The objectives of the Genetic Resources Unit are:

- Collection of plant genetic resources in Jordan.
- Evaluation, documentation, conservation and sustainable utilization of plant genetic resources in accordance with international rules.
- Promotion of the exchange of plant genetic resource material and information locally and internationally.
- Coordination of crop genetic resource activities (research, conservation *in situ* and ex-situ, public awareness, intellectual property and benefit sharing).
- Development of relevant strategic action plans and policies as the national center for plant genetic resources in Jordan.
- PGR multiplication, propagation and breeding.

The figure below includes the number of PGRFA Seeds Conserved at NCARE National Gene Bank:



19. The Seed Centre at the Forestry Department/Ministry of Agriculture

The Forestry Department/Ministry of Agriculture has established a Seed Center consisting of four subunits: seed collection, seed extraction, seed testing, and cold storage. The cold storage gene bank at the Seed Center maintains a vast range of genetic resources from forest trees and pastoral shrubs in medium term storage. Activities include collecting indigenous and threatened species, documenting accompanying data, and carrying out experiments to determine best germination procedures for each species.

The Seed Center has seeds of about 100 forest trees and rangeland shrubs species preserved, and provides forest nurseries with seeds every year.

20. Ecosystem conservation- local Honeybees &biodiversity – A case study from NCARE

The Bee Research Department at NCARE confirmed through its research that the free benefits derived from pollination obtained by ecosystem services provided by our endogenous insects, including honeybee improve the productivity and quality. According to the studies outcomes, the value of ecosystem services provided by insects to (34) selected crops to Jordanian economy was (33%) of the total value of these crops production, and the approximate value of estimation due to honeybee pollination was (27%) of their total value which was (26.3) times more that the total value of Jordan domestic honey production.

Self-Sufficiency outcomes results indicate that scenario of losing insects pollination will directly affect at least 35% of local crop production that were selected and this will harm our food security. Moreover, it is becoming evident that there is a crucial need to attract young generation's attention to the value of honeybees in achieving food security and stability of ecosystems conservation. Due to the worldwide decline of honeybee population, and the decreasing number of beekeepers, NCARE established a Bee Research Department which is mandated to conserve the local honeybees *Apis m. syriaca*, to study its behavior, breeding, and selection.

During the last 10 years this department distributed for free over 20,000 queens' cells which had helped in the conservation of this important honeybee genetic resource. Further,

the Department published 4 books and booklets; one of which was “Honeybees and Medicinal Plants of Jordan” which demonstrates the strong relationship between honeybees and wild flora. The program also included a schools’ awareness program targeting 1,200 classes with over 42,000 students from Jordan, Iraq and Palestine.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

Target 18
By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

National progress under this global target is represented by the following:

21. Community-based Rangeland Rehabilitation: A Case Study from Tall Ar-Rumman

The overarching goal of the Community–Based Rangeland Rehabilitation Project (CBRR) developed and managed by RBG, is to improve local livelihoods through sustainable ecosystem management. This is being achieved through the establishment of suitable environmentally friendly and sustainable income generation programs according to the community needs. Before initiating the CBRR, herders were grazing illegally all year round, and often cut the fence around the botanic garden for their livestock.

When RBG started the initiative, plans were adopted to restore the plant cover, conduct vegetation surveys and undertake biomass estimates, with the exclusion of livestock. These actions were faced with local opposition, which led to the adoption of an action plan to supply substitute forage to the livestock owners in compensation of the prohibition of livestock admission to the site.

The local community was involved in the project from the beginning. This included participating in problem definition, developing possible solutions, identifying alternative grazing scenarios and timing of the grazing activities. All of these were discussed during the public meetings with livestock owners and key personnel in the area.

Through the CBRR initiative, 42 families benefit through the various activities of herds management, rotational grazing. As a result, the Biomass of the protected site increased from 50 tons to over 100 tons and the plant species increased from 436 to 580 species.

The RBG's CBRR program was identified in 2012 as "one of the best ideas on the planet" by Katerva Award Council experts in global innovation, progress and ingenuity. The program was also one of 16 semi-finalists projects for the Land for Life Award in 2013, out of 137 projects. The CBRR will be replicated in other areas, including the development of a set of sustainable grazing protocols that can be used to improve the quality of rangeland habitats and the livelihoods of pastoralists throughout the region.

22. The Amman Declaration on Innovating Hima

This declaration was adopted in a regional workshop in Amman convened by the IUCN ROWA office.

Al Hima 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.

The starting point for restoring rangelands and reviving Hima is to address social rather than technological constraints. Reviving Hima is therefore a process rather than an action and whilst it is highly cost-effective, it is also highly demanding of skills; particularly skills for negotiation, participation and consensus building. Reviving Hima requires extensive dialogue between communities, government, and other stakeholders to reach agreement over policies and shared governance of natural resources at local, national and regional level.

A number of examples of reviving Hima exist in the Arab region, demonstrating common principles as well as local adaptations. Evidence shows that Hima is a way to optimize management of the rangelands (and other land use types) and deliver economic and environmental benefits, as well as associated social benefits, and contribute to relevant international targets.

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

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

Target 19
By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

National progress under this global target is represented by the following:

23. The RSCN Ajloun Nature Academy

A strategic goal of RSCN's is to build up the capacity of its personnel and partners through a structured capacity building program which started in late 1990s targeting partners at the national and regional levels. These programs focus on the protected area management, research methods and techniques, socio-economic development of local communities and its relation with protected areas, project management, and other supporting tools needed including training skills, proposal writing, technical writing, and public awareness program.

In 2008, RSCN adopted a new transformation strategy, where training and capacity building remained a strategic priority. Based on that, it was decided that the training and capacity building becomes a standalone program under what is planned to be: the Ajloun Academy for vocational training. A regional needs assessment was carried out early in 2011 to address the training needs of all partners. Three main topics were identified as a priority for the training program. These are: Protected Area Management, Biodiversity Conservation, and Socioeconomic Development.

The academy will be developed to accredit its curricula/certificate at international level. Three curricula are being developed in corporation with an international institution. The protected area management program is being developed in cooperation with Montana University; while the other two on biodiversity and socioeconomic development in cooperation with the Alfred Toepfer akademie für naturschutz.
A state of the art facility was built in Ajloun on an old abandoned quarry, with the capacity of 100 students. The building is designed to host more than one course at a time.

In conclusion, all of the capacity building efforts will be consolidated in a central training unit at RSCN, which will focus on the these three programs, in addition to other short courses covering the supporting skills needed for protected area management and nature conservation.

24. Jordan Environmental Information System

The objective of JEIS is to serve as a functional virtual platform for collecting, processing, analyzing and disseminating information to support the connectivity between the research and policy making for the management related to the three Rio conventions (CBD, UNCCD & UNFCCC) in Jordan, as well as to provide this information to various stakeholders in a timely and comprehensive way. The Project was funded by the Global Environment Facility (GEF) and partially by the Government of Jordan; and was implemented by the United Nations Development Program (UNDP-Jordan) and MoEnv.

The structure of the platform is comprised of: a directory of national institutions involved in the management of the environment, a catalogue of information needs and reporting requirements for the conventions, a catalogue of data and information resources, a directory of experts and facilities, and a documentation system. Accomplishments as of March 2013:

- Defined components and infrastructure of the proposed platform.
- Implemented platform components & infrastructure.
- Trained personnel in modern information management to capture, develop, and maintain the platform and dissemination of information products.

- Developed a detailed training manual and online help functionality to meet the training requirements of platform users.
- Proposed a framework for further development and expansion of the platform.

25. The National Biodiversity Information Management System (BIMS)

The development of a national system for biodiversity information management has been a national priority for a long time. A group of national institutions including MoEnv, RSCN, MoTA, ASEZA, PDTRA and MoMA came together with technical and financial support from GEF and UNDP to design and implement the first national management information systems specialized in biodiversity. The principal objective of the initiative is to develop and maintain a national system for biodiversity information and a monitoring system to hosted by the Royal Society for the Conservation of Nature (RSCN) in close collaboration with key national stakeholders and beneficiaries.

The BIMS is being developed on a GIS platform, aligned with the RSCN national Database and integrated with databases that exist for each of the pilot PAs selected for the program in Wadi Rum, Petra and Dibbin. The ultimate goal is to develop a nationally consolidated biodiversity information system accessible to stakeholders from the Government, Civil Society and the Private Sector. The results of this program are set to inform national and regional Land Use Plans, serve as a platform for decision-making, and as a source of up to date knowledge on biodiversity. The program started in 2013 and is foreseen continue through 2015.

7.3 Proposed strategic actions towards an improved national alignment approach

The Ministry of Environment is in the process of reviewing and developing the governance arrangements related to the national coordination, communication and reporting on the national biodiversity program. These include:

- The enhancement of the role of the national coordination mechanisms, primarily the national biodiversity committee.

- Encourage and facilitate the inter-institutional collaboration in the various fields of biodiversity while allowing for more specialization.

- The finalization of revision and alignment of NBSAP and more importantly the adoption of a clear national mechanism for its implementation and monitoring. This also includes the development of a clear financing strategy for the plan implementation from local and external sources.

- The adoption of a national capacity building program for the ministry and its associated partners and stakeholders from the government, civil society, local communities and private sector.

- Enhance the participation and involvement of national stakeholders and particularly local communities in the design, implementation and evaluation of national biodiversity strategies and programs as the central and site base levels. This should include a clear policy on sharing the benefits of biodiversity across all relevant stakeholders and interest groups.

- The adoption of an agreed upon financing plan for the implementation of the delivery on the various global targets related to biodiversity conservation. This should include both national as well international sources of funding and technical cooperation.

Section Eight: Synthesis on Jordan contribution towards the relevant MDGs

8:1 Relevance of the convention to the broader national objectives

In Jordan, the first National MDG report was released in 2004 and made an effective contribution to the country's policy-making as the goals, targets and indicators were adapted and aligned with national plans and development priorities.

The Jordanian Ministry of Planning and International Cooperation and in close consultations with UN agencies, civil society organizations and relevant stakeholders, launched in 2010, Jordan's Second National MDG Report titled "Keeping the Promise and Achieving Aspirations". The report shows Jordan's progress towards achieving the MDG's and focuses on the steps required for the upcoming stage to meet the goals by 2015. It also serves as a reference informing national development plans.

Jordan's second MDG Report showed that the country is on the right track towards meeting most of the MDG targets. In particular, MDG2 has been achieved and achievement of MDG5 and 6 is possible. Targeted policy actions are needed to achieve MDG 1, 3, 4 and 7. In general, significant challenges still impede progress particularly in light of the repercussions of the global economic crises and its impact on economic growth rates, public debt, government revenues and unemployment rates. With only 5 years to achieve the MDG's, a more holistic approach needs to be adopted.

In 2006 Jordan released two important documents that articulated the vision of the country and development planning, namely the "National Agenda" and the "We are all Jordan". This vision was operationalized into a three-year National Executive Program (NEP) specifying policies, programs and projects for government institutions. Other national programs focused on building the capacity of the Ministry of Planning and International Cooperation, which in charge of their monitoring and evaluation, in incorporating MDG indicators within the NEP.

However, the above efforts needed to be placed within an overall framework and be supported with comprehensive coordination mechanisms that enable formulation of coordinated policies at the national, sectoral and local levels. Key to achieving this is to provide the needed data and analysis and generate the knowledge base for policy-making. Therefore, several technical and institutional support programs are being provided by international partners to help the MoPIC establish an effective monitoring framework for MDG's in the NEP.

8.2 National Efforts Related to MDG 7

In Jordan, though a couple of Goal 7 targets have been achieved, overall the timely achievement of Goal 7 appears difficult given the daunting challenges. These relate to the acute water scarcity, high and still rising energy demand and prices, the shortfall on the sanitation target, biodiversity depletion, deforestation levels, increasing pollution of air and ground water, inadequate waste management, prospects of climate change and global warming, in addition to the potential repercussions of the financial crisis on the implementation of mega environmental preservation projects. According to 2009 DoS data, basic energy consumption in 2008 increased by 47.1% compared to 2000, while the population increased by 21.4% during the same period.

After its accession to the Montreal Protocol on Substances that Deplete the Ozone Layer, Jordan has fulfilled its commitment to ban the consumption of ozone-depleting substances and replace them with environmentally-friendly materials. It has also adopted numerous policies to limit CO^2 emissions. No radical change has been noted in the volume of greenhouse gas emissions, particularly carbon dioxide emissions, but greenhouse gas emissions are likely to be considerably reduced in case of further expansion in the replacement of crude oil and heavy fuel with natural gas.

Another positive development relates to access to potable water as notwithstanding the low availability of water resources, by 2008 Jordan had been able to connect 98.41% houses and community clusters to public water networks. The proportion of the population with a connection to a sewage network also increased from 48% in 2001 to 62.2% in 2008, but at this rate, achievement of the target of 70% use by 2015 appears improbable.

Several recent studies predict the negative impact of climate change on Jordan. Possible changes include rising temperatures and decreasing rainfalls, which will lead to a decrease in surface water sources and groundwater, reduce agricultural productivity and have multiple health impacts.

Controlling biodiversity depletion in Jordan remains a difficult and complicated issue, due to water scarcity and increasing pollution of water, soil and air in addition to the other potential negative impacts of climate change.

Despite a slight improvement with terrestrial and marine protected areas covering 1.4% of the total square area of Jordan in 2014, compared to 0.44% in 2004, the numbers of endangered species continue to decline significantly.