

Sultanate of Oman



Ministry of Environment and Climate Affairs

5th National Report to the Convention on Biological Diversity (CBD) 2014



THE PRESENT REPORT IS MAINLY BASED ON INFORMATION FROM:



Chris Mitchell, www.epilicons.com ©All rights reserved

Thanks for the support and assistance of:
Ms. Diane Klaimi: UNEP-ROWA
Prof. Dr. Ghassan Ramadan-Jaradi: Consultant
Dr.Thuraya AL Sariri & Mrs. Mariam Al-Busaidi: MECA

This report is based on the information provided mainly by: Ministry of Environment and Climate Affairs, Ministry of Agriculture and Fisheries, Ministry of Education,, Ministry of Heritage and Culture, Ministry of Higher Education, Ministry of Interior, Ministry of Manpower, Ministry of Regional Municipality and Water Resources, Ministry of Oil and Gas, Ministry of Social Development, Ministry of Commerce and Industry, Ministry of Tourism, Office of Conservation of the Environment, Oman Botanic Garden (Diwan of Royal Court) , Research Council (Oman Animal and Plant Genetic Resources Center),Sultan Qaboos University and Environment Society of Oman.

TABLE OF CONTENTS

1	LIST OF ACRONYMS	7
2	LIST OF FIGURES, PLATES, AND TABLES	8
3	EXECUTIVE SUMMARY	10
3.1	Importance of biodiversity	10
3.2	Conservation status of habitats and species	10
PART I: AN UPDATE ON BIODIVERSITY STATUS, TRENDS, AND THREATS AND IMPLICATIONS FOR HUMAN WELL BEING		14
4	ECOSYSTEM/SPECIES BIODIVERSITY OF OMAN	15
4.1	Desert (74% of Oman) Biodiversity	15
4.2	Mountain Biodiversity	16
4.3	Agricultural (8% of Oman surface area) biodiversity	17
4.4	Wetlands, Islands and Marine Biodiversity	19
4.5	Forest and woody areas	21
4.6	Taxa Diversity	21
5	PROTECTED AREAS	25
6	GREEN ECONOMY	28
7	AGRICULTURE	28
8	LEGISLATION	31
8.1	The Status of the Development (Kyoto)	31
8.1.1	Regulations on the National Level in the Sultanate of Oman	32
8.1.2	International Treaties and Conventions	32
8.2	General Overview of Environmental Standards in the Sultanate	32
8.3	Main Areas of Environmental Concern	33
8.3.1	Marine Pollution	33
8.3.2	Air pollution	33
8.3.3	Noise pollution	33
9	BIODIVERSITY TRENDS/ISSUES	34

	9.1	Trends/Issues of Aquatic Biodiversity	34
		9.1.1 Macroalgae Trends	38
		9.1.2 Seagrasses Trends	38
	9.2	Terrestrial Flora Trends	39
	9.3	Amphibians and Reptiles (Herptiles) Trends	39
	9.4	Birds Trends	40
	9.5	Mammals (Terrestrial and Marine) Trends	40
10	THREATS TO BIODIVERSITY		41
	10.1	Threats to Macroalgae	41
	10.2	Threats to Terrestrial Flora and Marine mangrove	42
	10.3	Threats to Corals	42
		10.3.1 Natural Disturbance	43
		10.3.2 Human Disturbance	43
	10.4	Threats to Reptiles/Turtles	43
	10.5	Threats to Birds	44
	10.6	Threats to Mammals (Terrestrial and marine)	45
		10.6.1 Threats to Terrestrial Mammals	45
		10.6.2 Threats to the Cetaceans	45
11	IMPACTS OF CHANGES IN BIODIVERSITY FOR ECOSYSTEM SERVICES AND THE SOCIO-ECONOMIC AND CULTURAL IMPLICATIONS OF THESE IMPACTS		46

PART II: THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN, ITS IMPLEMENTATION, AND THE MAINSTREAMING OF BIODIVERSITY		47
12	NATIONAL BIODIVERSITY TARGETS	49
13	NBSAP UPDATES TO INCORPORATE NATIONAL TARGETS AND TO SERVE AS AN EFFECTIVE INSTRUMENT TO MAINSTREAM BIODIVERSITY	57
14	ACTIONS TAKEN TO IMPLEMENT THE CONVENTION SINCE THE FOURTH REPORT AND THE OUTCOMES OF THESE ACTIONS	60
15	EFFECTIVE BIODIVERSITY MAINSTREAMING INTO RELEVANT SECTORAL AND CROSS-SECTORAL STRATEGIES, PLANS AND PROGRAMMES	69
16	RATE OF THE IMPLEMENTATION OF THE NBSAP	81
PART III: PROGRESS TOWARDS THE 2020 AICHI BIODIVERSITY TARGETS AND CONTRIBUTIONS TO THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS		85
17	PROGRESS TOWARDS THE IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND ITS AICHI BIODIVERSITY TARGETS	85
18	PROGRESS TOWARDS THE GOALS AND OBJECTIVES OF THE STRATEGIC PLAN OF THE CONVENTION	107
19	THE CONTRIBUTION OF ACTIONS TO IMPLEMENT THE CONVENTION TOWARDS THE ACHIEVEMENT OF THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS IN OMAN	108
20	LESSONS LEARNED FROM THE IMPLEMENTATION OF THE CONVENTION	111
21	APPENDICES	113
21.1	APPENDIX 1: INFORMATION CONCERNING THE REPORTING PARTY AND PREPARATION OF THE FIFTH NATIONAL REPORT	113
21.2	APPENDIX 2: INFORMATION CONCERNING THE REPORTING PARTY AND PREPARATION OF THE FIFTH NATIONAL REPORT	114
22	ANNEX. 1: REFERENCES	115

LIST OF ACRONYMS

AER - Authority for Electricity Regulations
AOS – Arabian Oryx Sanctuary
CBD – Convention on Biological Diversity
CDM - Clean Development Mechanism
CFCs - Chlorofluorocarbons
CHM – Clearing House Mechanism
CITES – Convention on International Trading in Endangered Species of Fauna and Flora
DGNC – Directorate General of Nature Conservation
DNA - Designated National Authority
EMP – Environmental Management Plan
EIA – Environmental Impact Assessment
ESO – Environment Society of Oman
IBA – Important Bird Area
IMO - International Maritime Organization
IRENA - International Renewable Energy National Agency
IUCN - International Union for the Conservation of Nature and Natural Resources
IWMS - Integrated Water Management Strategy
GCC – Gulf Cooperation Council
GDP – Gross Domestic Products
GEF – Global Environment Facility
GRR - Genetic Resources Roadmap
JICA – Japan International Cooperation Agency
MD – Ministerial Decree
MMR - Maternal Mortality Ratio
MORMEWR – Ministry of Regional Municipalities, Environment and Water Resources
MOECA – Ministry of Environment and Climate Affairs
MOAF – Ministry of Agriculture and Fisheries
MOWAFW - Ministry of Agriculture and Fisheries Wealth
NBSAP – National Biodiversity Strategy and Action Plan
NCA – Nature Conservation Areas
NGO – Non-government Organization
NR – National Report
NSSDAR - National Strategy of sustainable development for animal resources
NSWM - National strategy for waste management
OBG – Oman Botanic Garden
OCE- Office for Conservation Environment
OMR – Omani Rial
OSS – Oman Salinity Strategy
PDO – Petroleum Development Oman
QCEI – Qurm Center for Environmental Information
RD – Royal Decree
ROWA – Regional Office of West Asia
SQU – Sultan Qaboos University
UN – United Nations
UNCLOS – United Nations Convention on the Law of the Sea
UNEP – United Nations Environment Programme
UNICEF - United Nations International Children's Emergency Fund

2-LIST OF FIGURES, PLATES, AND TABLES

LIST OF FIGURES	
FIGURE 1: LOCATION OF THE SULTANATE OF OMAN	14
FIGURE 2: LOW SAND DUNES AT THE JUNCTION WITH DESERT PLAINS	16
FIGURE 3: WADI SHAB WITH AN OASIS OF PALM TREES	17
FIGURE 4: SUSTAINABLE DEVELOPMENT STRATEGY FOR ANIMAL RESOURCES	19
FIGURE 5: BANDAR AL KHAYRAN IN OMAN	20
FIGURE 6: VIEW FROM DIMANIYAT ISLANDS	21
FIGURE 7: THE FOUR GLOBALLY THREATENED MARINE TURTLE IN OMAN	22
FIGURE 8: TRADITIONAL AND TERRACED AGRICULTURE TO AVOID SOIL EROSION	30
FIGURE 9: NURSERY OF MANGROVE AT QURM RAMSAR SITE IN MUSCAT	34
FIGURE 10: AREAS OF MAJOR CORAL GROWTH IN THE SULTANATE OF OMAN	35
FIGURE 11: CAVE CORAL FROM OMAN	36
FIGURE 12: COMMON BROWN ALGAE OF THE COASTAL WATERS AROUND MASIRAH ISLAND	38
FIGURE 13: SPOON SEAGRASS	38
FIGURE 14: <i>ACACIA TORTILIS</i> TYPICAL OF THE DESERT PLAIN	39
FIGURE 15: NBSAP & 5NR DRAFTING TEAM	59
LIST OF PLATES	
PLATE 1: PERCENTAGE OF THE MAIN RECOGNIZED ECOSYSTEMS IN OMAN. <i>SOURCE NSSDAR, 2012.</i>	15
PLATE 2: COMPARED SIZE OF FLORA AND FAUNA IN THE SULTANATE OF OMAN	24
PLATE 3: A DIAGRAM SHOWING HOW FULLY THE NBSAP1 IS IMPLEMENTED PER WORKING AREA (WA).	86

LIST OF TABLES	
TABLE 1: ESTIMATES OF CULTIVATED AREAS (1000HA) AND PRODUCTION (1000T) FOR VARIOUS AGRICULTURAL CROPS IN 2004/OMAN	18
TABLE 2: TOTAL RICHNESS AND THREATENED SPECIES OF OMAN	23
TABLE 3: THREE MAIN CONTRASTING ECOSYSTEMS WITH THEIR SPECIES AND AFFINITIES IN OMAN	24
TABLE 4: THE NATIONAL PARKS AND NATURE RESERVES OF OMAN	26
TABLE 5: NUMBER OF HOLDINGS DISTRIBUTED BY TYPE OF HOLDING IN DIFFERENT GOVERNORATE	28
TABLE 6: STATUS OF THE 19 CETACEANS OF OMAN	41
TABLE 7: NATIONAL TARGETS OF THE SULTANATE OF OMAN	49
TABLE 8: ACTIONS TAKEN BY OMAN TO IMPLEMENT THE CBD BETWEEN 2010 - 2014	60
TABLE 9: PROGRESS OF IMPLEMENTATION OF NBSAP1 TOWARDS AICHI TARGETS	87
TABLE 10: WORKING AREAS OF RELEVANT ACTIVITIES IMPLEMENTED AND NATIONAL TARGETS PER GOAL.	107

3- EXECUTIVE SUMMARY

The Sultanate of Oman is the third largest and probably the most diverse country in the Arabian Peninsula. This condition is chiefly due to the location of Oman between latitudes 16°40' & 26°20' N and longitudes 51°50' and 59°40' E in the North Eastern corner of the Peninsula; and due to its geography, and topography over an area of 309500 km² with a territory extending from a long coastline of 3165 km in connection with three seas that are the Arabian Gulf, the Sea of Oman and the Arabian Sea with islands and islets to the mountain range (15% of the country surface area) that culminates at 3000 meters at Jabal Shams, through salt flats (Sabkha), lagoons (Khvars), large gravel desert plains (Seih), sand dunes, undulating formation of sand dunes, endless desert of Rub'wEl Khali (Empty Quarter) covering the southwest of Oman, and Wadis (dry riverbeds) (79% [desert plains and sandy areas] of the country surface area). The agro-biodiversity area covers 8% of country surface area and the coastal zone covers 3% only (MOAF, 2012).

3.1. Importance of Biodiversity

Oman is home to more than 1200 documented plant species (3 globally threatened), 509 marine flora species, 766 marine invertebrate species, 988 fishes (globally 13 threatened), 89 herptiles (6.7% endemic) (Reginald Victor, 2014), 518 bird species (12 globally threatened) and 93 mammal species (20 globally threatened). Additional surveys may increase the number of those species encountered in Oman.

Taking into account that Oman has a moderately human modified territory, biodiversity and the ecosystem services it provides are at the same time subject to potential threats from human activities and represent a great resource for human activities and wellbeing.

The total protected area (either by national legislation or based on International designation) 0.040249672 of the territory of Oman. Considering the different types of protection, the area protected in Oman is 4.27%.

In 2013 the Sultanate of Oman accessed Ramsar Convention that declared Qurm Mangrove Reserve in Muscat as a Ramsar Site with a total area of 171 ha. With regard to protection status (including IBAs), Oman has reached the Aichi target set for terrestrial and marine. Without the IBAs, Oman implemented 57% of the Aichi Target 11; however progress is still needed whether in term of adding new protected areas or Laws enforcement.

3.2. Conservation status of habitats and species

Oman was assessed in 2001, 2009 and in 2013. During this period, the methodology used for the assessment has improved, mainly through the posted new information and papers on websites, a matter that needs to be taken into account when comparing the outcome of the these assessments. Although the knowledge gap has decreased, 20% of the conservation status of species of global interest is still unknown. All together 55% of the Omani species are still subject to threats from overgrazing, climate change, habitat fragmentation, poaching and urban crawling. Pollution has a very little effect on both species and habitats as it is relatively very well controlled in the country. The remaining 25% of the species are in a "favorable" conservation status.

An important advancement is that in 2013, Oman accessed the Ramsar Convention whereas the last treaties "International Treaty on Plant Genetic Resources for Food and Agriculture" and "Biosafety Protocol" were accessed respectively in 2002 and 2003.

Management plans lay the foundation of the management intervention to ensure the maintenance and restoration of the conservation status of species and habitats. The extent of areas with proper management plans has been increasing but further work is needed in this regard, especially on the implementation of these management plans and their support with appropriate funds for their implementation.

Oman puts special emphasis on maintaining the genetic diversity of cultivated plants and farmed and domesticated animals, therefore the five national institutions (Ministry of Environment and Climate Affairs, Ministry of Agriculture and Fisheries, Sultan Qaboos University, Oman Botanical Garden, and the Research Council (TRC) through Oman Animal and Plant Genetic Resources Center (OAPGRC) are coordinating and harmonizing the relevant technical activities.

Oman's geographical situation and biological diversity provides favorable conditions for agriculture: Agricultural lands are highly dependent on fertile lands which are likely located along the coastal plain, at AL Batina and Salalah and Wadi banks of the mountainous area. Locally produced crops such as pomegranate, banana, and lettuce are locally consumed but many other crops are imported to supply the local markets. Native plants are also produced into handicrafts, medicines and household items. Agricultural areas cover 8% of the territory of Oman. Fisheries provide significant direct economic benefits whereas the agricultural sector in general represents 6% to 14.6 in 2008 of GDP and ranks first among the non-oil exports (NSSDAR [National Strategy of sustainable development for animal resources], 2012). Soil fertility is expected to deteriorate after successive cultivation following single or double crop rotation system. Organic fertilizers and subsequently the organic farming are least practiced in Oman. Larger numbers of cattle, sheep, goats and camels went beyond the carrying capacities of the rangeland grazing. This caused the deterioration of vegetation composition and biomass productivity. Desertification had encroached on Dhofar Mountains due to: heavy overstocking, little application of rangeland management practices and significant deterioration in rangeland and productivity. Goats (1557148 heads), sheep (351066), cattle (301558), donkeys (3825), camels (117299) and chicken (16998991) had dominated the farms and open spaces in almost all regions of the country. Overgrazing has taken its toll on plant diversity and vegetation cover particularly in the southern mountains of Jebel Samhan, Jebel Qamar and Jebel Qara. It caused soil erosion and compaction which increased runoff and decreased the level of groundwater aquifer. Camels constitute 18.6% of the total number of domesticated livestock in Dhofar region and considered as primary threat to the environment and vegetation covers than any others. Majority of the people let their camels graze freely on their own, thus their extensive browsing resulted in many trees and shrubs being killed.

The forests and woods which cover respectively 20 km² and 13000 km² represent the coastal mangroves and the remnants of forests, dense woodlands and related plant formations that are restricted to the mountainous regions of Oman.

As for the aquatic areas, the lagoons of Mangrove and the *Khawrs* of Oman are still subject to damage from rapid development.

Major coral growth is restricted to four areas: the Musandam Peninsula; the rocky shores, bays and islands in and adjacent the Muscat area (Sea of Oman); the straits, shallows and shores west of Masirah Island (Arabian Sea); and some isolated sheltered locations in Dhofar and the Al Hallaniyat Islands. Principal impacts on corals are: Fishery-related damage causing coral reef breakage, caused by

tangled gill nets and boat anchors; coastal destruction; litter; recreational activities; oil pollution; discharges from desalination plant; enriched water discharges from sea farms.

Little is known about the population status of cetaceans in the waters of Oman. The Environment Society of Oman (ESO) had collected sufficient data by photo identification techniques only for the Humpback Whale. There is also historic whaling data for this species which enables a limited understanding of historic abundance and so a rudimentary trend assessment has been possible. Oman's population of humpback whales is therefore genetically unique, and in severe danger of extinction. IUCN has declared the population Endangered based on its low numbers and limited regional range and it is widely acknowledged that this is one of the rarest baleen whale populations in the world.

Recent count of the plant species composition in Oman yielded a total of 1,200 documented flora species (Patzelt, in press). The conservation status of 261 plant species is assessed in the National Red List; 189 of those are range-restricted (A. Patzelt, in press.). 6.5% (78 species) of all species are endemic to Oman and cannot be found elsewhere in the world, and 9.3% are near-endemic or regional endemic (A. Patzelt, in press.). At total of 9.1 % of the flora is considered threatened (A. Patzelt, in press.). Endemism is at its highest in the southern region where 46% of the species are threatened (Ghazanfar, 1998). Of a total of endemic and regionally endemic species, 63 are present in Dhofar, 12 in central Oman and 25 in the northern mountains.

the Reptiles are represented by 103 species, while there are two known species of amphibians. Lizards form the largest group with 68 species. There are five marine turtles and 29 species of snakes, nine of which are sea snakes. Overall, 14 species of lizards are national endemics.

Of the seven recognized species of marine turtle in the world, five occur in the waters of Oman (Salm and Salm, 1991). Four of these nest on beaches in Oman namely the Loggerhead Turtle (*Caretta caretta*) (EN), Green Turtle (*Chelonia mydas*) (EN), Hawksbill Turtle (*Eretmochelys imbricata*) (CR) and Olive Ridley Turtle (*Lepidochelys olivacea*) (EN). The fifth species Leatherback Turtle (*Dermochelys coriacea*) (CR) is an irregular visitor to Oman where it may feed in offshore waters whilst on migration to distant nesting beaches elsewhere in the world. The historic nesting population of Loggerheads on Masirah Island was in the region of 30- 40,000 females in the late 1970's, but has declined since this time to a level of perhaps 20-25,000 by the early 1990's and to an estimated minimum of 12,000 by 2008 (Baldwin, 2009). This decline is similar to that experienced by the only other comparably large population of this species in the world, namely that of the Eastern United States (Florida), as well as most other populations globally. Oman would therefore appear to be no different to other nations of the world in experiencing severe decline in its nesting loggerhead population. However, Oman has a greater responsibility than most countries to implement conservation measures to prevent further decline, or indeed enhance recovery, owing to the fact that its population remains one of the two largest in the world and probably still constitutes up to 40% of all nesting females.

Threats to birds are land use and the establishment of alien species such as Common mynah, Ring-necked parakeet and House crow.

Six species of large mammals, Arabian Oryx, Arabian tahr, Arabian gazelle, sand gazelle Arabian wolf, White-tailed mongoose, Striped hyena and Gordon's wild cat are currently breeding in captivity.

Two species, Arabian Oryx and Arabian gazelle bred have been reintroduced in the wild (Reginald Victor, 2014). The program of captive breeding increased the number of the Arabian Oryx but poachers have altered this increase, whereas the Arabian Tahr that is a protected species by Law in Oman is still lacking Fewer than 100 Arabian Leopards still roam the mountainous regions of Southern Oman. This species which is listed in the IUCN Red List as Critically Endangered and in CITES Appendix 1 is also declining. Also in the vulnerable category is the Arabian Gazelle (*Gazella gazella cora*) for which its population has dramatically declined since 1990s.

Based on Media staffs, environmental awareness has increased in accordance to the interviews and events in which they are incurred.

The main causes of biodiversity loss derive from the short-term economic profits and interests. This results in the overuse of ecosystems, natural habitat loss, habitat fragmentation and degradation. Infrastructure, investments and agriculture require more and more land.

Invasive and alien species spread easily in disturbed and degraded habitats. Controlling invasive species and preventing their further spread in the country is an important conservation objective. In Oman, the use of native plant species is appreciated but the elimination of exotic animal species is not a priority yet. The collection of reliable data on invasive marine alien species has been going on for a while. With regard to sectorial integration, biodiversity aspects have been integrated into national strategies and their action plans, such as the national conservation strategy for the Sultanate of Oman: integrated resource and environmental management for sustainable development (1991), National Strategy of Sustainable Development for Animal Resources (NSSDAR, 2012), the Oman Salinity Strategy (OSS, 2012), the National strategy for waste management (NSWM, 2013), Genetic Resources Roadmap (GRR, 2014), Integrated Water Management Strategy (IWMS). Other sectors and areas like energy, transportation, and poverty reduction have been successful in the integration of biodiversity aspects.

PART I: AN UPDATE ON BIODIVERSITY STATUS, TRENDS, AND THREATS AND IMPLICATIONS FOR HUMAN WELL BEING

Q1: WHY IS BIODIVERSITY IMPORTANT FOR OMAN?

The Sultanate of Oman is the third largest and probably the most diverse country in the Arabian Peninsula. This condition is chiefly due to the location of Oman between latitudes $16^{\circ}40'$ & $26^{\circ}20'N$ and longitudes $51^{\circ}50'$ and $59^{\circ}40'E$ in the North Eastern corner of the Peninsula; and due to its geography, and topography over an area of 309500 km² with a territory extending from a long coastline of 3165 km in connection with three seas that are the Arabian Gulf, the Sea of Oman and the Arabian Sea (Figure 1: Location of Oman) with islands and islets to the mountain range that culminates at 3000 meters at Jabal Shams, through salt flats (*Sebkhas*), lagoons (*Khvars*), large gravel desert plains (*Seih*), sand dunes, undulating formation of sand dunes, endless desert of Rub' El Khali (Empty Quarter) covering the southwest of Oman, and wadis (dry riverbeds). Oman borders on its north side the Strait of Hormuz and the United Arab Emirates, on the northwest Saudi Arabia while at the southwest the Republic of Yemen. The current population is around 3.93 million people.



Figure 1: Location of the Sultanate of Oman

4. ECOSYSTEM/SPECIES BIODIVERSITY OF OMAN

The land of Oman is formed from stony desert plains, sandy and mountainous areas as well as littoral and coastal plain. The latter covers 3% of Oman surface Area (Ref: National Strategy of sustainable development for animal resources [NSSDAR]). Despite its dry climate, Oman is located in an area of outstanding biodiversity, mainly in the parts of the Sultanate where the precipitation is the highest.

The habitats of Oman are of a wide variety and range from coastal plains, wadi flows, lagoons, Khwars, Sebkhass, and deserts to mountains, whereas the main recognized ecosystems are (Plate 1 and below):

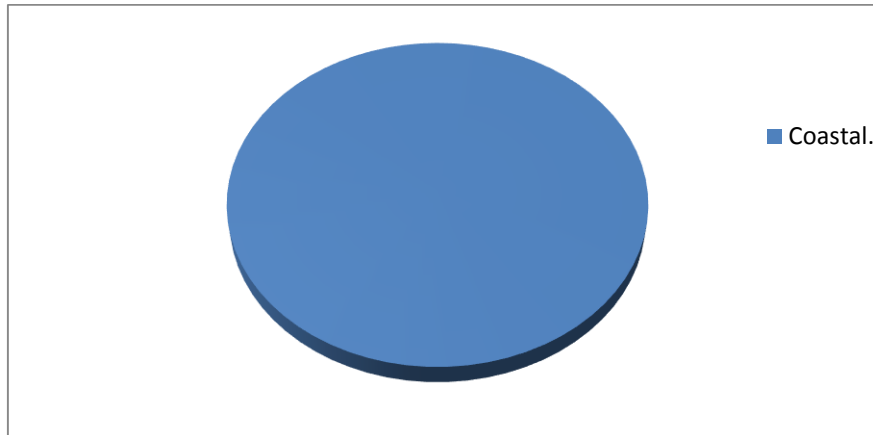


Plate 1: Percentage of the main recognized ecosystems in Oman. Source NSSDAR, 2012.

4.1. DESERT (74% OF OMAN) BIODIVERSITY:

Sand dunes and gravel deserts (*Seih*) cover a great proportion of the land surface of Oman. These areas are generally hyper arid with less than 100 mm of rainfall per year. They have mosaic of little vegetation mostly confined to depressions, wadis, runnels and rocky pavements. These areas are treeless with very few species. The principal vegetation in the rocky and gravel desert include *Acacia-Prosopis – Ziziphus* woodland with shrubs like *Lyciumshawii* and *Ochradenusarabicus*. Common annual vegetation include *Tetraena simplex*, *Plant agoovata*, *Aizoocanariense* and *Asphodelusfistulosus*. The Sand dunes have 2 main plant communities: 1) *Calligonium critinum* sub sp. Arabic umand *Cyperusaucherian* and 2) *Heliotropium*, *Panicum*, *Euphorbia* and *Indigofera*.

Vegetation is scattered with *Boswelliasacra* tree and *Acacia etbaicabushes* predominate. Larger areas of the desert are deprived from vegetation. The succulent *Tetraenaqatarense* and the leguminous tree *Prosopis cineraria* are the ones that also dominate the land scape. Near the edge of the desert, some common vegetation persist: *Calligonumcritinum*, *Tribulusarabicus*, *Dipterygiumglaucum*, *Cyperusconglomeratus*, *Heliotropium bacciferum* and *Tetraenaqatarensis*.



Figure 2: Low sand dunes at the junction with desert plains (syouh)

4.2. Mountain Biodiversity (15% of Oman Ref: NSSDAR):

There are two categories of recognized mountain biodiversity in Oman: arid and monsoon-affected mountains. Hajar mountains in northern Oman including Musandam peninsula are dry with bare rock outcrop and varied shallow soils dominating on sloping terrain and with very gravelly soils occurring in the valleys and alluvial fans. Many scattered oases abound with mostly falaj irrigation systems, tap local springs or wadis underflow where date palms, limes, banana, alfalfa and vegetables grow. Remnants of forests, dense woodland and related plant formations are restricted to the mountainous regions of Oman. Two types of mountains predominate in the country: dry in the larger part and semitropical in the Dhofar region. Mountain vegetation exhibits a distinct latitudinal zonation. The alluvial wadi fans and foothills of the mountains are dominated by open, drought- deciduous woodlands and shrub-lands, often intermixed with *xeromorphic* grasslands, *Panicum turgidum* community dominated by *Acaciaehrenbergiana*, *A. tortilis*, *Prosopis cinerea* and *Ziziphus spinachristi*.

In the central range of the western Hajar mountains, from 2100 m to the summit at 3000 m, isolated populations of *Juniperusseravshanica* form open woodland, often dominant with *Olea europaea subsp.cuspidata*. Juniper trees are generally in a poor state and regeneration is minimal. At lower elevation, the trees are in very poor condition and regeneration is virtually absent. The juniper woodlands of Oman are unique to the Arabian Peninsula and they may be a result of plant migrations from SE Iran across the Arabian Gulf. Northern Oman Mountains passing through the eastern UAE are definitely a center of endemism.

Three nationally endemic species namely *Asaccus montanus*, *Asccusplatyrhynchus* and *Pristurus gallagheri* and five regionally endemics such as *Asaccuscaudivolvulus*, *Asaccus gallagheri*, *Pristurus celerrimus*, *Lacerta jayakari* and *Lacertacyanura*. The Dhofar mountains until Yemen also

contain a number of endemic species: *Hemidactylus lemurinus*, *Meslaina ayunensis* and *Coluber thomasi*.



Figure 3: Wadi Shab with an oasis of Palm trees

Moisture rich mountains occur in Dhofar Region along north of Salalah and Rakhyout coast. Woody vegetation predominates on steep slopes and gullies while grass and bushes under heavy grazing cover most of the plains. Soils are generally shallow in the grazed areas which mean that soil erosion is rampant in the rangelands. Wooded slopes are protected from erosion by trees and bushes and they generally have deep soils. Rain-fed cultivation of beans and sorghum is done by some Jibali in very tiny plots during the monsoon.

4.3. Agricultural (8% of Oman surface area) biodiversity:

Soil survey of MOAF in 2004-2005 revealed that 2.223 million hectares are suitable for agricultural activities (7.4% of the surface area of the country). Irrigated land area is about 72,820 ha and planted with various crops. Table 1 below shows estimates of cultivated areas in 2004.

Table 1: Estimates of cultivated areas (1000ha) and production (1000T) for various agricultural crops in 2004/Oman (Source: Min. of Agriculture and Fisheries, 1990, modified 2004)

Agricultural crops	Area	Production
Vegetables	6.65	162
Fruits	42.04	329.2
Field crops	6.25	24.8
Perennial fodder crops	17.88	728.8
Total	72.82	

Agricultural lands are highly dependent on fertile lands which are likely located along the coastal plain, at Batina and Salalah and wadi banks of the mountainous area. Among Oman's top plantation crops raised by irrigation system would include the following: figs, guava, jujube, papaya, lemon, mango and dates. Locally produced crops such as pomegranate, banana, lettuce are locally consumed but many other crops are imported to supply the local markets. Other fruits, vegetables, grain crops and fodder are produced in Oman. Native plants are also produced into handicrafts, medicines and household items. Fisheries provide significant direct economic benefits whereas the agricultural sector in general represents 6% to 14.6 in 2008 of GDP and ranks first among the non-oil exports (NSSDAR, 2012).

Very large numbers of small farm holdings (about one hectare each) are cultivated to low yielding varieties, under fertilized and over-irrigated traditional crops. Soil fertility is expected to deteriorate after successive cultivation following single or double crop rotation system. Rate of mineral fertilizers applied is very low worsening the situation of soil fertility. Organic fertilizers are least practiced in Oman. Larger numbers of cattle, sheep, goats and camels went beyond the carrying capacities of the rangeland grazing. This caused the deterioration of vegetation composition and biomass productivity. Desertification had encroached on Dhofar mountains due to: heavy over stocking, little application of rangeland management practices and significant deterioration in rangeland and productivity.

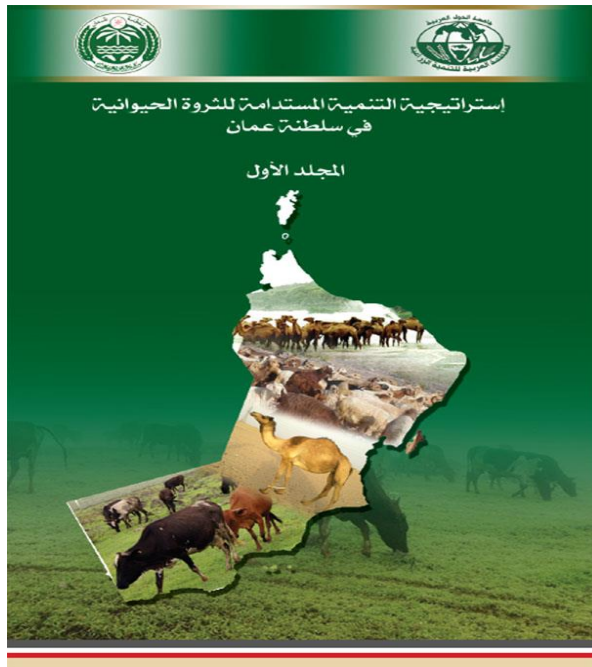


Figure 4: Sustainable Development Strategy for animal resources in Oman

Goats (2085206 heads), sheep (548231), cattle (359507), donkeys (3825), camels (242833) and chicken (16998991) had dominated the farms and open spaces in almost all regions of the country. Overgrazing has taken its toll on plant diversity and vegetation cover particularly in the southern mountains of Jebel Samhan, Jebel Qamar and Jebel Qara. It caused soil erosion and compaction which increased runoff and decreased the level of groundwater aquifer. Camels constitute 18.6% of the total number of domesticated livestock in Dhofar region and considered as primary threat to the environment and vegetation covers than any others (4th NR to CBD). Majority of the people let their camels graze freely on their own, thus their extensive browsing resulted in many trees and shrubs being killed (NSSDAR, 2012).

4.4. Wetlands, Islands and Marine Biodiversity

Wadis, Khwars, Sebkhass and mangrove forests encompass the country's wetlands. Seasonal water flows or *wadis* are one of the most common and important landscape elements in Oman draining rainwater from wide catchment areas and high mountains.

Terraces along wadi banks are intensively farmed. Vegetation along wadis include *Tamarix*, *Saccharum sp.*, *Neriummascatense*, *Ficuscordata* subsp. *salicifolia* and *Acacia nilotica*. Alluvial plains support growth of *Acacia*, *Ziziphus*, *Moringa* and *Ficuscordata* subsp. *salicifolia*. Extensive sand dunes are associated to the coastal areas and are important protector of beaches. The dunes and their associated grasses and shrubs trap marine sands which help prevent both the erosion of beaches and the covering of inland areas by wind-blown sand. *Khwars* are productive and valuable fish-breeding and nursery areas supporting dense masses of *Enteromorpha*, mullet fishes and the edible crab *Scylla serrata*. Figure 5 shows the Bander Al Khayran (plural of Khawr) in Oman.

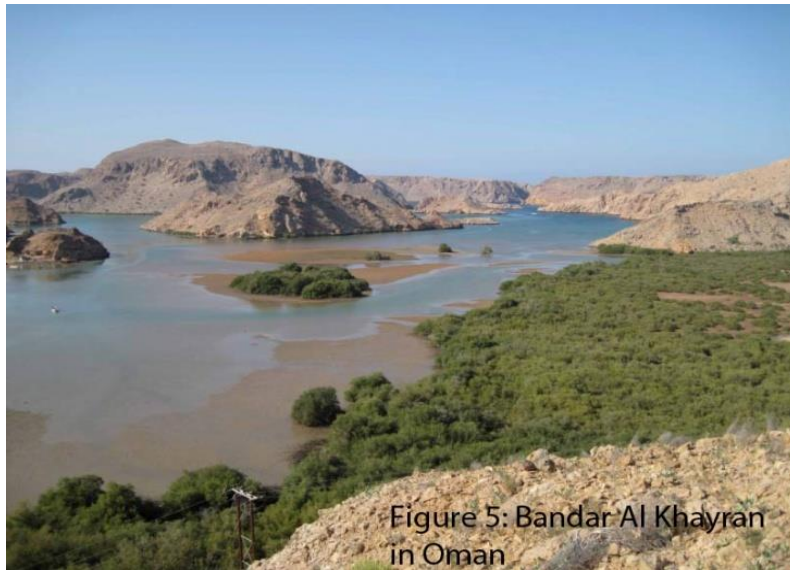


Figure 5: Bandar Al Khayran in Oman

Coastal plains and Sebkh vegetation are dominated by communities of halophytes, drought-deciduous thorn woodlands and open xeromorphic shrublands and grasslands. There are four coastal vegetation communities recognized (Patzelt and Al Farsi, 2000; 4th NR to CBD, 2009): 1) *Limonium stocksii-Zygophyllum quatarense* community in northern Oman where the coasts are mainly sandy and interspersed with rocky limestone, 2) *Limoniumcf. stocksii-Suaeda aegyptica* community characteristic of rocky shores with narrow beach areas and a wide spray zone, 3) *Atriplex-Sueda* community along offshore islands, flat sandy beaches and coastal sabkhas, 4) coastal lagoons with *Sporobolus virginicus*, *Sporobolus iocladius* and *Paspalum vaginatum* as bordering species and *Phragmitesaustralis* and *Typha spp* forming bordering reeds. Oman has a coastline stretch of 3,165 km which had been perceived as entirely covered by mangroves long time ago. Unfortunately, mangroves had been greatly reduced due to deforestation for fuelwood, grazing, and coastal developments. Mangrove vegetation is spread sporadically in the coastal areas of the country. In spite of massive mangrove destruction, there still exist good stands in Northern Batinah, Muscat, Eastern Sharqiyah, Mahawt Island and Salalah. It now covers a total of 1000ha (2010 International Year of Biodiversity Oman Report). There are few outstanding islands in Oman which include Dimaniyat, Masirah and Kuria- Murai (Hallniyat). Except for Dimaniyat, all other islands are still in the proposal state to become protected areas. The Dimaniyat Islands Nature Reserve (Figure 6) encloses some 203 sq km of sea and seabed and includes the nine islands, rocks and reefs and offshore shoals situated about 18 km off the Seeb-Barka coast.



Figure 6: View from Dimaniyat Islands Nature Reserve known for its richness in corals and other diversity

The reserve is an outstanding conservation area of national and regional importance. They have the highest density of nesting seabirds and the only known osprey nesting sites in the capital area. They also shelter the largest nesting population of hawksbill turtles in the country. These are relative unspoiled islands of great scenic beauty offering a living natural museum, including the nesting green turtles and sooty falcons and a variety of reefs with high coral diversity. Both the islands and the reefs are important to the mainland-based fishermen and people from Muscat, for fishing, recreation and worship. This is the most important site for wildlife conservation in the capital area and urgently in need of a management plan. Surveys conducted in the preparation of the Oman Coral Reef Management Plan have revealed significant damage to the reefs and widespread degradation. The coral reefs are threatened by large scale, irreversible damage and continued devaluation or loss of coral reef resources.

4.5. Forest and woody areas

Forests and woods are chiefly found in the coastal (mainly mangrove) and mountainous areas of the country where the forests cover 20 km² and the woods 13000 km².

4.6. Taxa Diversity

According to the IUCN, CITES and GCC 2002 Convention criteria, the following summarizes the categories of threatened flora and fauna in the Sultanate of Oman:

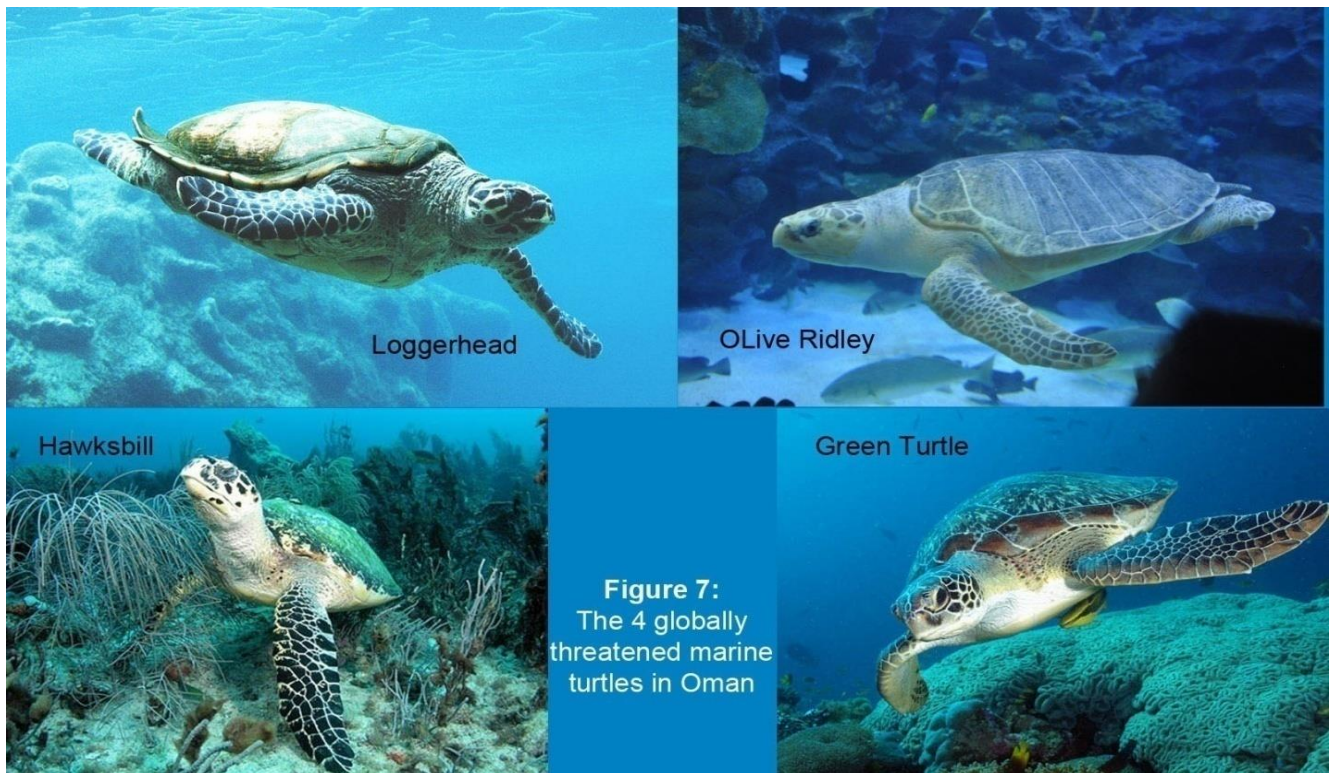
a) Based on available data, the threatened flora form 4.6% of the total number of species and 80% of these occur in southern Oman. Critically endangered, endangered and vulnerable categories respectively are 0.7, 0.2 and 2% of the total number of species, while 1.5% belong to low risk category. Data are not available for 0.3%. A rough estimate suggests that 136 plant taxa should be placed on a critical list (Reginald Victor/SQU Bull., 2014).

b) Eight species of birds are classified as endangered, including the Northern Bald Ibis and Slender-billed Curlew that are critically endangered;

c) Four species of marine turtles nesting in Oman are endangered, including the Loggerhead Turtle (*Caretta caretta*), Green Turtle (*Chelonia mydas*), Hawksbill Turtle (*Eretmochelys imbricata*) and Olive Ridley Turtle (*Lepidochelys olivacea*) that are classified as critically endangered;

d) Two species of mammals are endangered: the Arabian Leopard and Dhofar White-toothed Shrew that are critically endangered;

e) Two species of sawfish are critically endangered.



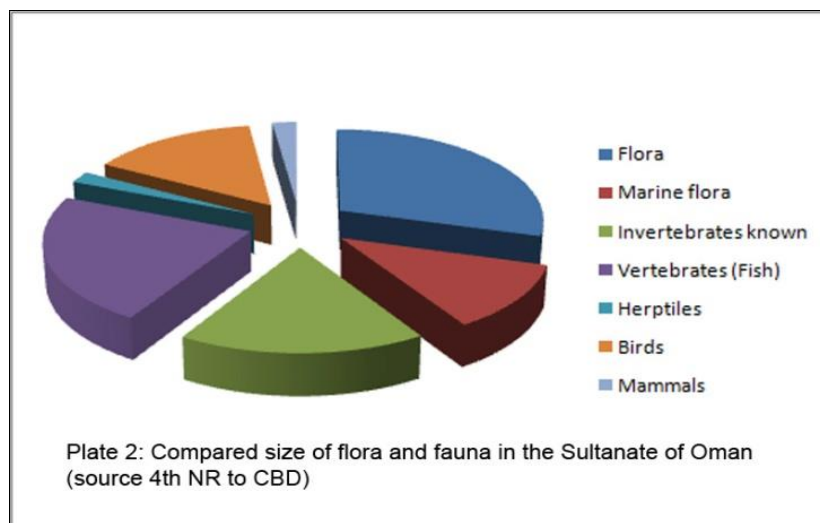
Other species are either in the near threatened or vulnerable classifications. They include 5 species each of mammals and fish, 12 species of birds and 11 species of plants.

The continental biodiversity of Oman contains more than 1295 plant species, of which 1200 are documented, including 78 endemic species. The main fauna features of the continental biodiversity are represented by 93 mammal species, including the Arabian Leopard, Arabian Gazelle, Arabian Wolf, Striped Hyena, Sand Gazelle, Arabian Oryx, Nubian Ibex, Arabian Tahr and Cheetah (probably extinct). The avifauna encompasses 518 species whereas the reptiles list contains 103 species. In the seas of Oman, Eighty-three species of sharks, rays and guitarfish are found together with 905 species of bony fishes (DGNC-MECA, 2009). Several species of cartilaginous fishes are protected in Oman with Narrow Sawfish (*Anoxipristis cuspidata*) and Olive Sawfish (*Pristis zijsron*) listed as critically endangered in the IUCN Red List. For a quick overview see Table (2) below:

Table 2: Total richness and threatened species of Oman (Source: Checklist of Oman Biodiversity, DGNC-MECA, 2009 in addition to updates provided by the drafting committee)

Categories	Number of species (see also Figure 8)		IUCN, CITES & GCC Status
Plants	1238(1200 documented)		3 IUCN Endangered 7 Gulf Cooperation Council (GCC) Appendix 1
Seagrasses	4	Marine flora 509	No data
Microalgae	323		No data
Phytoplankton	182		No data
Arthropods	399	Marine known Invertebrates 766	No data
Mollusks	58		No data
Corals	253		All species under CITES 2
Echinoderms	56		No data
Cartilaginous Fish	83	Fishes 988	IUCN: 2 critically endangered, 2 endangered, 1 threatened, 6 vulnerable, 2 proposed as globally vulnerable.
Bony Fish	905		
Herptiles	103	Amphibians 2 Snakes 29 Sea Snakes 9 Lizards 68 Marine Turtles 5	6.7% are endemic at national level
Birds	518		1 extirpated, 9 IUCN endangered, 1 IUCN threatened, 1 IUCN vulnerable, 1 Globally threatened, 1 GCC App.1, 1 GCC App. 2, 33 rare passage
Mammals	93 This number is lower than that one of 2009 because the previous count included 8 domestic species		IUCN: 3 critically endangered, 6 endangered, 2 near threatened, 9 vulnerable, 17 least concern and 31 data deficient (Reginald Victor/ SQU Bull., 2014). <i>The increased number of threatened species is not due to low conservation effort but to improved knowledge.</i>

The compared size of flora and fauna in Oman is shown in Plate 2, below:



The species diversity and the affinities of three main contrasting ecosystems of the country are given in the Table 3 below:

Table 3. Three main contrasting ecosystems with their species and affinities in Oman			
Ecosystem	Affinity	Endemism	Species diversity
Desert	Irano-Pakistani		<i>Desert to Arid: Acacia-Prosopis- Ziziphus</i> woodlands with shrubs like <i>Lycium</i> , <i>Ochradenus</i> . Common annual vegetation include <i>Tetraena</i> , <i>Plantago</i> , <i>Aizoon</i> and <i>Asphodelus fistulosus</i> , <i>Calligonium</i> , <i>Cyperus</i> , <i>Heliotropium</i> , <i>Panicum</i> , <i>Euphorbia</i> , and <i>Indigofera</i> . Fauna restricted to central desert plains: <i>Pristurus minimus</i> , <i>Uromastix thomasi</i> and <i>Acanthodactylus masirae</i>
Hajar Arid Mountain	Irano-Pakistani	7 species	Foot hills: dry with bare rock outcrop and scattered <i>Acacia-Prosopis- Ziziphus</i> . <i>Central western Hajar with Juniperus seravschanica</i>
Monsoon affected Mountain	African Semi-tropical	4 species	Humid in summer with monsoon rain and relatively dense woods

The centers of endemism and the services of the ecosystems through conservation and regulation of the environment are considered highly appreciated by the people of Oman. The centers of plant endemism are the mountains of northern Oman, the central desert and the mountains of Dhofar (Patzelt, *in press*).

The ongoing research and field expeditions carried out by Oman Botanic Garden team is contributing critical knowledge about the native flora and vegetation, actively filling gaps of knowledge. The conservation status of 261 plant species is assessed in the National Red List; 189 of those are range-restricted (A. Patzelt, *in press*). 6.5% of all species are endemic to Oman and cannot be found elsewhere in the world, and 9.3% are near-endemic or regional endemic (A. Patzelt, *in press*). At total of 9.1 % of the flora is considered threatened (A. Patzelt, *in press*) (Botanical Garden Report to MECA, 2014)

5. PROTECTED AREAS

Protected areas by laws (PAs) now cover 3.78% of Oman territory (see Table 4). The previous percentage (13.8%) that was provided by “Earth Trends country profile, 2003” and later by “World Bank, 2013” is due to considering the Oman surface area 212246 km² instead of 309500 km². One of the preoccupations of the future PAs Strategy of Oman is the delimitation of the boundaries of the protected areas so that the correct data can be used as an indicator for assessment and evaluation and as a benchmark for future monitoring.

Table 4: The National Parks, Nature Reserves and Specially Important Areas of Oman

Area	Management Type	Area in KM ²	Date
1. Al Sareen	Especially Important Area	670	1976
2. Ras Al Shajer	Especially Important Area	93	1985
3. Khawr Salalah	Especially Important Area	0.0006	1986
4. Al Wusta Wildlife	Wildlife Sanctuary	2824.3	1994
5. Al Dimaniyat Islands	Nature Reserve	203	1996
6. Turtle Reserve	Coastal Reserve	120	1996
7. Jabal Samhan	Nature Reserve	4500	1997
8. Khwar Mughsayl	Reserve	0.0006	1997
9. Khwar Baleed	Reserve	1	1997
10. Khwar Sawli	Reserve	1	1997
11. Khwar Dahareez	Reserve	0.0006	1997
12. Khawr Taqah	Reserve	1.07	1997
13. Khawr Rawri	Reserve	8.2	1997
14. Khawr Awqad	Reserve	0.00016	1997
15. Khawr Qurum Al Sagheer	Reserve	0.00035	1997
16. Khawr Qurum Al Kabeer	Reserve	0.00014	1997
17. Al Saleel Natural Park	National Park	220	1997
18. Al Khawair	Especially Important Area	4.2	2006
19. Jabal Al Akhdar	Scenic Reserve	122	2011
20. Al Qurum Nature Reserve	Ramsar Site	0.0009	2013
21. Al Wusta Wetland	Wetland Reserve	3400	2014
22. JabalQahwan	Nature Reserve	289.5	2014
Total Surface Area		12457.27 km²	

The Omani experience has innovative features as regards its ability to meet the protected areas function with the territorial specificities and for this to become the tools of conservation parks and at the same time local development.

Protected Areas, either at national and regional level, play a pivotal role in protecting precious environment and species, but also in raising awareness among people, creating direct and indirect employment and ensuring a place for field research with rangers to monitor changes.

Protected Areas are now being visited for leisure and/or for specific interests by an increasing number of people. In this respect dedicated initiatives conducted by public schools together with those managing protected areas have produced synergies that allow new generations to become familiar with concepts as biodiversity, endangered species, ecosystem balance, etc.

There are 33 IBAs in the Sultanate covering an area of 7,475,962 ha (24% of the surface area of the country). They receive protection of species and habitats but require at the same time a support from the national Laws of Oman. (Ref: <http://www.birdlife.org/datazone/country/oman/marin>).

Considerable protection of habitats has been achieved through the environmental permit system under Royal Decree (6/2003). Expansion of ranger units has improved the protection of conservation areas and wildlife. However, biodiversity conservation is severely threatened by economic development in various forms. The promulgation, funding and implementation of management plans for conservation is at present considered as an urgent priority.

The major proposals submitted for the conservation of the nature reserves are, (1) 1987 - IUCN proposals for a system of Nature Conservation Areas (NCA), (2) 1988 - The Coastal Zone Management Plan (IUCN), (3) 1990 – Sub-regional Land Use Plan for the Southern Region and (4) 1991 – Study for Wildlife and Conservation Areas master plan for the Coastal Areas of Barr Al-Hikman and Masirah Island. Legislation for wildlife protection and nature conservation is mainly in the form of two Royal Decrees (114/2001 and 6/2003) and number of Ministerial Decisions.

The main objective of *ex situ* conservation is to help endangered and threatened wildlife avoid extinction.

6. GREEN ECONOMY

Occupation and new jobs are increasingly but slowly becoming relevant, not only in agriculture and fisheries, but also in fields like eco-tourism.

The increase economic benefits to the local population through opening of investment in nature reserves needs strengthening, and the activation of a coordination with the Ministry of Tourism to develop a mechanism and guidelines for eco-tourism, especially the importance of focusing on employment of local people in eco-tourism projects is one of the essential means towards supporting eco-tourism in and/or outside nature reserves.

7. AGRICULTURE

Another peculiarity of Oman is found in its food culture and legacies; in this respect more and more people is involved in agricultural and farming activities to contribute to the productive system. The distribution of holdings over the Governorates is given in Table 5 below:

Governorate	%	Total	Crops Livestock & Poultry	Livestock & Poultry	Crops & Poultry	Crops & Livestock	Poultry	Livestock	Crops
Muscat	5.09	8478	257	75	59	1105	16	1892	5074
Dhofar	8.25	13750	43	6	9	1097	3	10488	2104
Musandam	2.40	4003	101	30	9	784	2	1084	1993
Buraimi	2.72	4508	235	158	26	862	9	554	2664
Dakhiliya	19.26	32090	783	128	194	5222	34	4144	21585
Batinah N	13.37	23942	1212	543	74	6533	63	6659	8858
Batinah S	12.36	20569	636	60	101	3350	15	2903	13531
Sharkiyah S	9.37	15610	138	244	23	1296	23	8766	5120
Sharqiyah N	15.18	25283	447	161	77	2740	23	5921	15914
Ghahirah	9.49	15812	490	157	63	3702	19	2464	8917
Wusta	1.52	2531	0	1	0	26	0	2458	46
Total	100	166603	4342	1563	635	26717	207	47333	85806
Percentage		100	2.61	0.94	0.38	16.04	0.12	28.41	51.50

New ways to produce food is now furthering the sustainability of the production itself, dimming the impact on the environment, supplying better quality food, and last but not least, improving life condition for farm animals. Furthermore traditional agriculture and farming activities normally avoid using large areas for monoculture, allowing the persistence of marginal areas and ecotones, enhancing preservation of biodiversity, and providing necessary connection between areas serving as dispersal corridors. Sound farming practices especially on water conservation techniques, arresting soil erosion (Figure 8), adapting suitable crop varieties and techniques to combat salinity in Al-Batina coast and the use of safe pesticides and chemical fertilizers have been addressed in the agriculture sector. Gene banks for leading crops, pasture and grass species were established for safe keeping and posterity.



Figure 8: Traditional and terraced agriculture to avoid soil erosion in Oman (Painet)

The long-term agriculture strategy of Oman is based - to achieve its goals - on the following core themes which have been adopted by the Royal Decree (1/96):

1. Development of human resources and development of capabilities and skills of Omanis to keep up with the technical development and management of the variables that occur in this technical development, beside the need to efficiently cope with local conditions and the ever-changing world.
2. Creation of a stable macro-economic climate in order to develop a private sector that is able to optimize the use of human resources and the nature of the Sultanate, in ways that are efficient and maintaining the integrity of the environment.
3. Encouraging the private sector that is characterized by efficiency and competitiveness and strengthening the mechanisms and institutions that will enhance the visions, strategies and common policies between the private sector and the government.
4. Creation of the appropriate conditions for the economic diversification and working on the optimal exploitation of natural resources available and the distinguished geographical location of the Sultanate.
5. Enhancing the standard of living of citizens and work to reduce disparities among national regions and different income groups, and ensure all citizens benefit from the outcomes of the development process.
6. Maintaining the acquisitions achieved during the past twenty-five years, and working on their maintenance and development besides completing some basic and necessary services.

7 LEGISLATION

The United Nations Environment Program (UNEP) has credited Oman with having one of the best records in environmental conservation, pollution control and maintenance of ecological balance. Oman is even stated as having one of the world's most rigorously "green" governments. Oman's biodiversity is catered for by varying topographic features, from a vast arid deserts in the West, to a belt of grass and woodland in the mountainous region of the South, and the Arabian Sea in the East.

8.1. The Status of the Development (Kyoto)

The Gulf Cooperation Council (GCC) embraces a future in renewable energy; in 2009 the newly created International Renewable Energy National Agency (IRENA) announced that its headquarters would be located in Abu Dhabi's Masdar City. The Sultanate of Oman, party to the Kyoto Protocol to the United Nations Framework Convention on Climate Change since January 19, 2005 led the GCC further, announcing the creation of a Designated National Authority (DNA) pursuant to its commitment as a 'non-Annex B' party to the Kyoto Protocol.

The creation of a DNA is a crucial step that will ultimately allow Oman to host projects, including renewable energy and clean technology projects, which reduce greenhouse gases under the Kyoto Protocol. These projects can provide an additional revenue stream to Oman from emissions credits sales in developing international carbon markets.

The Sultanate's decision to establish a DNA presented businesses in Oman with new opportunities in the renewable energy space. While wind, biogas, geothermal and wave energy pose strong opportunities for Oman, the greatest promise is held by solar energy. According to the May 2009 report of the Omani Authority for Electricity Regulations (AER), Oman is the beneficiary of some of the highest levels of solar density in the world. If harnessed, solar energy could provide for all of Oman's electricity needs.

Under Kyoto, non-Annex B members, primarily developing countries free from Kyoto's carbon emission limits, are permitted to monetize investments in carbon reduction projects by developing projects under the Protocol's Clean Development Mechanism (CDM). Projects under the CDM program are accredited by the CDM Executive Board, an implementing body of the Protocol, and result in reductions in carbon emissions, the implementation of which will earn emissions reduction credits (CERs) which can be sold on the open market to emitters in Annex B member nations.

Projects in Oman developed under the CDM must be approved by both the Oman DNA and comply with requirements established by the CDM Executive Board. Furthermore, all CDM projects must adhere to Omani law, as well as CDM rules.

The sale of CERs could facilitate the benefits posed by solar energy by helping finance such projects. According to AER, Oman's origination of CERs could save anywhere from three to 18 percent of the operational and capital costs of solar and wind grids.

8.1.1. Regulations on the National Level in the Sultanate of Oman

Oman's environmental regime is primarily regulated by the Law on the Conservation of the Environment and prevention of Pollution (Royal Decree No. 114/01). Although its forerunner (of the same name – Royal Decree No. 10/82) now stands repealed, it enabled the enactment of a series of environmental legislation, most of which continues to be in force today.

Legislation for wildlife protection and nature conservation is mainly comprised of number Royal Decrees and Ministerial Decisions:

- The Law on the Protection of National Heritage (Royal Decree No. 6/80);
- The Law on the Protection of Marine Biological Wealth (Royal Decree No. 53/81);
- The Law on the Conservation of the Environment and Prevention Pollution 114/2001;
- The law on Nature Reserves and Wildlife Conservation (6/2003).
- The Royal Decrees for the establishment of 18 Nature Reserves.
- Ministerial Decision (169/2000) prevent cutting green trees.
- Ministerial Decision (101/2002) on the prohibition of hunting or killing or captured of wild animals and birds.
- Ministerial Decision (110/2007) the issuance of the regulation on the law of nature reserves and wildlife conservation.

8.1.2. International Treaties and Conventions

Oman has ratified many international treaties related to environmental protection, including the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal, the UN Convention on the Law of the Sea, the UN Framework Convention on Climatic Change, the UN Agreement on Prevention of Desertification in Countries Facing Severe Arid Conditions and the Ramsar Convention.

8.2. General Overview of Environmental Standards in the Sultanate

As stated above, Oman has a whole body of environmental laws, principal among them being Law for Protection of Environment and prevention of Pollution (Royal Decree No. 114/01). This law imposes strict penalties for release of environmental pollutants and discharge of effluents in land and marine territory of Oman.

The Environmental regime regulates circulation and use of chemicals (Royal Decree No. 46/95); marine pollution (Royal Decree No. 34/74); air pollution from stationary sources (Ministerial Decision No. 5/86); management of solid non-hazardous waste (Ministerial Decision No. 118/04); management of hazardous waste (Ministerial Decision No. 18/93); noise pollution in the work place (Ministerial Decision No. 80/1994); waste water re-use and discharge (Ministerial Decision No. 145/93); occupational health and industrial safety precaution (Ministerial Decision No. 19/82); noise pollution in the public environment (Ministerial Decision No. 79/94); disposal of commercial waste materials (Ministerial Decision No. 8/84); and finally disposal of liquid effluents into the marine environment (Ministerial Decision No. 39/2004). Petroleum Law (Royal Decree No. 42/74) and Mining Law (Royal Decree No. 27/03) stipulate environmental standards for items covered by it and the Civil Defense Law (Royal Decree No. 76/91) contains provisions relating to fire safety and environment.

Environmental problems currently faced by Oman include:

- High levels of soil and water salinity in the coastal plains;
- Scarcity of water due to prolonged drought in certain areas;
- Industrial effluents seeping into the water tables and aquifers; and
- Desertification due to high winds driving desert sand into arable lands.

8.3.Main Areas of Environmental Concern

8.3.1. Marine pollution

The Law on Marine Pollution Control (Royal Decree No. 34/74), brought to light Oman's early concern for the safety of its marine environment. This law prohibits the discharge or release of any pollutant from a ship, shore location or oil transport facility in the Pollution Free Zone of Oman. This zone is the belt of water around Oman's territorial waters, which stretched for a distance of 38 miles. Any person violating the provisions of this law is subject to a maximum penalty of OMR 25,000 for a single violation, and of OR 4 million for multiple violations, and may also be deprived, either temporarily or permanently, of all environmental rights granted by the government. Terms such as "operator", "oil transport facility", "pollutant", "pollution control officer", etc. are all defined in this law.

8.3.2. Air pollution

Ministerial Decision No. 118/04 on the Control of Air Pollution from Stationary Sources stipulates that owners must employ scientific methods specified by the ministry for the prevention of the emission of pollutants, and for their treatment. This law prohibits the emission of smoke over a specified density, and burning of organic or agricultural waste in the open. Approval must be obtained before installing a chimney, which must conform to the height specifications stipulated depending on its intended use and to comply with the relevant rolls and regulations.

8.3.3. Noise pollution

Ministerial Decision No. 79/94 on the Control of Noise Pollution in Public Places prescribes noise levels based on the classification of public places, and identifies the following as external sources of noise:

- Industrial plants and public works;
- Road traffic; and
- Airports and the operation of commercial and other aircrafts.

Variations in noise levels during the day on weekdays and holidays are measured in accordance with the prevailing international standards, taking into account wind velocity direction, temperature and humidity.

Ministerial Decision No. 80/94 on Noise Pollution Control in the Work Place prescribes noise limits in places of work. Machines, equipment and other noise generating installations are required to be checked for noise emission levels during operation and installation.

Q2: WHAT MAJOR CHANGES HAVE TAKEN PLACE IN THE STATUS AND TRENDS OF BIODIVERSITY IN YOUR COUNTRY?

To secure consistency with the 4th National Report, the analysis of status and trends of biodiversity and related threats for the period 2009-2013 have been conducted using the same methodology used in the 4th National Report.

9. BIODIVERSITY TRENDS/ ISSUES

9.1. Trends/Issues of Aquatic Biodiversity

The lagoons of Mangrove and the Khwars of Oman are still subject to damage from rapid development to include the following issues: a) port and fishing boat, harbor construction that requires damaging landfill and dredging causing coastal erosion and sedimentation; b) road construction; c) tourism and recreation; and d) solid waste and water pollution.



Figure 9: Nursery of mangrove at Qurm Ramsar Site in Muscat

In this habitat, the following main needed actions deserve attention: a) sustainable utilization and biodiversity conservation; b) planting and new locations; c) seed provenance; d) mangrove nurseries (Figure 9); e) monitoring; f) education and awareness; g) existing facilities; h) information sharing and communication; i) coordination; and j) Omanization.

In the wake of tropical cyclone “Gonu”, environmentalists in Oman have intensified efforts to create a natural wall of mangrove forest to thwart any tidal threat along the country's coastline. Mangroves protect the coast from erosion, surge storms, especially during hurricanes, and tsunamis, especially that the mangrove forests' massive root system is efficient at dissipating wave energy.

Coral communities of the Sultanate of Oman present unique characteristics that are to be preserved. These coral reefs are distinct from those in others areas of the Arabian area, which are

already distinct from the rest of the Indian Ocean. In the Sultanate of Oman, major coral growth is restricted to four areas: the Musandam Peninsula; the rocky shores, bays and islands in and adjacent the Muscat area (Oman Sea); the straits, shallows and shores west of Masirah Island (Arabian Sea); and some isolated sheltered locations in Dhofar and the Al Hallaniyat Islands. Other parts of the coast of the Sultanate of Oman, either lack corals or have limited growth of small, scattered colonies, due mainly to the absence of suitable substrate (e.g. along the sandy Batina coast), or to seasonal upwelling of cold water on the Arabian Sea coast. Most of the sub-littoral zone of Oman is soft substrate, but the variety of the coastal morphology and hydrological regime also leads to a variety of biotic zones or biotopes. The Coral reefs throughout Oman are threatened by large scale, irreversible damage and the continued devaluation or loss of coral reef resources, including those currently of value to fisheries, tourism and recreation, coastal protection, scientific study, marine biodiversity and marine ecology. Natural impacts on Oman's coral reefs indicate unusual and stressful conditions that corals in the Sultanate must tolerate. Principal impacts are: Fishery-related damage causing coral reef breakage, caused by tangled gill nets and boat anchors; coastal destruction; litter; recreational activities; oil pollution; discharges from desalination plant; enriched water discharges from sea farms.

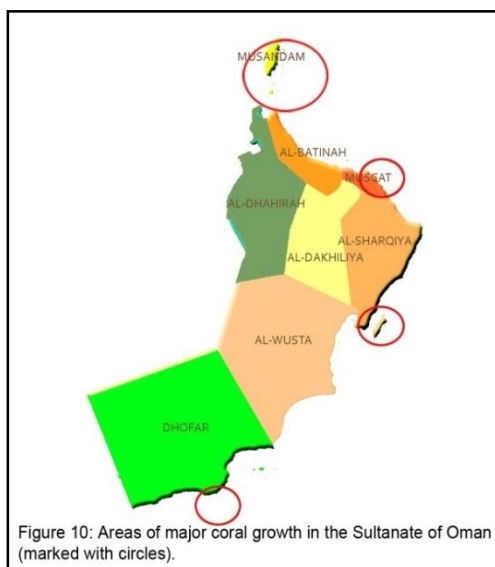




Figure 11: Cave Coral from Oman

The Omani aquatic ecosystems are unique in the sense that their locations are in an arid region and that their biodiversity composition has evolved into species that had been resilient of the almost harsh and dry environment. Therefore, any significant perturbation to their natural environment will result in the biodiversity's eventual extinction. Aquatic communities include the spring-streams and *Wedian* (plural of *Wadi*). Streams originating from springs (*ayns*) could be natural or man-made *aflaj* (plural of *falaj-water channel*). Springs usually originate in the mountains or in the foothills of mountains. The MORMEWR has reported 69 important springs in the Sultanate of which 45 are cold and 33 are thermal. Of the total, 64 also yield potable water. Local rainfall patterns in the watershed affect the number of active streams at any given time. Floods affect the structuring and restructuring of habitats in the *Wedian*. On the biodiversity point of view, only Muaydin drainage at Birkat al Mawz had been studied yielding 33 invertebrates and three vertebrate taxa were recorded in a 1.5-km strength of the wadi (Victor and Al Mahrougqi, 1996 as cited by Victor, 2000).

There are no large natural freshwater lakes in Oman. However, in Wadi Darbat in the Dhofar region, the wadi pools merge to form lake-like conditions immediately after the khareef or monsoon. The pools shrink in size during the dry winter period. There are also reservoirs, ponds or pools and khwars in other parts of the country. Khwars in northern Oman are mostly brackish and sometimes hyper saline, while many in the Dhofar region remain freshwater for most part of their hydrological cycles. Important retention reservoirs are found in Jabal Akhdar area. Temporary ponds are those that dry up during most of the months of the year but refill briefly during rains while astatic pools are temporary with unpredictable pattern of recurrence. Thriving in such ponds are the ciliates, rotifers, copepods, *Cladocera* and *Ostracoda*. Some macro crustaceans like shrimps (*Anostraca*), tadpole shrimps (*Nostraca*) and clam shrimps (*Conchostraca*) occur in these habitats (Victor, 2000). Khwars are best studied in the Sultanate. The biota included the fringing terrestrial and aquatic macrophytes (Ghazanfar, 1998), micro invertebrates, crustaceans macrofauna, mosquitoes, fish and birds by various scientists. Knowledge of aquatic macrophytes in Oman is very poor. In the retention reservoirs of the Western Hajar Mountains, *Potamogeton nodosus* dominated the macrophytes. Some species of micro/macro crustaceans, insects, freshwater mollusks, leeches, nematodes, other invertebrates, had been recorded but many species has to be identified or species to be verified. Oman has seven species of freshwater fish. Several exotic fish species have started establishing populations in the wild which is a threat to the environment. Tadpoles of *Bufo arabicus* and *Bufo dhufarensis* are common in the freshwaters of northern and southern Oman, respectively (Victor, 2000).

Overgrazing of vegetation in watersheds contributes to erosion and consequent severe siltation of *Khwar* areas and the productive near shore marine environment. Feral animals like dogs, cats, goats, donkeys, introduced rats are potential threats to wildlife leading to potential extirpation of sensitive species. Other issues raised reveal the following: a) Beaches and camping sites and scenic areas are fouled by litter, b) Drying of sardines and discard of fish offal, old nets, oil drums, rusted freezers and other litter on fish landing beaches diminishes their value for recreation, c) People lacking support of fisheries resource management due to ignorance or inadequate knowledge and information, d) Gross wastage of fishes together with the capture of undersize and berried crayfish is depleting fishery resources, e) Polluting beaches, and potentially threatening some species, notably crayfish, sharks and groupers with local extermination, f) Coastal archeological sites are being lost to coastal development, damaged by vehicle traffic and road works, looted by amateurs or degraded by litter before they are studied, g) Human predation of breeding seabirds and their eggs has resulted in local extermination of breeding colonies, h) Mangroves, reeds and rushes are endangered by development pressure, overgrazing, infilling, pollution and dumping of garbage, i) Intermittent illegal discharges of oil at sea off the coast contaminate the beaches with oil and tar balls, destroy their recreational value and threaten the breeding seabird colonies, j) Escalating sand mining activities or the demand for sand by new development schemes could lead to disappearance of smaller beaches, k) Careless fishing practices are damaging corals thereby reducing aesthetic value of reefs for recreation, and their productive value for fisheries, through entanglement of nets, ropes and anchors, l) Enriched waste water from inland containment lagoons enters the *Khwars* and solid wastes are dumped in the *Khwars*, mangroves and *wadis*, on the beach and into the sea, m) Coral reefs in much of Mussandam are being devastated by the Crown-of-thorns Starfish (*Acanthaster planci*) and temperature-induced bleaching of the corals, n) Breeding population of turtles are threatened by collision with the high speed boats of Iranian traders and heavy oil and flotsam pollution of their nesting beaches, o) Gunnery target practice by Royal Navy of Oman causes disturbance to seabirds, p) Tourism village, fisheries and other development projects may create the need for new or upgraded roads and improved access to the seashore could stimulate beach erosion, damage coastal environments and reduce their value for recreation, wildlife and fisheries, or lead to further loss of beaches.

Little is known about the population status of cetaceans in the waters of Oman. The Environment Society of Oman (ESO) had collected sufficient data by photo identification techniques only for the Humpback Whale. There is also historic whaling data for this species which enables a limited understanding of historic abundance and so a rudimentary trend assessment has been possible. The results of this work indicate very conclusively that Humpback Whales occur in very low numbers in Oman (Baldwin, 2009), with a best estimate of just 82 individuals remaining in the population (95% CI 60-111, Chapman/Petersen Index). Oman's population of humpback whales is therefore genetically unique, and in severe danger of extinction. IUCN has declared the population Endangered (see attachment) based on its low numbers and limited regional range and it is widely acknowledged that this is one of the rarest baleen whale populations in the world.

ESO's involvement in turtle research in Oman is currently focused on Loggerhead Turtles nesting on Masirah Island. This has included systematic data collection according to rigorous scientific protocols undertaken over the past two years that have allowed for preliminary estimates of abundance. When pooled with previous data, albeit collected in a non-systematic and less scientific manner, some analysis of trends has been possible. These data suggest that the historic nesting population of Loggerheads on Masirah Island was in the region of 30-40,000 females in the late 1970's, but has declined since this time to a level of perhaps 20-25,000 by the early 1990's and to an estimated minimum of 12,000 by 2008 (Baldwin, 2009). This decline is similar to that experienced by the only other comparably large population of this species in the world, namely that of the Eastern United

States (Florida), as well as most other populations globally. Oman would therefore appear to be no different to other nations of the world in experiencing severe decline in its nesting Loggerhead population. However, Oman has a greater responsibility than most countries to implement conservation measures to prevent further decline, or indeed enhance recovery, owing to the fact that its population remains one of the two largest in the world and probably still constitutes up to 40% of all nesting females. ESO has also been involved with assessment of Hawksbill Turtles nesting on the Dimaniyat Islands. No population estimate has been attempted, but ecological evidence suggests that the nesting population is at, or very near to, carrying capacity.

9.1.1. Microalgae Trends

There have been few studies on the macroalgae of Oman, e.g. the survey mainly for commercial potential of seaweeds by Mardela Int. (1975) listed around 30 taxa identified mostly to generic level. A list of seaweed taxa is given in Barratt *et al.*, (1984). The study showed the brown algae as abundant around Masirah (Figure 12). Further studies are needed to show the trends of the Macroalgae. More recently, a study on the Delesseriaceae (Rhodophyta) of the Arabian Sea was undertaken. Representatives of this family are relatively well documented for adjacent areas in the Indian Ocean and these taxa are consequently a good tool for biogeographical analyses. The morphology, anatomy and reproductive characteristics of ten species are being studied; including taxa with disjunct distribution patterns (e.g. *Zellera* sp.) and first records since their original description (e.g. *Chauviniella jadinii*). Other algal groups that require a thorough examination are the Chlorophyta, the Nemaliales and the Rhodymeniales.



Fig. 12: Common brown alga of the coastal waters around Masirah Island.

The record of a true Kelp species *Ecklonia eadiata* that is found at depth between 6 and 12 meters in a tropical region is of great biodiversity interest as it is otherwise reported only from South Africa, Australia and New Zealand. The presence of this exceptional record of a temperate species has not recently been confirmed since despite attempts (most recently in 2009) to find it. It is possible that the species is confined to a much localized site east of Sadh, Dhofar; further efforts should be made to confirm its presence. Apparently, the sea currents play a big role in the redistribution of algal species.



Figure 13: Spoon seagrass *Halophila ovalis*

9.1.2. Seagrasses Trends

Distribution, abundance, and biomass data for seagrass communities at several locations on the coast of Oman were studied. The main study site was on the western side of Masirah Island on the Arabian Sea coast of Oman. This area is an important feeding ground for the green turtle, *Chelonia mydas* L., and it is affected by upwelling of low temperature waters during the summer monsoon. The depth distributions of *Halodule uninervis* and *Halophila ovalis* (Figure 13), the two most abundant seagrasses at this site, overlapped but were inversely related. *Halodule* dominated the intertidal zone and *Halophila* was more predominant in the deep subtidal, although total biomass of the two sea grasses were similar in this depth zone. At all depths, biomass of *Halophila* was about equally distributed between leaves and roots and rhizomes. Leaf biomass of *Halodule* was only 7–20% of the total biomass and the highest below-ground biomass occurred in the intertidal zone. Biomass of these species here and at other sites and of *Thalassodendron ciliatum* (Forssk.) den Hartog at this site was generally lower than comparative data in the Gulf and the Red Sea. Small patches of *Syringodium isoetifolium* (Aschers.) Dandy was

also observed in Umm Ar Rasas Bight making a total of four species recorded to occur in Oman. The reduced growth of sea grasses at Masirah Island seems to be due to stresses associated with the summer monsoon and grazing pressure. Survival of these populations is discussed in terms of seasonal growth and flowering. The Gonu Cyclone which caused extensive damage in 2007 along the Sea of Oman was the strongest tropical cyclone on record to hit the Arabian Peninsula. The dense beds of the smaller sea grasses *Halodule uninervis* and *Halophila ovalis* in the shallow intertidal at Ra's Sawadi apparently were destroyed by this cyclone.

9.2. Terrestrial Flora Trends

Recent count of the plant species composition in Oman yielded a total of 1,200 documented flora species (A. Patzelt, *in press*). The conservation status of 261 plant species is assessed in the National Red List; 189 of those are range-restricted (A. Patzelt, *in press*). 6.5% (78 species) of all species are endemic to Oman and cannot be found elsewhere in the world, and 9.3% are near-endemic or regional endemic (A. Patzelt, *in press*). A total of 9.1 % of the flora is considered threatened (A. Patzelt, *in press*). Endemism is at its highest in the southern region where 46% of the species are threatened (Ghazanfar, 1998). Of a total of endemic and regionally endemic species, 63 are present in Dhofar, 12 in central Oman and 25 in the northern mountains. Regionally endemic species existing in Oman are distributed in the western region of Dhofar and eastern Yemen. However, the cover and the individual numbers of flora are decreasing mainly in the north of Oman.

Of the marine forests, only *Avicennia marina* thrives distributed in the northern and southern coasts on the edges of small sea inlets. *Rhizophora mucronata* has been introduced in small areas in the Dhofar coasts. Also in the brackish water lagoons (khawrs) in Dhofar is a distinctive *Ceratophyllum demersum*, *Potamogeton pectinatus*, *Najas marina* and *Chara spp*. In partnership with JICA, mangrove afforestation had been engaged with the Sultanate in April 2000.

A Japanese mangrove expert was sent to then MRMEWR (now MECA) to spearhead an *Avicennia marina* afforestation program. The marine mangroves Sediments from 6000 years ago revealed the presence of pollen from *Avicennia marina* and *Rhizophora mucronata* mangroves. At present, the nearest *Rhizophora* mangrove is found on the southwestern end of the Arabian Peninsula in Yemen and in the Sirik estuary of Iran. *Brugiera gymnorrhiza* is recorded as extinct in Yemen though still present in Somalia.



Figure 14: Acacia tortilis, typical of the desert plain

9.3. Amphibians and Reptiles (Herptiles) Trends

The Reptiles are represented by 103 species, while there are three known species of amphibians. Lizards form the largest group with 86 species. There are 29 species of snakes and nine of these are sea snakes. Overall, 37 of Oman's species are endemic at regional level, of which 14 species of lizards are national endemics. The centers of endemism are northern Oman Mountains, the Dhofar Mountains and the Central Desert Plains. Conservation of nationally endemic reptiles is of considerable importance. The IUCN Red List of Threatened Animals has four species of nesting sea turtles only and therefore, requires revision.

Of the seven recognised species of marine turtle in the world, five occur in the waters of Oman (Salm and Salm, 1991). Four of these nest on beaches in Oman namely the Loggerhead Turtle (*Caretta caretta*) (EN), Green Turtle (*Chelonia mydas*) (EN), Hawksbill Turtle (*Eretmochelys imbricata*) (CR) and Olive Ridley Turtle (*Lepidochelys olivacea*) (EN). The fifth species Latherback Turtle (*Dermochelys coriacea*) (CR) is an irregular visitor to Oman where it may feed in offshore waters whilst on migration to distant nesting beaches elsewhere in the world. All herptiles are in decline.

9.4. Birds Trends

Birds are probably the best-studied group and 518 species of birds have been recorded to date. Of these, about 85 are considered residents and others are visitors for only a part of the year. There are no endemic bird species. Oman is an extremely important stopover place or wintering area for countless birds. Millions of birds pass through Oman during spring and autumn migration. About 142 species of birds either breed or probably breeding in Oman. The endangered species that visit Oman on a regular basis need protection. Threats are land use and the establishment of alien species such as Common Mynah, Ring-necked Parakeet and House Crow.

For the great majority of species no change in status has been noticed in recent years, whereas there is a need for responsible monitoring and evaluation in order to know about the bird populations or number of individuals. However, the breeding populations of European Bee-eater (*Merops apiaster*) and the Blue-cheeked Bee-eater (*Merops superciliosus*) are continuing the downward trend probably due to loss of habitat and human disturbance at breeding colonies (Eriksen, 2009).

9.5. Mammals (Terrestrial and Marine) Trends

The status of the terrestrial mammals in Oman has been well documented. Apart from the known IUCN status for these species, a preliminary red list showing Oman status is also available. Of the mammals of Oman, three are critically endangered, and six are endangered. Lower risk – least concern status has been assigned to 17 taxa and 31 taxa with insufficient information are considered data deficient. One taxon is assigned the status of lower risk – conservation dependent. Four taxa are regional endemics and one taxon is endemic to Oman. The current status of *in situ* conservation measures in Oman is commendable.

Six species of large mammals, Arabian Oryx, Arabian tahr, Arabian gazelle, Arabian wolf, White-tailed mongoose, Striped hyena and Gordon's wild cat are currently breeding in captivity. Two species, Arabian oryx and Arabian gazelle bred have been reintroduced in the wild. The program of captive breeding increased the number of the Arabian Oryx but poachers have altered this increase, whereas the Arabian Tahr that is a protected species by Law in Oman is still lacking estimates of its numbers in the wild. In addition there is little information about it in captivity. Fewer than 250 Arabian Leopards roam the mountainous regions of Oman. This species that is listed in the IUCN Red List as Critically Endangered and in CITES Appendix 1 is also declining. Also in the vulnerable category is the Arabian Gazelle (*Gazella gazella cora*) for which its population has dramatically declined since 1990s.

In Table 6 below, nineteen Cetacean species of Oman and their conservation status are given (source: www.iucnredlist.org). Codes are: DD – Data Deficient; EN - Endangered; LC - Least Concern; VU – vulnerable; NT –uNear Threatened.

Table 6. Status of 19 cetaceans from Oman		
Common name	Scientific name	IUCN Red
Mysticete whales	<i>Balaenoptera edeni cf brydei</i>	DD
Blue whale	<i>B. musculus</i>	EN
Humpback whale	<i>Megaptera novaeangliae</i>	LC, but regionally EN
Sperm whale	<i>Physeter macrocephalus</i>	VU
Dwarf sperm whale	<i>Kogia sima</i>	DD
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	LC
Long-beaked common dolphin	<i>Delphinus capensis</i>	DD
Pygmy killer whale	<i>Feresa attenuata</i>	DD
Spinner dolphin	<i>Stenella longirostris</i>	DD
Striped dolphin	<i>Stenella coeruleoalba</i>	LC
Pantropical spotted dolphin	<i>S. attenuata</i>	LC
Rough-toothed dolphin	<i>Steno bredanensis</i>	LC
Indo-pacific bottlenose dolphin	<i>Tursiops aduncus</i>	DD
Common bottlenose dolphin	<i>Tursiops truncatus</i>	LC
Risso's dolphin	<i>Grampus griseus</i>	LC
Killer whale	<i>Orcinus orca</i>	DD
Melon-headed whale	<i>Peponocephala electra</i>	LC
False killer whale	<i>Pseudorca crassidens</i>	DD
Indo Pacific humpback dolphin	<i>Sousa chinensis</i>	NT

Q3: WHAT ARE THE MAIN THREATS TO BIODIVERSITY

10. THREATS TO BIODIVERSITY

The main threatening factors to biodiversity in Oman are Habitat destruction (desertification, changes of soil characteristics) Overharvesting (overgrazing), Urbanization, Chemical pollution (nitrate, pesticides, heavy metal), Invasive species, Water shortage, and Climate change. Details on these threats are given below:

10.1. Threats to Macroalgae

The main threats to macroalgae include:

- I. Oil pollution and

II. Construction impacts from rapid coastal developments.

10.2. Threats to Terrestrial Flora and Marine mangrove

The increase in the number of threatened species in Oman is mainly attributed to habitat loss because of overgrazing and development. Possible climate change, off-road driving, ecosystem modification and littering are also representing a threat to flora and vegetation of the country (A. Patzelt, in press.). These threats lead to the loss or decline of plant populations. The on-going research in Oman Botanic Garden in documenting plant communities and plant species distribution will help to further identify threats for flora and vegetation.

Terrestrial lands of Oman depend mainly on perennial plants with availability of annual plant species, for fodder, only after rain. In Oman, threats to plant species diversity and vegetation cover can also be inferred from land use, rangeland degradation (desertification) and pollution. In 1995, Oman signed the UN agreement on combating of desertification in countries facing severe arid conditions. Mesquite or Ghaf bahri (*Prosopis juliflora*) had been introduced in the country three decades ago as a fast growing ornamenting in landscape planting (Al Rawahy *et al.*, 2003) and is now been growing in most part of the country and even reaching oil exploration areas. The species is native of southwest US and northwest Mexico (Shiferaw, *et al.*, 2004). First recorded in 1998, *Nicandra physaloides* is native to Peru and has been spreading around mountain settlements of Dhofar Oman Botanic Garden). Lead Tree (*Leucaena leucocephala*) is now cultivated in home gardens and on sides of the roads. It is seen as a future colonizer. To date, threat of *Prosopis* and *Leucaena* to biodiversity is still undocumented in Oman.

Threats to vegetation are summarized in Oman Plant Red Data Book(Patzelt, A., in press.) as follows:

- I. Breakdown of traditional land management practices, including livestock management
- II. Development of human settlements and other non-agricultural land uses with a substantial footprint.
- III. Human intrusion and disturbance;
- IV. Climate change;
- V. Lack of protected areas for plant conservation
- VI. Lack of species management plans
- VII. Lack of monitoring of threatened species
- VIII. Lack of restoration programs

- IX. Introduction of exotic species for agriculture, ornamental horticulture, rangeland management, including overgrazing by livestock and desertification.

10.3. Threats to Corals

Corals generally have specific requirements for light, temperature, salinity, and oxygen, which if not fulfilled may lead to coral mortality. As coral colonies are sessile, they are also vulnerable to siltation, because it inhibits larval settlement. Their dependence on light is because they depend on the activity of the symbiotic zooxanthellae, which is a photosynthetic partner. Responses of corals to stress include alterations in the growth rate and metabolism, behavioral responses such as filament extrusion and mucus production, sediment shedding, altered reproductive biology, and the appearance of disease. Therefore, coral reefs are vulnerable both to natural and human disturbance.

10.3.1. Natural disturbance includes:

- I. Physical changes (climatic, tidal and geological events, such as hurricanes, cyclones, storms, sea level rise, volcanic eruptions, and drop in temperature),
- II. Diseases (two diseases - white and black bands - are wide spread in the Caribbean, but have not been recorded in the Indo-Pacific),
- III. Natural predation (especially in the Indo-Pacific region, by the starfish *Acanthaster planci*, the gastropod *Drupella rugosa*, sea urchins *Echinometra mathaei*, *Heterocentrotus mammillatus*, *Diadema setosum* and *Tripneustes gratilla*), and
- IV. Competition for food and space, which can limit coral growth and the expansion of the coral reef.

10.3.2. Human disturbance includes:

- I. Coral and sand mining, and some coastal engineering works, resulting from coastal development; deposits of sediments; and soil erosion and run-off from land clearance, due to bad management and unconcerned management,
- II. Deleterious fishery-related damage causing coral reef breakage; caused by tangled gill nets and boat anchors., over-fishing or unsustainable harvest of fish and over-exploitation of reef species,
- III. Intensive recreational activities and resulting litter, rubbish and soil disturbance
- IV. Oil pollution and discharges from desalination plant and sea farms.
- V. industrial, domestic and agricultural pollution, and
- VI. Destruction of other ecosystems such as mangroves and seagrass beds, which help to stabilize coral reefs.

In a relatively recent review, it has been established that globally, 36% of all reefs were classified as threatened by overexploitation, 30% by coastal development, 22% by inland pollution and erosion, and 12% by marine pollution. Therefore, of the world reefs, more than a quarter are at high risk, and just under a third are at moderate risk from human disturbance. These human activities, coupled with natural disasters have led to reductions in the natural reef systems and marine resources worldwide.

Coral reefs throughout Oman are threatened by large scale, irreversible damage and the continued devaluation or loss of coral reef resources, including those currently of value to fisheries, tourism and recreation, coastal protection, scientific study, marine biodiversity and marine ecology.

10.4. Threats to Reptiles /Turtles

Like cetaceans, threats to turtles in Oman have been well-documented and are the same as those faced by the marine mammals. Their threats include:

- I. Interaction with fisheries gear, including by catch and ghost-netting,
- II. Habitat loss, degradation, modification and obstruction associated with coastal development,
- III. Lighting from coastal industry, housing, resorts, utilities, roads, airports, and other infrastructure,
- IV. Coastal erosion on nesting beaches due to coastal development, sand mining, beach driving, removal of vegetation and over-grazing,
- V. Strikes from shipping traffic associated with some of the busiest shipping lanes in the world,

- VI. Pollution from litter, hydrocarbons and other contaminants, especially those associated with increased coastal industrial development,
- VII. Ineffective species or habitat protection programs on both nesting and feeding grounds Egging and;
- VIII. Poaching,

It is considered highly likely that the decline in the nesting Loggerhead Turtle population detected on Masirah Island is largely attributable to fisheries by catch, as is the case for the population of this species off the coast of the Eastern United States. However, lighting and coastal development are also an increasing threat to this species at key nesting sites, as well as to other species.

10.5. Threats to Birds

Considered major threats to birds in Oman are the following:

1. Loss of Habitat: A number of important bird areas are under threat from human developments. Presently, the trend is that development projects on coastal areas are keeping away shore birds (Eriksen, 2009). Though new habitats will be developed with more greenery and golf courses, the birds that will benefit from such development are completely different to the ones (herons, waders, gulls and terns) that now use the beaches and mudflats at the tidal creek. For these birds the added disturbance from far more people using the area on a daily basis is worrying. Likely, breeding population of Sooty Falcon (*Falco concolor*) on the offshore islands at Ras As Sawadi and the Daymaniyat Islands will probably be subject to increased disturbance. Farmlands near Sohar and in Salalah are presently under severe threat. Water used to irrigate the cultivated areas and grasslands have greatly diminished in the last few years. A noticeable decrease in the number of species and the number of birds using these areas as wintering destination is apparent. In particular, two Red Data List species, the Sociable Plover (*Chettusia gregaria*) and the Greater Spotted Eagle (*Aquila clanga*) have already been reported a marked decrease on the number of sightings per year (Eriksen, 2009).
2. Spread of invasive, alien species. A number of alien bird species has spread alarmingly in recent years. Three species are currently considered invasive: Ring-necked Parakeet (*Psittacula krameri*), House Crow (*Corvus splendens*) and Common Mynah (*Acridotheres tristis*). All three species are exceedingly common on Al Batinah coast and these have now colonized the Salalah region, the latter species only recently so. Particularly alarming is the spread of the Common Mynah. This species is very aggressive towards native birds, say up to the size of at least Laughing Doves (*Streptopelia senegalensis*). It competes with native species for food and nesting sites. Whereas nothing much can be done on Al Batinah, there may still be time to control the spread of at least the House Crow and the Common Mynah in Salalah, but action must be taken now before the number of birds explode (Ramadan-Jaradi, *unpubl.*).

10.6. Threats to Mammals (Terrestrial and marine)

Threats to mammals are summarized as follows:

10.6.1. Threats to Terrestrial Mammals

- I. Persecution based on some misguided traditional beliefs towards felines and canines.
- II. Poaching for Oryx, Tahr, porcupine, gazelle meat had been rampant.
- III. Live capture of carnivores and herbivores had become common for private collections and trade.
- IV. Habitat loss and fragmentation through urban, quarrying, development and off-road driving.
- V. Competition with other herbivores (including goats and sheep) had been listed as threatening to their existence.

10.6.2. Threats to the Cetaceans:

Threats to marine mammals in Oman include the following:

- I. Interaction with fisheries gear, including by catch and ghost-netting
- II. Strikes from shipping traffic associated with some of the busiest shipping lanes in the world.
- III. Habitat loss and degradation associated with fisheries, coastal development and offshore shipping traffic. Noise associated with shipping traffic, offshore seismic exploration and offshore military operations.
- IV. Disturbance and noise by recreational boats and dedicated whale/dolphin watching tour operations.
- V. Pollution from hydrocarbons and other contaminants, especially those associated with increased coastal industrial development.
- VI. Lack of dedicated species or habitat protection programs.

11. IMPACTS OF CHANGES IN BIODIVERSITY FOR ECOSYSTEM SERVICES AND THE SOCIO-ECONOMIC AND CULTURAL IMPLICATIONS OF THESE IMPACTS

There is a strong relation between people and their environment as well as their natural resources. This relation is essential and should satisfy both humans and natural resources. In other words, humans and biodiversity should be in balance to ensure the sustainability. As such, people will have to promote development that will not alter the balance and condition of the natural ecosystems. In Oman, the following impacts of the changes in biodiversity are:

- Larger numbers of cattle, sheep, goats and camels have exceeded the carrying capacities of the grazing areas and caused the deterioration of vegetation composition and subsequently decreased the biomass productivity.
- Desertification had encroached on Dhofar Mountains due to heavy over stocking and little application of rangeland management practices. This has led to significant deterioration in rangeland, a matter that pushed the owners of herds to purchase alfalfa and hay from farms.
- Hydro-geological instability still represents an overall natural threat. In addition risks for human health and natural environment by pollution in several areas of Oman should be put in a safer state and decontaminated. Otherwise, there will be a need to purchase water from abroad and to pay a huge bill for the health of people.
- Climate variation that caused the Super-Cyclone *Gonu*, which entered the Sea of Oman in June 2007, has led to Oman's worst natural disaster and the largest Cyclone on record to strike the Arabian Peninsula. Highest winds were over 260 km/h in the Arabian Sea and the storm severely damaged coastal areas including 1,000s of sq m of reef damaged near Muscat. The "*Gonu*" emphasizes how well managed wetlands, river basins watersheds are important to mitigate the climate change events.
- Over use of water for agriculture has resulted in salt water intrusion. This causes "salinization" of groundwater negatively affecting both freshwater and terrestrial biodiversity.
- Agricultural land use, road and bridge construction activities and mining resulted in sediment loading of aquatic habitats directly or via surface runoff.
- Siltation has impacted on deposition and erosion of biotopes of perennial spring streams. Silt and sand are deposited in "khawrs" and retention reservoirs affecting survival of biodiversity.
- Chemical pollutants such as nitrogen and phosphorus and toxic pesticides, hydrocarbons from oil and heavy metals from industrial wastes including organic wastes from sewage and septage disposal all contributed in the devastation of aquatic biodiversity.
- Litter, tar balls and coastal roads are most conspicuous threats to shore land environments. Small beaches in the Khasab area and along the north coast of the peninsula are staging posts for Iranian small boat traders. These beaches are severely littered with tins, bottles, glass, plastic bags, cartons and sand bags used as ballast, a matter that destroy the eco-tourism industry.

PART II: THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN, ITS IMPLEMENTATION, AND THE MAINSTREAMING OF BIODIVERSITY

Oman adopted in 2001 the National Biodiversity Strategy and Action Plan (NBSAP), as a reference document in order to stick to commitments accepted with the ratification of the Convention on Biological Diversity. The National Strategy illustrates the political directions as well as the basic rules, principles and guidelines which the Sultanate can use to direct the development process hand in hand with the preservation of biodiversity to contribute in achieving the biodiversity objectives of the National Strategy that includes nine main objectives:

1. Protection of natural habitats and productive, renewable resources for rational and sustainable utilization.
2. Conservation of natural habitat environments and the biodiversity of fauna and flora, particularly rare species and those of special significance.
3. Providing a high-quality natural environment for recreational and touristic activities.
4. Improvement of knowledge on ecosystems and elevation of resource management capabilities.
5. Raising awareness on the importance of biodiversity conservation and the sustainable use of biological resources.
6. Passing legislation to ensure biodiversity conservation and the sustainable use of biological resources.
7. Building a system of incentives to encourage the activities of biodiversity conservation and the creation of job opportunities for the locals.
8. Equal distribution of the returns yielded from the sustainable use of resources at the local and regional levels, including genetic resources.
9. Promoting regional and international cooperation in the fields of biodiversity conservation and the sustainable use of natural resources.

The NBSAP of Oman aims to merge and integrate biodiversity conservation targets and sustainable use of natural resources within sartorial policies, and as a consequence the implementation of the **vision** of the updated national strategy itself in 2013: **"To work together rationally for reconciliation and harmonization with Nature"**.

For instance and in accordance with the strategic plan for the sustainable development of the country, the national strategy provides for the execution of a number of priority objectives, including:

1. Assessment of the status of biological diversity and its value.
2. Identification and reduction of threats to species and ecosystems mainly from human activities.
3. Establishing traditional but wise dependence of local communities on the conservation and sustainable use of biodiversity, including agricultural biodiversity to meet the population's needs for food, health care, fuel, construction materials, raw materials, commercial, industrial, recreational and a variety of other resources.
4. Enlightening the best conditions for environment recovery and reducing of greenhouse effects due to the increase of CO₂ (carbon emissions) for the conservation of biological diversity.
5. Development of the legal framework for the protection of biological resources, determining the balance between economic and social environmental benefits for the sustainable use of biological resources at the regional national and local levels.
6. Improvement of the system of coordination of actions aimed to resolve biodiversity issues.

7. Restoration of habitats and ecosystems.
8. Raising awareness and education of the local population and public.
9. Undertaking inventories of all fields as available to classify economic, ecological, and sensitive species, as well as ecosystems and habitats of interests.
10. Richness of genetic diversity for the development of sustainable cultivars and breeds of domestic animals.
11. Improving legal and economic conditions for biodiversity conservation.


However, this national strategy, developed in 2001, as a policy document, supported by public funding and binding for execution, was approved by the government. Many of the provisions of the National Strategy and the Action Plan on the conservation and sustainable use of biodiversity in Oman relate to different ministries and agencies, not subordinate to the Ministry of Regional Municipality and Water Resources at that time (now the role of the Ministry of Environment and Climate Affairs), therefore the provisions of this document tend to be slightly better reflected in sartorial plans.



In accordance with resolutions adopted at the 10th and 11th Conferences of the Parties on the conservation of biological diversity, currently a new National Biodiversity Strategy is about to be finalized, primarily with support of the government of Oman, and the technical support of UNEP. The strategy may be submitted for approval earlier in year 2015.


In general, the current Oman's interests aimed at conservation of the biodiversity, coupled with the improvement of people's lives, should resolve issues of biodiversity and prevention of desertification and land degradation; rehabilitation of ecological disaster areas (chiefly, Mangrove); prevention of pollution of the sea; prevention of pollution and depletion of water resources; prevention of air pollution, bacteriological and chemical contamination; reduction of volumes of industrial and domestic wastes; and prevention of natural and manmade emergencies.


12. NATIONAL BIODIVERSITY TARGETS


The National targets are indicated in Table (7) below.



Table 7: National Targets of the Sultanate of Oman				
International Goal	Aichi Target	National Priority Level (10 priorities)	National Target (23 targets)	Indicators
<p><i>Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</i></p>	 <p>Aichi 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.</p>	<p>16/20</p>	<p>A.1- By 2017 a national roadmap in awareness to encourage behavior change towards the national heritage of biodiversity is developed and its implementation initiated.</p>	<p>National Strategy for Education, Environmental Awareness and Sustainable Development.</p>
			<p>A.2- By 2018, awareness raising campaigns covered all the administrative areas and all productive sectors of Oman.</p>	<ul style="list-style-type: none"> •Map of awareness conducted campaigns. •Number of productive sectors involved.
			<p>A.3- By 2020, at least 65% of the Omani people are appreciating the values and the protection of the biodiversity, aware of its threats in the Sultanate and knowledgeable about its conservation and sustainable use measures.</p>	<ul style="list-style-type: none"> • Trends in membership of environmental NGOs • Trends in media involved in environmental issues • Trends of research conducted in sensitive or protected areas. • Number of protected or controlled areas.



<p>Strategic Goal C: <i>To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</i></p>	 <p>Aichi 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 landscape and seascapes.</p>	15.5/20	<p>C.1- By 2020, the extension of protected areas is steered to have a national system of ecologically representative protected areas, to cover 17% of terrestrial ecosystems and 'inland waters and 10% of marine and coastal areas.</p>	<ul style="list-style-type: none"> • Percentage of the area dedicated to protected areas. • Evolution of the connectivity of protected areas and other integrated lands and seascapes • Evolution of the extension of marine protected areas, and coverage of key biodiversity areas.
			<p>C.2- By 2020 mechanisms for integrating economic, social and cultural values of national biodiversity and ecosystem services in decision-making and sector planning are strengthened.</p>	<ul style="list-style-type: none"> • Trends in policies considering biodiversity and ecosystem services in the assessment of the environmental and strategic impact. • Frequency of assessments of the economic, social and cultural values of biodiversity. • Trends in integration of biodiversity values and ecosystem services into sectoral policies and development.
<p>Strategic Goal E: <i>Enhance implementation through participatory planning, knowledge management and capacity building</i></p>	 <p>Aichi 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,</p>	14/20	<p>E.1- By 2018, the CHM is enriched with information and massively accessed by visitors on internet.</p>	<ul style="list-style-type: none"> • Number of visitors to the National CHM through the internet. • Amount of information incorporated into the CHM.
			<p>E.2- By 2019, the assessment of economic, social and cultural values of national biodiversity and ecosystem services is improved</p>	<ul style="list-style-type: none"> • Trends in the number of assessments of biodiversity and ecosystem values

	widely shared and transferred, and applied		E.3- By 2020, knowledge about the resilience of ecosystems to climate change is improved and the indicators for its monitoring and evaluation are developed and applied.	<ul style="list-style-type: none"> • National Action Program to combat desertification. • National Plan of Actions using indicators to monitor, evaluate and stop Desertification.
<i>Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</i>	 <p>Aichi 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</p>	14/20	C.3- By 2020, the establishment of adequate programs for in situ and ex situ conservation of the genetic diversity of cultivated plants, domestic and wild animal species, microorganisms, as well as for the conservation of forest species and other species of flora spontaneous with a socio-economic value have safeguarded and maintained the genetic diversity of species and the services of ecosystems.	<ul style="list-style-type: none"> • Number of species subject to conservation measures of genetic resources. • Number of in-situ and ex-situ conservation sites.

<p>Strategic Goal B: <i>Reduce the direct pressures on biodiversity and promote sustainable use</i></p>	 <p>Aichi 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.</p>	<p>13.5/20</p>	<p>B.1- Between 2015 and 2020, the threats to biodiversity are gradually halved through new supportive issued legislation, suppression of 50% of pressures and promotion of sustainable use.</p>	<ul style="list-style-type: none"> • Changes of biodiversity in term of number of threatened species and habitats. • Percentage of threats removed or weakened.
			<p>B.2- By 2016 a national red list of habitats established and by 2020, prioritized plans for the safeguard of the most endangered habitats, including wetlands are implemented.</p>	<ul style="list-style-type: none"> • Surface areas of degraded/ endangered habitats. • Changes in condition and vulnerability of ecosystems • Changes of biodiversity in terms of number of species and surface areas of habitats. • Establishment of an information Platform to monitor biodiversity conservation and sustainable utilization

<p>Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services</p>	 <p>Aichi Target 14 By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable</p>	<p>12/20</p>	<p>D.1- By 2020 watershed areas, forest lands, outstanding scenic terrestrial, coastal and marine views, oases, and Aflaj (traditional water channels) are restored and safeguarded.</p> <p>D.2- By 2020, a national assessment about the state of provisioning, regulating and cultural services supplied by natural ecosystems and their importance for people and on management options to be developed for the sustainable supply of ecosystem services, is developed.</p> <p>D.3- By the end of 2017 a national strategy is established for the sustainable management of ecosystems supplying important ecosystem services.</p>	<ul style="list-style-type: none"> • Number of watershed areas, forest lands, outstanding scenic terrestrial, coastal and marine views, oases, and Falaj identified, restored areas mapped and safeguarded. Aflaj alone may secure 40% of water for irrigation purposes • Dams at Jabal Al Akhdar, J. Serah, Dhofar, J. Shams, and wadi Daykah aim at providing water resources for citizens mainly in remote areas. • Fog collection at Dhofar and its contribution to secure irrigation water for trees and rain-fed irrigation to prevent desertification. • Coverage of Remote sensing used for identification and mapping. • Number of assessment reports for ecosystem services. • A national strategy for the sustainable management of ecosystems supplying important ecosystem services.
--	--	---------------------	---	---

<p>Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use</p>	 <p>Aichi 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</p>	<p>12/20</p>	<p>B.3- By 2020 an inventory of national marine genetic resources is developed, a program for preservation is established, including plans for the conservation and management of coral reefs.</p>	<ul style="list-style-type: none"> • Number of genetic resources and number of collections created and maintained. • Volume of financial and material support allocated to the conservation of genetic resources. • Evolution of coral populations in major operating sites.
<p>Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</p>	 <p>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 function and biodiversity</p>	<p>11/20</p>	<p>C.4- By 2018 a prioritized list of endangered species in Oman is established and adequate scenarios to stabilize their populations is implemented by 2020.</p>	<ul style="list-style-type: none"> • The list of threatened species of Oman is issued together with relevant research evidence of the reasons of their threat status • Agreed upon scenario to maintain the threatened species approved.
			<p>C.5- By 2019, national red-lists of species are elaborated and action plans for most of the globally endangered species are developed and implementation is initiated.</p>	<ul style="list-style-type: none"> • Target actions (action plans) to address or remove all or some of the reasons that are driving the decrease of the species, timely set in place. • Red-lists in mammals, birds, reptiles and fishes elaborated

<p>Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use</p>	 <p>Aichi 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.</p>	<p>10/20</p>	<p>B.4- By 2018, a coordinated national program for monitoring, surveillance and control against invasive alien species is developed.</p>	<ul style="list-style-type: none"> National program for monitoring, surveillance and control of invasive alien species
			<p>B.5- By 2018, legislation is enacted to manage pathways to prevent alien invasive species introduction and installation.</p>	<ul style="list-style-type: none"> Legal preventive measures to prevent introduction and installation of invasive species issued and applied.
			<p>B.6- By 2020, Oman controlled and/or eradicated 20% of the all identified invasive species in the country.</p>	
<p>Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use</p>	 <p>Aichi Target 8 By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.</p>	<p>9.2/20</p>	<p>B.7- By 2018 a map of various pollution impacts in the Sultanate is produced.</p>	<ul style="list-style-type: none"> A map of pollution sources.
			<p>B.8- By 2019, sources of pollution are put under control and monitored.</p>	<ul style="list-style-type: none"> A national monitoring program for identification of the main sources and diffusion paths of chemical and physical pollutants in the natural ecosystems and the effects of pollution on natural ecosystems.

			<p>B.9- By 2020, the pollution is brought to levels of little impact on ecosystem function and biodiversity.</p>	<ul style="list-style-type: none">• Emission trends in the environment of harmful pollutants to biodiversity• Changes in levels of contaminants for wildlife• Trends in deposit rates of pollution• Proportion of wastewater discharged after treatment• Changes in water quality in aquatic ecosystems
--	--	--	--	---

Q6: HOW HAS YOUR NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN BEEN UPDATED TO INCORPORATE THESE TARGETS AND TO SERVE AS AN EFFECTIVE INSTRUMENT TO MAINSTREAM BIODIVERSITY?

13. NBSAP UPDATES TO INCORPORATE NATIONAL TARGETS AND TO SERVE AS AN EFFECTIVE INSTRUMENT TO MAINSTREAM BIODIVERSITY

The Sultanate of Oman devotes great attention to the preservation of biodiversity at the national and global levels. In conformation of that, it officially acceded to the Convention on the Biological Diversity in 1994 in accordance with Royal Decree No. 119/94.

In compliance with the main membership obligations and responsibilities in this Convention, and according to Article (6A) of the Convention, the Government of the Sultanate prepared the first National Biodiversity Strategy and Action Plan in 2001. With the adoption of the Strategic Plan for Biodiversity 2011-2020 at CBD COP-10 in Nagoya, Japan, Parties to the CBD have been requested to update their NBSAPs with the new Aichi Biodiversity Targets, including reporting on their adopted strategies at COP-12. The Strategic Plan contains a vision of a world "living in harmony with nature" where by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people" (CBD COP 10 decision X/2). The Aichi twenty targets relate to the sustainable management and use of the world's biological resources. In order to achieve this, the Parties to the Convention are expected to develop or update their National Biodiversity Strategies and Action Plans (NBSAPs) in line with the Strategic Plan, including the setting of national targets and the development of biodiversity indicators to measure the progress of target achievement and NBSAP implementation. The United Nations Environment Program Regional Office for West Asia (UNEP ROWA) is supporting the regional implementation of decision X/2 and coordinating with the Secretariat of the CBD as well as with the Sultanate of Oman, where the Ministry of Environment and Climate Affairs (MECA) is leading on the NBSAP development process.

In compliance with Article (6B), the Sultanate has adopted integral, multi-sector directions that depend on incorporating considerations of ecosystem protection and management to eliminate or reduce loss of biodiversity and promote its sustainable use in all the development plans projects of the different relevant Government and non-Government organizations and agencies. Since biodiversity conservation is a responsibility shared by most Government agencies in the Sultanate, the development of the Strategy required active participation to achieve integration among all the targeted sectors and ensure complete coordination between these sectors during the future implementation of the National Strategy Action Plan, knowing that at present, the NBSAP updating process is still at its apogee where the working teams from the different governmental and non-governmental agencies collaborate to produce a realistic and tangible NBSAP that is in line with the global strategy 2011-2020.

In the first NBSAP (NBSAP1), the priority areas for interventions are derived from the 9 objectives already set for the NBSAP1. These objectives are connected to the national targets as follows:

1. Protection of natural habitats and productive, renewable resources for rational and sustainable utilization. Objective related to national targets: B1 and B2

2. Conservation of natural habitat environments and the biodiversity of fauna and flora, particularly rare species and those of special significance. Objective related to national targets: B1, B2, C4 and C5.
3. Providing a high-quality natural environment for recreational and touristic activities.
4. Improvement of knowledge on ecosystems and elevation of resource management capabilities. Objective related to national targets: C2 and E2.
5. Raising awareness on the importance of biodiversity conservation and the sustainable use of biological resources. Objective related to national targets: A1, A2 and A3.
6. Passing legislation to ensure biodiversity conservation and the sustainable use of biological resources. Objective related to national targets: B1, B5 and B8.
7. Building a system of incentives to encourage the activities of biodiversity conservation and the creation of job opportunities for the locals.
8. Equal distribution of the returns yielded from the sustainable use of resources at the local and regional levels, including genetic resources. Objective related to national target: C3.
9. Promoting regional and international cooperation in the fields of biodiversity conservation and the sustainable use of natural resources. Objective related to national target: E1.

The revision of the NBSAP and the establishment of the national targets are the results of two workshops that were conducted in Muscat of Oman with the support of UNEP/ROWA and CBD Secretariat. The first workshop was to strengthen capacity in the production of national targets and indicators as part of the National Biodiversity Strategy and Action Plan (NBSAP) updating process. The results of the workshop were: government agencies, NGOs and research institutes that are involved in updating NBSAPs have a better understanding of the analytical needs and availability of information to support the definition of national targets and indicators considering the Strategic Plan for Biodiversity 2012-2020 as a flexible framework; participants are a drafting team of the NBSAP and 5thNR to CBD and they are confident to use the 'Biodiversity Indicator Development Framework' and prepared to develop indicators for NBSAPs in their first task of the second workshop; participants gained new ideas, inspiration and opportunities for NBSAP updating from the experience of others in the region, provided to them by the consultant.



Figure 15: NBSAP & 5th NR drafting team of Oman

The second workshop was 1) to strengthen capacity in the production of SMART national targets and appropriate indicators as part of the National Biodiversity Strategy and Action Plan (NBSAP) updating process, and 2) to learn about biodiversity mainstreaming and how to develop the 5th National Report to CBD. Since the updating of the NBSAP and the preparation of the 5th National Report to CBD are country driven activities based on the participation of a wide range of stakeholders (CBD/COP 10), the trainer's purpose was to provide the trainees with the necessary tools and guidelines to upgrade their skills and enable them to be capable of updating their NBSAP and reporting on their recent progress in the implementation of their national Actions. In order to assist them doing their tasks, the Trainer will review their updates of the NBSAP and their 5th National Report to CBD.

Without their information on the progress made to implement the NBSAP between 2010 and 2013 and without their specific national targets and indicators set by them, the trainer will remain tied and deprived from any material needed for the reviews.

By following the guidelines of the CBD in this second workshop, the results of the workshop showed that the government agencies, academic and research institutes in Oman that are involved in updating the NBSAP have:

- Improved understanding of the information needs to develop national targets and indicators within framework of the Strategic Plan for Biodiversity 2011-2020;
- Increased skills and confidence in developing SMART Priority National Targets and using indicators as part of NBSAP updating and implementation.
- Gained new ideas, inspiration and opportunities for NBSAP updating from the experience of other countries in the region.

In addition, the workshop had a secondary set of objectives for participants to:

- Understand that the national targets are not necessarily those of Aichi targets but may correspond to some and be in line with others.
- Recognize that some of the Aichi targets are not a priority for Oman.
- Understand that 'Indicators are Purpose Dependent.
- Have confidence to use the 'Biodiversity Indicator Development Framework';

Have confidence to develop indicators for NBSAP, including Aichi Targets; increased collaboration - national, regional, global levels.


Q7: WHAT ACTIONS HAS YOUR COUNTRY TAKEN TO IMPLEMENT THE CONVENTION SINCE THE FOURTH REPORT AND WHAT HAVE BEEN THE OUTCOMES OF THESE ACTIONS?

14. ACTIONS TAKEN TO IMPLEMENT THE CONVENTION SINCE THE FOURTH REPORT AND THE OUTCOMES OF THESE ACTIONS

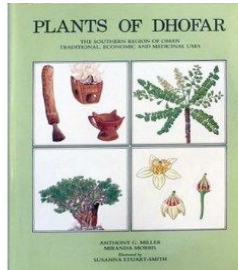
As the NBSAP-2 is not fully updated and implemented yet, this section describes the contribution of the implementation of the NBSAP-1 since the submission of the 4th National Report on the implementation of the CBD from January 2010 to December 2013. In a summary table, we provide for each theme strategy, actions and results of the implementation (Table 8).

The United Nations Environment Program (UNEP) has credited Oman with having one of the best records in environmental conservation, pollution control and maintenance of ecological balance. Oman is even stated as having one of the world’s most rigorously “green” governments. Oman’s biodiversity is catered for by varying topographic features, from a vast arid desert in the West, to a belt of grass and woodland in the mountainous region of the South, and the Arabian Sea in the East.

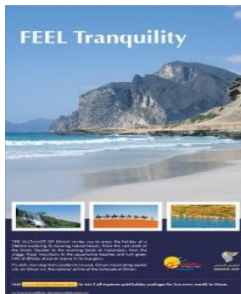
Table 9: Actions taken by Oman to implement the CBD between 2010 - 2014

Themes	Actions during 2010 - early 2014	Results/ Notable progress
<p>Education/ Awareness</p>	 <p>OAPGRC in collaboration with national partners contributes to the educational awareness programs in the country. For examples:</p> <ul style="list-style-type: none"> • Qurum Natural Park 29 April - 1 May 2012 Exhibition, which introduced school children to the plants, animals, marine and microbial species of Oman. • Road show activity, which aims to raise the awareness on diversity, benefits, threats and uses of genetic resources in Oman. • Science Café series meeting to provide a platform for mutual learning and dissemination of knowledge on issues related to genetic resources in the Sultanate. • Development of a web portal for information on genetic resources. • Curricula in Oman continued to offer information/knowledge about species, habitats, economic species, threats to species & habitats and importance of conservation and sustainable use of 	<p>Environmental Education Document for a sustainable development in Oman.</p> <p>Annual program version of cognitive development for students in materials of science, mathematics, geography within an environmental context.</p> <p>The national report for the International Year of Biodiversity 2012 which showed how awareness about the importance of biodiversity is raised through activities and events in the country.</p> <p>Participation of students in several workshops and seminars about the various threats to biodiversity.</p> <p>Raised awareness among people of Oman on the importance of biodiversity as a necessity of the life of humans and the need to use it sustainably and to appreciate it appropriately.</p> <p>A number of NGOs and youth have played a big role in creating awareness about the importance of a clean environment and its preservation.</p> <p>Ministry of Environment and Climate Affairs signed in 2012 a contract with the Japanese Agency for International Cooperation (JICA), to establish The Qurum Center for Environmental Information (QCEI) at the Qurum Natural Park, in Muscat. QCEI's concern is the collection and presentation of environmental, economic and social data (knowledge dissemination), environmental awareness programs and capacity building in environmental education.</p>

biodiversity.



Production of Leaflets, brochures, posters and booklets (mainly by Ministry of Education, Ministry of Environment and Climate Affairs and the National Research Centre for Environmental Conservation) to sensitize people on the socio-economic values of biodiversity and the importance of appropriately managing it in order to serve the goals of the CBD.



Government agencies and ministerial bodies are working tirelessly to preserve the country's environment.

Promotion of the establishment of NGOs for awareness purposes and linkage between biodiversity and women.



Inauguration of a new program on environmental science at the faculty of high technology, applied science section; by the Ministry of Manpower.

The MECA and MOAFW conducted the Renaissance Whale and Dolphin project that is a multifaceted scientific and public awareness project established by ESO in 2011.

Several NGOs established and several workshops of awareness, including 6 workshops of awareness to women, chiefly in rural areas, were taking place in 2012 by the Ministry of Social Development.

New graduates as bachelors in Environmental Science, biodiversity and conservation.

Renaissance Whale and Dolphin project Provided information that can lead to effective conservation management.

Improved conservation of cetaceans based on information acquired through scientific research.

Produced knowledge of OBG created additional appreciation for plant diversity by students.

OBG also provide valuable opportunities for conservation awareness activities and education.

Ministry of Information and Ministry of Tourism are fully involved in promoting biodiversity sustainable use and conservation.



The Oman Botanical Garden (OBG) contributes to the education programs in the country.

Oman's unique wildlife and nature reserves are key attractions of the country and as such are being featured and promoted by both the Ministries of Information and Tourism.

Five-year underwater research effort and campaign spearheaded by the international organization Biosphere Expeditions yielded in January 2014 to governmental protection of two secluded bays in Oman. The aim of the research is to ensure the survival of a unique marine ecosystem and natural jewel in Oman's crown. This area has a high coral coverage at nearly 60 per cent of the underwater surface. This is greater than that of most reefs around the world, and the Musandam reefs are certainly the best in the region.”



On 19 April 2013, Oman has completed the formalities and deposited its instrument of accession with the Director-General, along with the required name and map of at least one Wetland of International Importance. Thus the Ramsar warmly welcomed the Sultanate of Oman as the 167th Contracting Party.



Petroleum Development Oman (PDO) conducted biodiversity surveys carried out for the entire concession area to map out biodiversity features and identify sensitive areas. The latest survey was done end 2012.

The surface area of Protected Areas increased from 2.6% to 3.78%.

All fishing bar hand line has been banned from the coral-rich bays of Khwar Najd and Khwar Hablain on the Musandam peninsula of Oman. The Ministry of Agriculture and Fisheries has prohibited the use of all forms of nets and cages in an effort to protect the pristine corals and conserve the natural beauty and marine resources of this relatively untouched area.

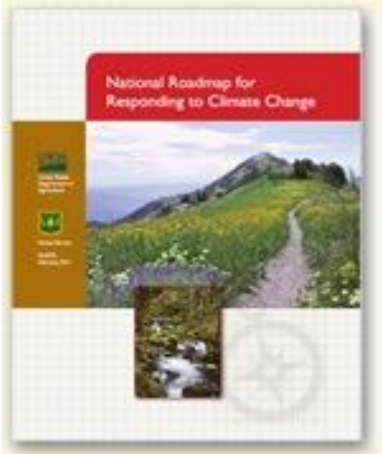
Increased surface area of MPAs. Precise size is to be calculated.

Accession Of Oman to the Ramsar Convention entered into force on 19/8/2013 with the Oman's first Ramsar Site, the 172-hectares, the Qurm (mangrove) Nature Reserve wetland which lies at the heart of Muscat, the capital city.

The outcome of these surveys was incorporated into environmental and social GIS tool enabling all projects subject to EIAs to have an environmental map for their location showing all environmental and social features. This tool has helped a lot in avoiding sensitive areas and applying strict controls to manage potential impacts.

Most of the eco-regions are preserved with their species in Oman.

Protected Areas

<p>Conservation, sustainable utilization and fair and equitable Benefit sharing as per the Nagoya Protocol.</p>	<p>Development of a genetic resource information platform by OAPGRC</p> <p>Establishment of Oman Animal & Plant Genetic Resources Center.</p> <p>Development of a Strategic roadmap for the OAPGRC</p>	<p>All information pertaining to the genetic resources registered in the database became uniform amongst the different organization</p> <p>The national database is serving as a tool Knowledge and information sharing and for communication and coordination amongst different national stake holders.</p> <p>Better protection of the country's genetic resources.</p> <p>Improved sustainable use of animal and plant genetic resources through education, research and innovation.</p>
<p>Climate Change</p>	<p>National roadmap in response to Climate Change with the following essential actions:</p>  <p>Assessment involving the current and future risks, vulnerabilities, policies, and knowledge gaps through coordinated and well-integrated technical studies;</p> <p><i>Engagement</i> involving internal and external partners in identifying and prioritizing strategies to reduce GHG emissions and adapt to climate change;</p> <p><i>Management</i> for resilience, in ecosystems as well as in human communities, through adaptation, mitigation, and sustainable development strategies.</p> <p>OBG is collecting baseline phenological data that will form a strong platform for many conservation projects in the country.</p> <p>OAPGRC organized a Science Café session to discuss Global warming as an environmental disaster and its local and global impact on genetic resources. .</p>	<p>Gaps and constraints to the preparation of a national strategy for climate change adaptation and mitigation are known.</p> <p>Focusing on plans for institutional coordination, network development, and capacity strengthening as a backbone for the development of the National Strategy.</p> <p>The implementation of the last 3 actions (assessment, engagement, management) is in progress.</p> <p>Possible link between climate change and plants development is investigated.</p>

Petrol Development Oman (PDO) constructed wetland system at Nimr Cluster, which has seen a desert area of 2.4 million square meters transformed into lush greenery by planting two million reeds to naturally clean oil and other contaminants from produced water.



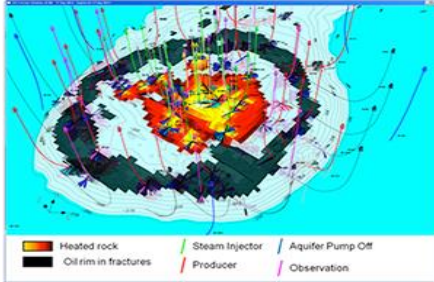
Pollution reduced.




A valuable habitat for migratory birds, with close to 100 different species being identified at the site to date.

Reduced PDO's consumption of fuel gas when deployed on large scale.

Pollution

PDO implemented the Qarn Alam Steam project scheme, which came on-stream in March 2012. It is the world's first full field thermally assisted gas oil gravity drainage project in a carbonate field and aims to increase the recovery factor from 3% to over 30%.



<p>Eco-tourism</p>	<p>Beside bird-turtle-dolphin watching and nature reserves visiting the government of Oman promoted eco-tourism through assigning new areas as attraction for visitors.</p>  <p>Development of the Tourism Concept Master Plan and Management Plan for Wadi Darbat as ecotourism attraction.</p>  <p>Bandar Khiran assigned by Royal Decree as public ecotourism site.</p> 	<p>Maximized conservation and protection of ecosystems and species in some places and maximized ecotourism in other places.</p> <p>Cooperation between Ministry of Tourism and IUCN-ROWA to prepare the eco-tourism and site management plans for Bandar Khiran.</p>
---------------------------	---	--

Exotic species

Control of the invasive *Prosopis juliflora* in various places of the country, including Wadi Darbat.






Identified exotic invasive bird species in the country.



Increased fertility of the soil.

Attraction of researchers to study the appropriate ways to eliminate the invasive species and block their pathways to the country.

<p>Species conservation</p>	<p>Oman Botanical Garden issue a Plant Species National Red List(this document is currently in press.).</p> <p>List of mammal and bird threatened species produced.</p> <p>Sooty Falcon surveys and monitoring continued.</p> <p>Environment Society of Oman (ESO) received grant from “Hima Fund” in 2012 to research Egyptian Vulture (Globally Endangered Species) on Masirah Island. The project received additional funding in its second phase till July 2015 to cover a broader geographical area in Oman, around the governorates of Al Batina, Al Dhahra, Ah Sharqiya, Dhofar and Muscat.</p>  <p>ESO analyzed in 2011-2012, as a part of an ongoing project, various options for a sustainable harvest of the highly economic Frankincense Tree in Oman (EOS, internal report) .</p>  <p>The MECA and MOAFW supervised the Renaissance Whale and Dolphin project that is a multifaceted scientific and public awareness project established by ESO in 2011.</p>  <p>Arabian Leopard, Arabian Oryx, Arabian Tahr, Mountain Gazelle, etc. are under ongoing legal conservation measures.</p>	<p>Priority plant species for conservation are known and help prioritizing actions. Red List motivated the community into taking appropriate action to reduce the loss of species</p> <p>Priority species for conservation are known and help prioritizing actions.</p> <p>Sooty Falcon is protected through close control and monitoring.</p> <p>Project is in progress. Results showed a large increase of the Egyptian Vulture population on Masirah Island. The results of the wider survey are in progress.</p> <p>Renaissance Whale and Dolphin project Provided information that can lead to effective conservation management.</p> <p>Improved conservation of cetaceans based on information acquired through scientific research. Recent cases involved among others compensating a shepherd for a goat killed by a protected leopard, funding the construction of a higher fence around a date grove in Central Oman to protect it from a pair of foraging tahrs, and catching a poacher in the act of netting birds, after his illicit activities were reported to a ranger by villagers.</p>
------------------------------------	---	---



The development of the national plant agro biodiversity conservation strategy for Oman was initiated and commissioned of the OAPGRC. The objectives of the international consultancy is to provide guidance for OAPGRC and facilitate the development of a national plant agro biodiversity conservation strategy for Oman.

OAPGRC hosted the First Meeting of Medicinal Plants Focal Points of Indian Ocean Rim Association the Regional Centre for Science and Technology Transfer (IORA RCSTT Cum) Exhibition to discuss issues on conservation and sustainable use of medicinal plants. The meeting was attended by participants from Egypt, India, I. R. Iran, Malaysia, Seychelles, Sri Lanka, Thailand and the Sultanate of Oman both from Government and private sector.

The meeting ended up with the Salalah Declaration which aims to enhance regional medicinal plant co-operation through high-profile events and annual joint activities.



As the NBSAP-2 is not fully updated and implemented yet, this section describes the contribution of the implementation of the NBSAP-1 since the submission of the 4th National Report on the implementation of the CBD from January 2010 to December 2013. In a summary table, we provide for each theme strategy, actions and results of the implementation (Table 8).

The United Nations Environment Program (UNEP) has credited Oman with having one of the best records in environmental conservation, pollution control and maintenance of ecological balance. Oman is even stated as having one of the world's most rigorously "green" governments. Oman's biodiversity is catered for by varying topographic features, from a vast arid desert in the West, to a belt of grass and woodland in the mountainous region of the South, and the Arabian Sea in the East.

Q8: HOW EFFECTIVELY HAS BIODIVERSITY BEEN MAINSTREAMED INTO RELEVANT SECTORAL AND CROSS-SECTORAL STRATEGIES, PLANS AND PROGRAMMES?

15. EFFECTIVE BIODIVERSITY MAINSTREAMING INTO RELEVANT SECTORAL AND CROSS-SECTORAL STRATEGIES, PLANS AND PROGRAMMES

The implementation of the National Biodiversity Strategy requires a multidisciplinary approach and a great amount of sharing and collaboration between policy makers and central and regional administrations, with the support of the academic and scientific world, as well as many partners and stakeholders from various sectors. Accordingly, one of the main aims for National Strategy for Biodiversity is the achievement of a complete and effective mainstreaming of biodiversity matters in policies. It is now possible to emphasize main synergies achieved, as collaboration established with agricultural, fishery and forestry sectors, outcome of decision making process to mobilize economic resources and planning of Oman funds. Therefore this section dwells on the integration of biodiversity conservation and sustainable use into directly relevant sector and cross-sector plans, programs and policies of the country.

SECTORAL & CROSS SECTORAL BIODIVERSITY INTEGRATION

Communications with leading stakeholders of the country for biodiversity are conducted in order to solicit as much information as possible on how they accept and adopt biodiversity in their systems. SQU represented the academic institution principally from their contribution in the advancement of biodiversity research. Experts were requested for updates of developments in their fields where they unselfishly shared their data for this national report. Ministries of Heritage and Culture, Agriculture and Fisheries Wealth, Diwan of Royal Court and other ministries were contacted. ESO representing the non-government organization was also reached.

Ministry of Oil and Gas : From the early stage, Petroleum Development Oman (PDO) has issued an Health Safety and the Environment (HSE) policy with key objectives on environment and biodiversity protection. To implement this policy, HSE management system was developed to manage all aspects of HSE and since 1999 PDO has obtained and maintained the ISO 14001 certificate for entire activities. One of the prime objectives of the HSE policy is to comply with the legal requirements in

particular environmental requirements and to achieve this PDO has obtained 20 environmental permits for entire facilities, projects and operations.

Moreover, PDO has been implementing a number of efforts to protect environment and biodiversity. A key tool is conducting Impact Assessment studies for all projects from the early stages including assessment of possible impacts on Biodiversity. The studies include carrying out baseline surveys to identify sensitive flora and fauna that might be impacted. Necessary controls are set and implemented to minimize possible impacts on Biodiversity.

In order to protect the Biodiversity in its concession areas, PDO issued a procedure, which describes the minimum requirements for protection of flora and fauna in or when activities taking place in a conservation or environmentally sensitive areas. All activities and projects at PDO need to comply with this procedure. The procedure is prepared in compliance with the environmental legislation and the PDO's HSE Policy, which calls for no harm to people and environment.

PDO does not operate in any nature conservation areas. In addition, biodiversity surveys were carried out for the entire concession area to map out biodiversity features and identify sensitive areas. The outcome of these surveys was incorporated into environmental and social GIS tool enabling all projects teams to have an environmental map for their location showing all environmental and social features. This tool has helped a lot in avoiding sensitive areas and applying strict controls to manage potential impacts. Furthermore, a biodiversity action plan has to be developed when operating close to environmentally sensitive areas to ensure minimum impacts.

In order to protect the marine life, PDO conduct regular marine surveys. The latest was done end of 2012. It is planned to conduct a new study in 2014. The survey focuses on the impact of produced water of the effluent treatment plant discharge to marine environment. The survey includes water and sediments analysis and some information on the flora and fauna of the mina al-Fahal Bay. In addition to this, PDO conduct daily patrolling around the pay to check if any spillage occurred and the same get informed to MECA to initiate immediate cleanup of any encountered spillage. PDO has also conducted a pilot project to improve the quality of discharged water to marine environment at MAF. The outcome was encouraging and was presented to MECA. It is expected to complete the project for the entire effluent within 2 years.

One of the major achievement made by PDO is the largest industrially constructed wetland system in the world at Nimr Cluster, which has seen a desert area of 2.4 million square metres transformed into lush greenery by planting two million reeds to naturally clean oil and other contaminants from produced water.

The 1.5 million square meters of evaporation ponds have been instrumental in reducing the amount of hydrocarbon-polluted produced water and now provide a valuable habitat for migratory birds, with close to 100 different species being identified at the site to date. These include flamingos, sand martins, cuckoos, wagtails, barn swallows, red-necked phalaropes black-crowned sparrow larks, Turkestan shrikes, western marsh harriers, brown-necked ravens, desert wheatears, little stints, ortolan

buntings, slender-billed gulls, spotted flycatchers, desert whitethroats, and the exotically named Eastern olivaceous warbler.

Historically, the flowlines are all made of bare carbon steel with a life time of +/- 7 years. To address the integrity of flowlines, PDO has put a strategy aiming to find the most technically feasible solution to meet its “No Leak Policy”. The strategy was aiming to replace the old flow-lines with more durable ones made of either Carbon Steel with Fusion Bonded Epoxy (FBE) internal coating or Carbon Steel with Poly-ethylene (PE) liner increasing the life time of these flow lines to +/- 20 years life time.

The Qarn Alam Steam project scheme, which came on-stream in March 2012, is the world's first full field thermally assisted gas oil gravity drainage project in a carbonate field and aims to increase the recovery factor from 3% to over 30%.

A good proportion of this steam is made using waste heat from generating electricity – an energy-efficient process known as cogeneration. However, in its drive for continuous improvement, PDO was inspired to take a bold step into the world of renewable energy, by harnessing the sun’s rays for steam generation. The Amal West solar Enhanced Oil recovery (EOR) project represents a true landmark for the global oil and gas industry – with a capacity for producing 11 tones of steam per hour at high pressure. Using a new concept of an old system, it is a demonstrator for a technology that has potential to significantly reduce PDO’s consumption of fuel gas when deployed on large scale.

PDO endeavor to plant native trees in their camps across the concession area and supports re-plantation programs and rehabilitation programs done by the Regulator. In addition to the above, PDO funded many studies related to the protection of flora and fauna.

Ministry of Heritage and Culture (MOHC) and Sultan Qaboos University (SQU): SQU and the MOHC both keep scientific specimens and a limited number of live plant collections. MECA has close working relationship with these agencies in terms of research and formulation of national policies on the conservation of the country’s biodiversity. Housed in the MOHC is the National Herbarium where 14,000 plus collections of plant specimens from over 1000 species of plants are kept in their herbarium together with some live plant specimens at the backyard. Within the Ministry is the Oman Museum of Natural History where a large collection of shells, vertebrate and invertebrate skeleton collections and fossils are kept. These are on display for public viewing enhancing people’s knowledge of the country’s biodiversity. A project concluded on classification of marine algae in the southern coasts of Oman had been completed by the museum further adding knowledge on this group. Research projects with the museum and SQU include the country’s biodiversity and nature reserves. Conduct of research had been coordinated closely with the Ministry where some key technical persons are directly involved as in survey work for the turtles and birds of prey. The museum and university were connected in 2013-2014 for updating information on biodiversity mainstreamed and for which they shared what they have. Both MOHC and USQ contributed to the development of the NBSAP1 and recently to the NBSAP2, and proposed future options to the biodiversity of Oman.

Ministry of Agriculture and Fisheries Wealth (MOAFW): This Ministry is in close communication with MECA in terms of consultation on matters pertaining to permitting on use of certain species particularly the endangered ones. Studies and field surveys on plant genetic resources

for food and agriculture had been carried out in the Sultanate. Twenty locations of natural pastures covering 171 ha are in the monitoring supervision of the Ministry of Agriculture. The goal of the Ministry is to protect and preserve the diversity of pasture and grasses including the wild plant species and agricultural crops. Local breeds of vegetables are being raised in the farms through the cooperation of farmers. A National Gene Bank was established and developed through a Seed Technology Unit established by the Ministry. One hundred eighty six varieties of date palm trees together with mango, Omani banana varieties, citrus, medicinal plants, shrubs and trees were housed in the field gene banks of Wilayat Bahla and Wilayat Barka. The Ministry is also working on the improvement of indigenous/ local wheat and barley varieties through national breeding programs in the hope of obtaining superior varieties of these cereals. Fishing gear and methods development project had been carried out by the Ministry of Fisheries Wealth taking into consideration the species selective ability of the methods. The Ministry is also involved in lobster fisheries project, shrimps, crustacean and abalone farming and modernizing the fisheries statistical system which are directed towards the conservation of the fishery resources. In its strategy for 2006-2020, the MOAFW focuses on increasing production, research and research stations, sustainable investment, food security; improving skills, rural and agricultural life, agricultural and fishery industry, pasture, immunity of plants and animals; reduce the use of chemical pesticides; protect soil from erosion and crops and livestock from diseases.

Ministry of Defense: The Royal Oman Police and the military cooperate accordingly on biodiversity protection measures.

Ministry of Information and Ministry of Tourism: Oman's unique wildlife and nature reserves are key attractions of the country and as such are being featured and promoted by both the Ministries of Information and Tourism. They publish the nation's facts and figures in their website and other forms to entice local and foreign tourists and largely to provide general knowledge. Ecotourism in Oman is promoted vigorously by the Ministry of Tourism online, on print media and other venues. The more popular wildlife like the Oryx, Gazelle, Turtle and Leopard and famous places and reserves of the country are focused in the ministry's attractions for ecotourism.

Ministry of Manpower and Ministry of Social Development: The Ministry of Social Development conducted through the Directorate General for Development several workshops to improve the women skills in environmental matters, chiefly paper and newspaper recycling. The Department of Women's Affairs in 2012, implemented six workshops on "the role of women in improving the consumption pattern of the family" in all governorates of the Sultanate, including the preservation of the environment. The Ministry of Social development gives a weight that the women should have an important role in the society, particularly in matters related to the environment. The Ministry of Manpower is represented by the Higher Faculty of Technology/ Department of Applied Sciences. It plays a leading role in the field of technical education and practical training in its capacity as an educational and research supplier of human resources and builder of human capacities and competencies for national qualifiers. With this in mind, and with the interest of the faculty to keep up with environmental issues and challenges, this faculty launched in the academic year (2013/2014) a modern program in environmental sciences (Environmental Sciences Section). This program is unique of its kind in the Sultanate and provides Bachelor and Master's diploma in many areas environmental issues at local, regional and international levels.

Ministry of Education and Ministry of Higher Education: In cooperation with MECA, the Ministry of Education took the lead in incorporating messages of biodiversity conservation in the curriculum of schools (Grades 1-12) with many schools participating in various environmental awareness programs of the government. At different grade levels, school children are taught of the

basics of environment and an appreciation of biodiversity. Beyond grade school, formal courses are offered in the Bachelor of Science program in Environmental Biology at Sultan Qaboos University. In the same university, a Master of Science program in Environmental Science is awarded to students of higher environmental expertise since 2011. Diploma/BS in Environmental Science program is now instituted at the Higher College of Technology through the Ministry of Higher Education. Though the program's emphasis will be in the applied science aspect of environment, biodiversity courses will still be highlighted.

Ministry Of Regional Municipalities & Water Resources: The main projects conducted by the ministry to enhance biodiversity conservation are :

- The Hydro geological Map is one of the pioneer projects on the Gulf area which plays an important role in identifying various groundwater aquifers and their hydrologic characteristics. This map help in achieving sustainable food security projects in the Sultanate .
- Storage dams at mountainous areas (Jabal Al Akhdar, J. Serah, Dhofar, J. Shams). These structures aims to develop water resources for citizens at remote areas with no access to traditional water and help them to settle at their villages.
- Wadi Dayqah Dam as the largest retention dam at the Gulf area and it's contribution to secure irrigation water to villages downstream the dam and to secure strategic drinking water source for Muscat.
- Fog collection at Dhofar and it's contribution to secure irrigation water for trees and rain-fed irrigation to prevent desertification.
- Aflaj in Oman represents a vital water source as it secure nearly (40%) of water demand to irrigated land.
- The idea aims to spotlight on the Falaj system in Oman as a socio-economic, agriculture and water system focusing on the following issues:
 - Falaj's water management and distribution system
 - Agriculture land management system
 - Falaj maintenance system as a hydraulic construction
 - Emphasize on the Five Omani Falaj, nominated by the UNESCO to be included within the World Heritage List.
- Balance between water uses and renewable resources and the preservation of water resources from depletion and pollution (to provide maximum protection for the elements of the environment based on the water).
- Provision of potable water to the citizens , industrial and commercial uses and agricultural to provide ways to collect and re-use of treated sewage water (providing water security requirements, especially in times of drought and raise the standard of living and improve the quality of life and health status , and ensuring availability of water resources necessary to meet the requirements of building a modern economy for future generations).
- Rationalizing the use of available water resources, protection and reduce wastage of water to enhance those resources.
- Changing the cropping pattern in some farms in order to exploit the optimum utilization of water and work to raise the efficiency of water use Aflaj.
- Wastewater Services and Re Use in Oman are 150 Treated Plant produce 64 mcm.44 plant operated by MRMWR produce 12 mcm.
- The plan is to increase the production of TSP and production reach 100 mcm by the year 2030.
- Development and modernization of systems Hydrometric Monitoring Network and providing an update on the number(40) station to measure rainfall and number(5) stations are running remote monitoring system using the "Packet Radio GPRS". System .The project aims to improve the network monitoring global climate change through the development of national networks world

countries, as well as reduce the risk of natural disasters and mitigation (floods and droughts), and therefore can address the environmental, social and cultural climate change.

- In the dams recharge dams feeding groundwater protection and filling and filling in Dhofar governorate protection Heights Am'rat Valley U'day .

Diwan of Royal Court: The Diwan of Royal Court which handles similar environment projects is occasionally consulting MOECA on biodiversity matters. His Majesty, Sultan Qaboos bin Saeed is himself an environmentalist and a nature lover. It has become imperative that all his ministers and supporters mainstream biodiversity conservation and the principles of nature conservation in all their programs.

All conservation programs pertaining to biodiversity had been supported by the Sultan, with the budget for the various projects being funded by him. Four Institutions established with the aim of wildlife and biodiversity conservation of the environment ; Office of conservation of the environment , The Oman Botanic Garden (OBG) , Omani mammal Breeding Center and the National Field Research Centre for Environmental Conservation

The office for conservation of the environment (OCE): OCE is one sector at the Diwan of royal court reflecting the concern of His Majesty Sultan Qaboos bin Said for the environment and abundant wildlife of the Sultanate of Oman. There are five reserves are under the management of The office for conservation of the environment (OCE) distributed in Oman. One of the largest reserves is Al-Wusta Wild life Nature Reserve in Al-Wusta Region. This region was selected for the establishment for reserve because it was the last location where the Arabian Oryx was spotted in the early of 1960s before its extinction. Another reserve is Wadi A'Sareen Nature Reserve that is located within the range of the Wilayaat of Al-Amerat, Qurayyat and Dima wa Ta'iyen. This reserve consider as a habitat for one of the largest population of Arabian tahr in Oman. Also, The office for conservation of the environment (OCE) does different projects in the Sultanate for instance, the Arabian Gazelle Survey project, Sooty falcon survey project and the Arabian Leopard conservation project and sand gazelle reintroduction project (OCE 2014)

OCE founded in 1997 A Survey Program to study and conserve the Arabian leopards of Oman and since then research is ongoing on this leopard subspecies. The office had also collaborated with international organizations such as Biosphere expedition (2006-2011) and British Exploring Society (2012-2014) to survey for the leopard and other territorial mammal species in Musandam mountains and western Dhofar mountains.

The results of these surveys have been published international and a book on the natural history of the leopards of Oman is just being published. A documentary program on the efforts to conserve the Arabian leopard had been produced and aired nationally and internationally.

However, recently the Diwan of Royal Court also signed a Memorandum of Understanding with the Earth watch Institute regarding four programs. The Oman Earth watch Program aims to:

1. develop a cadre of research and development specialists and educators in the Sultanate of Oman to take a lead in developing the long term role of the Program.
2. identify and develop relevant field research and pilot projects on issues that relate to sustainability of the environment and the continuing priority to map, monitor and manage Oman's rich natural and cultural resources.

3. provide a forum for the science research and policy implementing communities to meet, agree priorities and exchange information and ideas.
4. ensure that the results of the fieldwork are shared with the education community both formally through Sultanate of Oman's national curriculum and informally through meetings, workshops, the media and other means.
5. identify and train leading Omani scientists to direct their own field projects in the Sultanate of Oman and elsewhere in the world.

Ministry of Education (MOE) has also produced an educational booklets to raise awareness of student about the Arabian Tahr and the biodiversity of mountainous ecosystem.

The first two programs build on existing work carried out by the Office of Conservation of the Environment on the Arabian leopard at Jebel Samhan and the Arabian tahr at Wadi Sareen . The other two projects are in the planning phase and will focus on the juniper and olive mountain woodlands of Jebel Akhdar and Jebel Shams, through collaboration with Sultan Qaboos University, and increasing the efficiency of use of natural water resources for the benefit of communities and biodiversity, with Nizwa University.

Each project will deliver quality research outputs, enhance capacity and systems for the management of natural resources, and serve as a model for the development of further research activities. The project staff will consist of Omani and international scientists working together with students, field assistants, and field staff from relevant ministries.

The OCE has also been involved with the Sooty Falcon Survey where 10% of the species global population is breeding on the islands in the Sea of Oman. In 2009, surveys were made in Dimaniyat and Fahal Islands revealing 36 and 40 nesting pairs, respectively. In 2010 microchip readers and loggers to electronically recapture falcons were used. Sooty falcons were fitted with microchip rings in the past. add these information :

Sooty falcon's population is declining which lead to its status change from least concerns to near-threatened. The (OCE) is committed to multi- year research effort to conserve these falcon. Up to now the OCE conducted surveys on main nesting areas for sooty falcon in Oman (Daymaniyat, Suwaydi and Fahal islands) which holds about 90-100 pairs. They also tracked five juvenile sooty falcons which have been fitted with satellite- received transmitters on Fahal island, one of them reached Madagascar (the wintering ground for these falcons). OCE is planning to survey other areas in Muscat and Musandam peninsula (McGrady et al., 2014).

Oman Botanic Garden (OBG) : OBG is under the supervision of Diwan, targets to complete the checklist of Plants of Oman. It develops protocols for propagation, cultivation and plant conservation of all native plants. Around 30% of the 261 species of rare and threatened plants of the country are in the ex situ collection of the garden. The garden is also working towards the cultivation and preservation of the genetic crop diversity and documentation of the associated local knowledge. The garden includes conservation and the importance of plant biodiversity into all of its education programs and communications. The garden is part of a regional network of botanic gardens and member of the Arabian Plant Specialist Group. OBG has produced a comprehensive Red List of plants in the Sultanate of Oman. It conducts regular field research. It has propagated 330 species of plants and

has grown more than 60,000 plants. A seed bank has been established in coordination with Millennium Seed Bank Project founded by Royal Botanic Gardens in Kew, England. Oman Botanic Garden already holds over 60% of the total flora of the country as seeds, and 335 species are in the living collection. The garden tries to have genetic diversity among the collection. Another aim of the garden is to harbor all plants listed in the Oman Plant Red Data Book. The collections will be linked to seed banks and integrated into in situ strategies. Strong national and international links to universities, herbaria and other research organizations will be established, and the garden will also provide valuable opportunities for conservation awareness activities and education.

Monitoring of individual species, their populations and habitats and the sharing of this information is essential if conservation measures are to be successful. Such work is undertaken by Oman Botanic Garden during a very active field work program.

The Diwan has also been involved with the Sooty Falcon Survey where 10% of the species global population is breeding on the islands in the Sea of Oman. In 2009, surveys were made in Dimaniyat and Fahal Islands revealing 36 and 40 nesting pairs, respectively. In 2010 microchip readers and loggers to electronically recapture falcons were used. Sooty falcons were fitted with microchip rings in the past.

The Oman Animal and Plant Genetic Resources Center (OAPGRC): OAPGRC was established by The Research Council in 2012, with the Mission: To promote the recognition, sustainable utilization and valuation of the genetic diversity inherent in Oman's animals, plants and microorganisms as a natural heritage resource. One of the Center vision is to extracting values from the genetic resources. This will be achieved through sustainable genetic resources utilization, innovation by translating research outputs into viable business propositions, and investment through facilitating genetic-related foreign directed investments in Oman. The center is working on achieving goals under: Policy (coordination and advice), Building Capacity (documentation, conservation, research and education) and Extracting Value (utilization services and investment).

The OAPGRC activities are translated into 28 core complementary programs. The phasing of these programs is based on a pre-establishment phase for 3 years in order to further refine the thematic and operational aspects as well as raise awareness and build the foundations of the center and then over the following 10 years, with a strong, collaborative center, increase and use knowledge and then harvest the results and the value of Biodiversity. By 2013 OAPGRC phased in four programs: Coordination and Dialog Platform, Public Awareness, Data Collection and Maintenance, Information System Backbone. The other programs shall be launched successively once a core functioning center has been established.

Currently, OAPGRC operates four kingdom-based scientific committees with members from national partners that advice on key issues related to genetic resources.

In addition OAPGRC is working on the assessment of the current status of genetic resources in Sultanate of Oman through gap analysis, national surveys in order to develop the strategy for priority species, collection, conservation and characterization.

OAPGRC is involved in regional and international networks such as: Association of Agricultural Research Institutions in the Near East North Africa (AARINENA), Indian Ocean Rim association (IORA), Biodiversity International, and International Union for Conservation of Nature (IUCN).

Data collection maintenance and research is one of the program established by OAPGRC which is essential in developing monitoring programs, indicators, indicator-based reporting and collecting and maintaining data on genetic resources. Beside, Genetic Resources Information Platform (GRIP) is on progress database that aims to develop an information system to cover accession data, classification data, characterization data, research data and management, and seeking mechanisms for making the information held in the database easily accessible to all stake holders. The center is in the process of documenting and developing checklists for genetic resources.

Environment Society of Oman (ESO): Founded in 2004, it is the sole Omani NGO that supports the government campaign for environment conservation and protection on national scale. ESO has engaged in various projects that enhance environment and biodiversity awareness that compliment national and regional knowledge and information data base. This NGO has launched research projects on whales, dolphins and turtles in Omani waters (progress report, 2013) and a project on frankincense (annual report, 2012) with government and international supports. ESO engaged itself in educating the public about the importance of Arabian Tahr, native plants particularly trees, economic/aesthetic importance of Oman's cultural and natural landscapes. ESO is instrumental in organizing clean up campaigns and awareness building meetings. In 2012, after being awarded a grant by the Hima Fund, ESO started working on researching and conserving through awareness, the Egyptian Vulture population on Masirah Island. This project is now being extended to include a larger geographical area in Oman in 2014.

PROGRAM INTEGRATION

Conservation of biodiversity has become one of the environmental activities of development programs of Oman. It aimed for the best planning and implementation for the benefit of the Omani environment and protection of all its components. In 1974, the Office of the Advisor for Conservation of Environment in the Diwan of Royal Court was established. The Diwan is directly under His Majesty's directive, such office played a role in spreading interest in the environment and natural resources. It initiated the development of Arabian Oryx reintroduction program in Jiddat Al Harasis. The Ministry of Environment was first established in 1984 which became the Ministry of Regional Municipalities, Environment and Water Resources in 2001 but became a separate Ministry of Environment and Climate Affairs in 2007. The emergence of the 1992 Earth Summit prepared the way for the Ministry to be engaged in biodiversity protection. The Sultanate became a signatory to the Convention of Biological Diversity which prompted the Ministry to produce its National Biodiversity Strategy and Action Plan in 2001, a national effort to conserve its biodiversity and the sustainable use of the biological resources. Thereafter, National Reports for the CBD were submitted to meet the requirements as a member signatory country. After IUCN's study on major environmental problems in Oman, the National Conservation Strategy was formulated giving rise to proposals for protecting coastal zones natural resources. Management plans were developed to cover the 3,165 km coasts of Musandam, Al Batinah, Muscat, Sharqiya and Dhofar. In particular, the lagoons or khwars being fragile ecosystems and biodiversity rich areas had received national attention. In fact some of them were proclaimed as protected areas. Marine habitats of the Arabian Sea coast of Oman include key environments of international significance including,

1. The turtle nesting beaches of Ras Al Hadd and Masirah Island,
2. Migratory bird feeding and nesting grounds of Barr Al Hikman,
3. Suspected resident, breeding populations of the humpback whale,

4. A unique, mono-specific coral reef off Barr Al Hikman,
5. Wetlands including mangroves.

A major boost to efforts by the Sultanate of Oman to reduce (tar ball) contamination of its coastline was met by the successful submission to the International Maritime Organization (IMO) at the first pass in 2002 for designation of Special Area status for the Arabian Sea coast of Oman. Once the obligations to IMO to provide Reception Facilities and other requirements are met, the Special Area of the Arabian Sea coasts will come into force. This will allow Oman to issue specific mandatory methods for protection of its marine environment against oil pollution and other discharges from ships and tankers. So far, Oman had been vigilant in monitoring its territorial waters from polluting local, regional and international ships and tankers to protect its sensitive coasts and beaches.

In 1992, UNEP classified Oman as among arid countries in the world having 95.8% of its space being affected by desertification. The Sultanate has identified four regions of desertification: Governorate of Dhofar, Sharqiya Region, Jebel Al Akhdar and Al Wusta Plains. A National Plan for Combating Desertification was developed in 1993 for which RD 8/2003 was passed issuing the law for grasslands and management of animal resources. It required the replanting of deteriorated lands and their protection against overgrazing.

POLICY INTEGRATION

Being an environmentalist himself, His Majesty's ensured that the laws of the land will address effectively the protection needs of the country's biodiversity. Perhaps, the very first law affecting biodiversity was Royal Decree 38/75 proclaiming Qurm Area as an open protected area followed by RD 26/79 which was about the law of national gardens and protected natural areas. Royal Decree No. 10/82 issued in 1982 proclaims the law on conservation of the environment and prevention of pollution. This law committed the importance and need to provide the greatest possible protection of nation's natural wealth and avoid immediate or long term damage or side effects which may appear as a result of the various development projects to be executed throughout the Sultanate. In addition, a number of other regulatory legislations were passed that integrate biodiversity, to wit: RD 36/94 establishing the Arabian Oryx Sanctuary; RD 23/96 establishing Dimaniyat Islands Natural Reserve; RD 25/96 establishment of the Turtle Reserve; RD 48/97 established Jabal Samahan Reserve in Dhofar; RD 49/97 established the Khwar Reserves in the Salalah Coast; RD 50/97 established Saleel Natural Park; RD 114/2001 was issued as the law on conservation of the environment and prevention of pollution which superseded RD 10/82; and RD 6/2003 decreed the law on nature reserves and wildlife. In support of Royal Decrees, various Ministerial Decisions were likewise issued particularly on management guidelines for specific proclaimed nature reserves. Protection measures for wildlife through banning of killing, hunting and catching of wild animals and birds was also contained in MD 2/2002.

MAINSTREAMING OF BIODIVERSITY

For many years, population surveys of Arabian Tahr, Arabian Leopard, Sooty Falcons and Marine Turtles have been conducted providing a wealth of scientific data. Being all flagship species, efforts to monitor had provided protection of other species and the different habitats and ecosystem associated with the species, deemed beneficial for the conservation of biodiversity. In the same light, propagation of 350 Omani plant species which are mostly endemic species and 30 % of which are in rare and threatened status have found a secured habitat in the Oman Botanical Gardens. The Diwan of Royal Court had been instrumental in the implementation of this kind of project.

The opening of Oman Natural History Museum in 1985 had prepared the way for public education on biodiversity. Its holdings of herbarium, insects, shell, skeleton and fossil specimens had enriched the museum collections providing materials for display. Visitors, particularly the school children, became more exposed to learning about the country's biodiversity. It also became a venue for conducting valuable research by local and international investigators.

Various fishery projects had also emphasized appreciation of Oman fish resources. There were specific projects on abalone, shrimps, crustaceans, kingfish, sharks, marine algae, fish marketing and others that underscore economic benefits for the fishing communities. Information on biodiversity conservation has effectively been spread to a larger segment of the society by way of multi-media. It was the fastest way to reach the general public and for them to understand government efforts in conserving biodiversity. Several programs on radio, television and print media had been disseminated. Many documentaries on biodiversity have been featured and had reached both local and international viewers.

INCLUSION OF BIODIVERSITY IN EIA AND OTHER ASSESSMENTS

Environment Impact Assessment (EIA) is a prominent instrument of biodiversity integration in planning. It is not a new measurement taken in Oman. Royal Decree No. 10/82 entitled "Law on Conservation of the Environment and Prevention of Pollution" prepared the way for prescribing all development projects of Oman and to prepare an environmental impact study. This was further strengthened by R.D. 114/2001 which is the law on conservation of the environment and prevention of pollution requiring a full EIA before an environmental permit is issued. EIA involved eight groups of projects: industrial, mining, agricultural, food, service, marine and coastal, tourism and light industries. The EIAs are thoroughly scrutinized by the MECA as to its soundness and acceptability before any environmental permit is granted.

EIA is a process to help decision-makers to protect, conserve and manage Oman's environment according to the principles of sustainable development, thereby achieving or maintaining human well being, a healthy environment and a sound economy.

Baseline study requires listing of all species and habitat types within the project area and vicinities and for which rare and protected species are to be highlighted. Species and habitat types encountered in field surveys as well as from secondary records are presented in the EIA report. Mitigation measures and environmental protection opportunities are presented in the Environmental Management Plan (EMP) reducing potential impacts by the project on biodiversity. The EIAs are thoroughly scrutinized by the Ministry as to its soundness and acceptability before any environmental permit is granted. Before Environmental Permits are issued, adoption of the EIA requirements had been mandatory for all development projects. Unfortunately, lack of manpower in the Ministry – as is the case in many countries - resulted in many projects not being monitored closely. In spite of this, few projects strictly adhered in the implementation of their Environmental Management Plan as evidenced traceable in their progress reports. Two outstanding applicants are Sohar Power Desalination Plant in 2008 and Baraka III power project in 2010. Following the submission of the EIA reports by the consultancy firms, initial sites visits conducted by the staff from MECA's Directorate of Environmental Affairs evaluated favorably the project's compliance to the conditions set in the permit. They submitted the required quarterly report thereafter. In fact, they were already granted a second Final Environmental Permit which proved their dedication to strictly adhere to the conditions set in the permit. Likewise, Petroleum Development of Oman (PDO) has proved its project's worth to be awarded the environmental permit for oil exploration. They submitted a full-scale EIA to the

satisfaction of MECA reviewers and for which a Final Environmental Permit was granted. Such permit is only granted when major issues regarding project implementation are thoroughly addressed.

ANALYSIS OF OUTCOMES

During the time when the Sultanate of Oman became a signatory of the Convention of Biological Diversity and when it formulated its NBSAP, the country had since then imbibed the concepts and practices in biodiversity conservation. It has become the inspiration of MECA and adopted it in many of its decision-making endeavors to always provide priority and consider the interest of biodiversity in the country. New laws had been created that will perpetually protect and will directly address the needs of the country's flora and fauna. It strengthened further the Ministry's justification in preserving its declared nature reserves by proposing more funding to be allotted for each reserve. It further keeps the eyes of the Ministry in considering other sites for declaring as protected areas realizing that indeed unique biodiversity should be conserved for posterity.

Because of the deepening international interest in biodiversity, MECA's Directorate of Nature Conservation has been leading in addressing the country's quest for conserving its biodiversity. Two years ago, the directorate had redesigned its Biodiversity Department which now comprise four sections:

- 1) Biodiversity Development,
- 2) Combating Desertification,
- 3) Biological Database, and
- 4) Wildlife Rehabilitation and Reproduction Centers.

The Department was instrumental in forging mutual agreements between countries to protect wildlife that are common in their territories to include the Arabian Oryx, gazelles, migratory birds, turtles, whales and dolphins and others. It periodically updates its list of traded species in close consultation with the university, museum and concerned ministries. As a new signatory country to CITES, the Directorate is still in the process of preparation for formulating its policies and guidelines to regulate the trade and transit of protected species. At present, the Directorate lacks support staff and space to accommodate the CITES program hampering its progression. Likewise, the Marine Environment Conservation Department of the Directorate has been regulating the issuance of marine permits that will ensure no heavy tourist use like diving in marine reserves to ensure no disturbance on the coral reefs and breeding fishes. Its deployment to date of over 300 artificial reef masses in Dimaniyat, Fahal Islands and other coastal areas had produced good results in coral reef growth and increase in fish stock. The department conducts periodic beach cleanup in Dimaniyat and Masirah Islands where they actively involve the local citizens through partnership with the Environment Society of Oman (ESO). Such beach cleanup events promote good public image for the Ministry and consciousness towards maintaining the integrity of the marine ecosystem. Oman had been actively participating in the many workshops conducted by the Regional Organization for the Protection of the Marine Environment (ROPME) which include all the GCC countries, Iran and Iraq. Since its inception in 1979, the Ministry has been actively participating in various workshops on topics about the red tide, coral reef, mangrove and mussels. It has tailored most of its marine and coastal programs on ROPME's thrusts. Three departments in the Directorate (Biodiversity, Nature Reserves, and Marine Environment Conservation) all worked together to regularly conduct turtle census in all the marine reserves. However, several years of census data had never been analyzed to become useful for the management of the turtle species in the country nor the voluminous census data on Oryx, Gazelles, Tahr, Ibex, Leopard, Foxes, and others also waiting for attention. The Directorate lacks suitable technical staff to handle the processing of wildlife census data. On similar light, baseline data on biodiversity generated

by almost all the EIA reports submitted to MECA had not been organized nor analyzed. These data could have already served as kick off information on biodiversity of important sites in the country.

Recently, the directorate published new editions of the Nature Reserves in the Sultanate of Oman and A Field Guide to the Larger Wild Terrestrial Mammals of Oman to update data and information in the publications. These publications target the general public to promote the appreciation of the country's nature reserves and wildlife. ESO likewise published books for appreciating biodiversity which include *The Native Plants of Oman* by Clive Windbow, *Landscaping with Omani Wild Trees* by David Insall, *Birdlife in Oman* by Hanne and Jens Eriksen and *The Natural History of Oman* by Martin Fisher. Perhaps biodiversity conservation had already been built-in in the culture of MECA for quite some time. Such culture is also assumed already existing in SQU which lives by its laurel and prestige as the country's top academic institution. Apparently, other ministries may just be starting to feel or internalize the key importance of biodiversity in their system instead of just for the sake of abiding biodiversity laws of the country. Credit should be due to non-government entities like the ESO that boldly advocated for the conservation of biodiversity but fully supporting the government's program. Thus, it is implied that there will always be consciousness to inject biodiversity importance on matters that will be beneficial for the Oman environment. Though moving at a slow phase, it is envisioned that goals to conserve Oman's biodiversity would still be attained in the very near future.

Q9. HOW FULLY HAS YOUR NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN BEEN IMPLEMENTED?

16. RATE OF THE IMPLEMENTATION OF THE NBSAP

During the review and update processes of the NBSAP, the implementation of the latter's actions and the state of biodiversity in Oman were analyzed. It appears that considerable progress has been achieved regarding several strategic objectives and actions. The following working areas represent the main actions of the NBSAP1 that were implemented between 2001 and 2013. These working areas were aligned with the Targets 2010 in the 4th National Report of Oman to CBD. Unfortunately, these actions were not provided with indicators that allow the assessment or the evaluation of the implementation and the degree of its execution by the country. Therefore, the assessment used is based on an estimation that is facilitated by the description of the main actions implemented. The obtained estimation should preferably be regarded in conjunction with the increased pressure on biodiversity in some areas that may alter the progress or reduce its effectiveness.

The working areas dealt with are as follow:

I. Protection of the Biodiversity components

WA.A Promotion of the conservation of biodiversity of ecosystems, habitats and biomes.

WA. A.1 Protected areas:

1 The surface of the protected areas has reached 3.78% in 2014 making the implementation of this target 57%.

WA. A.2 Area of particular concern

2 Area of particular concern to biodiversity conservation is represented by the Ramsar Site which is the 171-hectare-Qurm (mangrove) Nature Reserve wetland that lies at the heart of Muscat, the capital city. This performance corresponds to at least 20% of the Omani desire for areas of particular concern. Additional Ramsar Information Sheets are in preparation to establish more Ramsar Sites in the country.

WA.B Promotion of the conservation of species diversity.

WA.B.1 Restoration, maintenance, and decline reduction of species:

1. Arabian Oryx, Arabian Tahr, Arabian Leopard, Mountain Gazelle, Egyptian Vulture, Sooty Falcon, Whales, Dolphins, and 5 species of marine turtles enjoy a multifaceted and promising conservation efforts. Oman Botanic Garden has propagated 350 of the 1200 species of Omani flora. Similarly, genetic resources are receiving an exceptional priority protection. Restoration, maintenance, and decline reduction of species had been in the range 45-50% accomplishment.

WA.B.2 Status of threatened species

2. So far, the population of Oryx in captive condition has grown in numbers that breeding program was temporarily discontinued as response mainly to poaching reasons. For the other species (Tahr, leopard, Gazelle, vulture, turtle, etc.) the status has significantly improved by 30%.

WA.C. Promotion of the conservation of genetic diversity

WA.C.1 Genetic diversity of crops, livestock and of harvested species of trees, fish and wildlife and other valuable species conserved and associated indigenous and local knowledge maintained

1. Despite its arid climate, Oman possesses abundant domesticated animal genetic diversity. A unique marine genetic diversity is accessible from the long shores of Oman recognized by scientists around the world. The unique geo-conditions have given birth to a diverse range of plant genetic resources as well as multiple land races that go way beyond the typical palm tree expected in the Arabian Peninsula. Oman is committed to global initiatives in biodiversity conservation in general and genetic resources in particular. Subsequently, Royal Decrees were issued on the ratification of international treaties such as:

- eThe convention of Biological Diversity (CBD) (Royal Decree No. 119/1994)
- eThe Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (Royal Decree No. 10/1997)
- eThe International Treaty on Plant Genetic Resources for Food and Agriculture (57/2004).

This working area is 82% implemented.

II. Promotion of sustainable use

WA.D Promotion of sustainable use and consumption

WA.D.1 Biodiversity-based products derived from sources that are sustainably managed

1. Majority of the country's agricultural lands are managed in a sustainable manner whereby different varieties of crops are better utilized and conserved. Research institutions such as SQU, OAPGRC and the Ministry of Agriculture and Fisheries were instrumental in preserving various accessions and cultivars. The implementation in this working area is estimated by 40%.

WA.D.2 Unsustainable consumption reduced

2. MECA and MOAF are still succeeding in containing rampant bad practices in fishing where fishermen occasionally catch turtles and dolphins; overgrazing by camels, cattle, goats and feral donkeys that threatened many species of vegetation and competed with local wildlife; over harvesting of trees and bushes that is causing desertification. The estimated reduction is around 55%.

WA.D.3 No species of wild flora or fauna endangered by international trade

3. It is forbidden in the country to hunt, kill, take, possess or trade wildlife. Isolated reports on local wildlife hunting for food (i.e., turtles, gazelle, Houbara Bustard), poaching or for falconry (certain eagles and falcons) are received by authorities, further reducing the species' population and abundance. Implementation is about 65%.

III. Threats to Biodiversity

WA.E Pressures from habitat loss, land use change and degradation, and unsustainable water use.

WA.E.1 Rate of loss decreased

1. Screening of development projects through EIA filter had at least halted the unwanted destruction of wild habitats and wildlife therein. In addition the rate of species loss is reduced through the use of management and action plans for habitats and ecosystems that were suffering from fragmentation, soil erosion, overharvesting and urbanization. Rate of accomplishment is about 42%

WA.E.2 Threats from invasive alien species

WA.E.2.1 Pathways for invasive species blocked

1. Uprooting of Mesquite (*Prosopis juliflora*) on areas invaded by this species is in progress, mainly in Salalah, Dhofar Governorate. Promotion of native species by OBG is an added value. The implementation on blocking the pathways doesn't exceed 20%, especially that the invasive species of birds and fishes are not considered yet.

WA.F.1 Management plans in place

1. Management plans for the declared nature reserves and other wilderness areas specified strict prohibition of introducing exotic species but only endemic or native species are considered, i.e., reforestation or landscaping. It is now being followed. This is also being practiced in the implementation of the Environmental Management Plan as an EIA requirement. Until recently (2013) the Ring-necked Parakeet, Common Mynah and Indian House Crow that form the triangular base of the invasive bird species roam freely in the Qurm Nature Reserve of Muscat. Thus they merit an eradication management plan for a better control. The rate of implementation is about 55%

WA.G. Challenges to biodiversity from climate change and pollution

WA.G.1 Enhance resilience of the components of biodiversity to adapt to climate change

1. MECA imposes a 50-300 m setback lines for development on beach areas to protect coastal biodiversity as contained in a ministerial decision. It is also a caution for any expected sea level rise. Efforts to reforest mangroves in certain Khwars through intensive transplantation activities have brought some success. Thus, restoring the integrity of important lagoons in the country despite the felt impact of world climate change. What is important is to reduce the Range of accomplishment is 45-50%.

WA.G.2 Reduce pollution and its impacts on biodiversity

2. New EIA requirement from the MECA has expanded to include impact of projects on climate which generated consciousness on how pollutants may affect biodiversity and climate; its strict implementation at least now guarantees reduction in use pollutants. Implementation is about 75%.

IV. Maintain goods and services from biodiversity to support human well-being

WA.H- Maintain capacity of ecosystems

WA.H.1 Capacity of ecosystems to deliver goods and services maintained

1. So far, there has been a freely flow of delivery of goods and services in the country. Except for the case of the marine ecosystem whereby several incidences of algal bloom had occurred in the Sea of Oman which resulted in many fish kills. Scientists are still studying for reasons why the red tide phenomenon happened in marine environment. Overall implementation is around 55%.

WA.H.2 Biological resources that support sustainable livelihoods maintained

2. Honey collection from bee farms and in the wild have supported local livelihoods but on very limited scale. Accomplishment estimated is 10%. Marine resources are much better maintained to ensure livelihoods at larger scale. Accomplishment is by 65%.

V- Protect traditional knowledge, innovations and practices

WA.I. Maintain socio-cultural diversity of indigenous and local communities

WA.I.1 Protect traditional knowledge, innovations and practices

1. Full respect on traditional knowledge and practices had been afforded to the local people particularly on their production and harvesting methods. Implementation around 60%

WA.I.2 Protect the rights of indigenous

2. Fully respected and adopted, local communities are properly consulted whenever there will be planned developments in their areas and where their interests are at stake. Rate of implementation is 80%.

VI- Ensure the fair and equitable sharing of benefits

WA.J. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

WA.J.1 All access to genetic resources is in line with CBD and its relevant provisions.

1. Farmers have access to the different varieties of crops that are recommended by the Ministry of Agriculture. Accomplishment is about 45%.

WA.J.2 Benefits arising from the commercial and utilization of genetic resources shared in a fair and equitable way

2. Completed researches on genetic resources studies conducted at SQU and Ministry of Agriculture and Fisheries are published accordingly. Publications are available at their libraries and copies are also sent to concerned government agencies, academies and NGOs. Implementation is estimated by 50%

VII- Ensure provision of adequate resources

WA.K. Improved financial, human, scientific

WA.K.1 New and additional financial resources are transferred to allow for the effective implementation of commitments

1. MECA receives its share of allocations from the Ministry of Finance to fund its proposed projects on a five-year basis. In turn, MECA has to distribute the funds to various directorates to support approved projects. For the period 2005-2008, DGNC projects on establishment and maintenance of wildlife breeding center and nursery and support of NBSAP's activities. Estimated rate of implementation is about 70%.

2. Establishment of Oman Animal and Plant Genetic Resources Center (OAPGRC) to support policy advice, building capacity and experts and extracting value from genetic resources. This includes linking farmers, researchers and entrepreneurs to translate knowledge into marketable products, promoting the emergence of a sustainable knowledge-based industry leveraging Oman's genetic resources, and creating links between researchers specialized in genetic resources and other national actors from the public sector, education and communities.

WA.K.2 Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention

2. Technology generated from research findings in SQU and MOAF are published and shared to various government agencies and NGOs. SQU and UNESCO forged a MOA on marine biotechnology transfer. SQU also cooperates with international institutions (universities and research councils) on exchange of technologies. Implementation rate is around 55%.

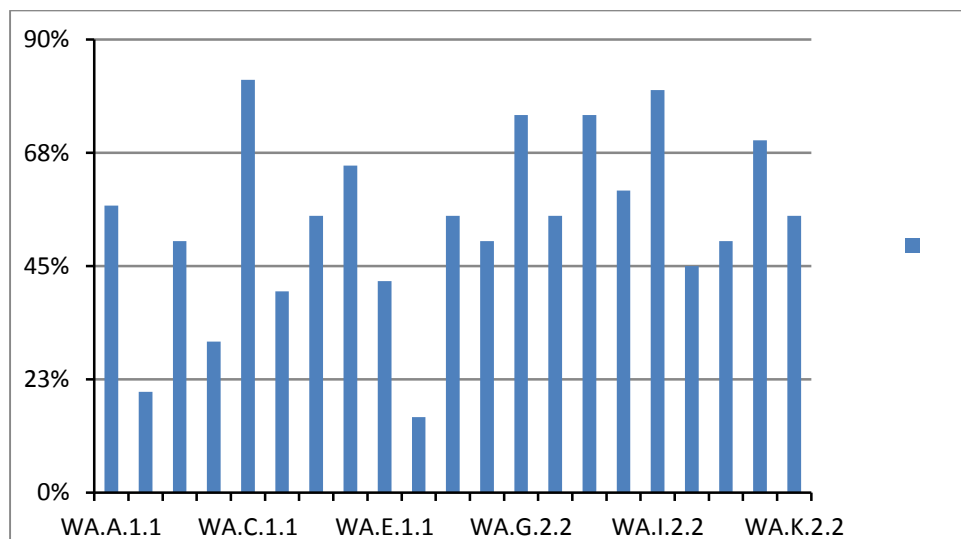


Plate 3: A diagram showing how fully the NBSAP1 is implemented per working area (WA).

PART III: PROGRESS TOWARDS THE 2020 AICHI BIODIVERSITY TARGETS AND CONTRIBUTIONS TO THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS

Q10: WHAT PROGRESS HAS BEEN MADE BY YOUR COUNTRY TOWARDS THE IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND ITS AICHI BIODIVERSITY TARGETS?

17. PROGRESS TOWARDS THE IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND ITS AICHI BIODIVERSITY TARGETS


The answers to the CBD question “How full has your National Biodiversity Strategy and Action Plan been implemented” above show not only the degree of accomplishments of the different targets that were identified in the NBSAP of 2001 and aligned with the Targets 2010 but also the degree of accomplishment of some national priority targets set in 2013 and aligned with Aichi targets. In general, efforts to conserve biodiversity had been rewarding in Oman but still progressing.

In general, the Oman’s nature conservation Law (R.D. 6/2003 *Law on the Conservation of Nature Reserves and Wildlife*) reinforced and still reinforcing the nation’s program for protecting biodiversity in the reserves. New areas have been recommended for declaration as reserves but are still awaiting formal designation. Protection of endangered species through *ex situ* conservation has been actively engaging local communities and advanced science. The Oman Botanic Garden, and the Captive Breeding Centre are established under the management of the Diwan of Royal Court. Elsewhere in the

country small-scaled captive stations have been set up where Gazelles, Arabian Oryx, and other wild mammals are kept in Barka Breeding Center. Monitoring activities for marine life, fisheries, terrestrial and aquatic vegetation are struggling because of certain technical and administrative difficulties. Initial conservation efforts included the issuance of guidelines for Environmental Impact Assessment (EIA) submission with details on biodiversity required from baseline surveys, assessments and suggested mitigations of impacts on flora, fauna, habitats and human being. Other efforts include the publication of materials to appreciate the country's biodiversity and the reserves, and the attendance of Ministries at International Conventions on biodiversity conservation. Sound farming practices especially on water conservation techniques, reducing soil erosion and the use of safe pesticides and chemical fertilizers have been addressed in the agriculture sector. A Directorate-General office was created to address animal production and quarantine needs. Gene banks for leading crops, pasture and grass species were designated for safe keeping and posterity. Greater efforts on sewage treatment such as the Muscat Waste Water Project and efforts to avoid the discharge of wastes in *Khwars* in Batina and Salalah coasts have been addressed to promote a better environment. The recent institution of the Oman Research Council has paved the way to pursue interest in scientific research including the country's biodiversity through the establishment of the Oman Animal and Plant Genetic Resources Center. Currently, SQU leads in biodiversity research with an appreciable accomplishment in basic investigations. A coordinated research effort among stakeholders is still to be seen. MOE has also worked on enhancing environmental awareness of school students using the advance technologies in the education system. **The following Table (9) shows the progress of implementation of NBSAP1 towards Aichi Targets. The last column is a broad assessment of efficiency of actions taken in order to achieve each Aichi Target.**

Table 9: Progress of implementation of NBSAP1 towards Aichi Targets

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

 Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
A.1- By 2017 a national roadmap, in awareness to encourage behavior change towards the national heritage of biodiversity, is developed and its implementation initiated.	During 2001-2009 the progress was mainly based on issuance of decrees and decisions beside some administrative work such as appointment of wildlife rangers. During 2010-2013, the image changed when the Sultanate, based on a legal framework, continued its efforts through increased awareness campaigns targeting public with focus on women, visits of students to nature reserves, zoological and botanical gardens; production and publication of papers, booklets, leaflets, brochures, etc... about the importance of biodiversity and the need to conserve it and use it in a sustainable way. OAPGRC has an ongoing Public awareness program, which covers important issues which promote Oman's genetic resources. During 2014-2015 OAPGRC is organizing a mobile exhibition in collaboration with related organizations that will travel throughout all the sultanate' governates with the aim to raise awareness to schoolchildren and the general public on important issues genetic resources and biodiversity in Oman.	Aichi Target 1 National Target A.1	Improving
A.2- By 2018, awareness raising campaigns covered all the administrative areas Aichi Target 1 National Target A.2 Aichi Target 2and all productive sectors of Oman.	(This cell is empty in the original document)	Aichi Target 1 National Target A.2 Aichi Target 2	Improving Level of awareness is getting high due to integration of awareness activities into the tasks of many ministries and other governmental agencies of Oman. The environmental awareness is nowadays in the plate/dish of all ministries. The discussion of the Minister of Environment and Climate Affairs' statement with the members of the state council in September 2013, on TV for many hours is considered a real awareness campaign.



Aichi 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,

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>His Majesty, Sultan Qaboos bin Saeed is himself an environmentalist and a nature lover. It has become imperative that all his ministers and supporters imbibe the principles of biodiversity conservation in all their programs. The EIA reporting became a must and the conservation of biodiversity has become one of the environmental activities of development programs of Oman. It aimed for the best planning and implementation for the benefit of the Omani environment and protection of all its components. The integration of biodiversity into the agricultural sector and into the oil and gas sector is greatly supported by the government of Oman. Very recently, there is acceleration of the pace of wastewater treatment projects, mitigation of all forms of pollution, such as industrial pollution, and preservation of biodiversity and the natural environment in many sectors. This resulted in an increase in protection of biodiversity.</p>	<p>National Target B.1 Aichi Target 2 WA.F.1.1 WA.G.2.2</p>	<p>Improving Environment Impact Assessment is a prominent instrument of biodiversity integration in planning. It is not a new measurement taken in Oman. Royal Decree No. 10/82 entitled “Law on Conservation of the Environment and Prevention of Pollution” prepared the way for prescribing all development projects of Oman and to prepare an environmental impact study.</p>



Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>Sustainable tourism is a key source of income and employment for local communities, which, in turn, provide strong incentives to protect biodiversity. Maintaining the environment, upon which the economic health of the local population is based, becomes the priority, resulting in more tourists who, in turn, generate more funds for conservation.</p> <p>The promised review, in the 4thNR to CBD, of policies related to biodiversity conservation, including the use and implementation of evaluations and socio-economic incentives to provide a supporting environment that leads to the establishment of and more effective management of biodiversity areas couldn't find a place in 2008 and until today. During the workshops, the requested incentives to promote scientific biodiversity research were not considered a true priority.</p>	<p>National Target B.1 Aichi Target 2 WA.F.1.1 WA.G.2.2</p>	<p>Insufficient or no comparable data</p>



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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>Majority of the country's agricultural lands are managed in a sustainable manner whereby different varieties of crops are better utilized and conserved. Research institutions such as SQU and the Ministry of Agriculture and Fisheries were instrumental in preserving various accessions and cultivars.</p> <p>MECA and MOAF are still struggling to contain rampant bad practices in fishing where fishermen occasionally catch turtles and dolphins; overgrazing by camels, cattle, goats and feral donkeys had threatened many species of vegetation and competed with local wildlife; over harvesting of trees and bushes causing desertification.</p> <p>It is forbidden in the country to hunt, kill, take, possess or trade wildlife. Authorities usually receive isolated reports on local wildlife poaching (hunting for food, i.e., turtles, gazelle, Houbara Bustard) or for falconry (certain eagles and falcons), further reducing the species' population and abundance.</p> <p>Unsustainable water use remains the main issue in the country but efforts are made to control this particular issue mainly through the revival of the Falaj system (see text).</p>	<p>W.A.D.1.1 W.A.D.2.2 W.A.H.2.2</p>	<p>Little or no overall change</p>

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



Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
-----------------	----------	--	--

<p>. B.1- Between 2015 and 2020, the threats to biodiversity are gradually halved through new supportive issued legislation, suppression of 50% of pressures and promotion of sustainable use.</p>	<p>Screening of development projects through EIA filter had at least halted the unwanted destruction of wild habitats and wildlife therein. In fact, Omani laws do not allow the establishment of any development project in critical natural habitats and an EIA study is required to each project taking into consideration the critical natural habitats and others. Water sustainable consumption is enhanced.</p> <p>Oman has implemented a project (the artificial coral reefs) to create an alternative system to the lost habitats of the coral reefs by deployment of almost five hundred artificial coral reefs moulds in Al Fahal island and the Dimaniyat Islands.</p> <p>The Botanical Garden of Oman states that the most pervasive and over-riding threats to plants in Oman are agriculture (livestock farming), affecting 82% of all threatened plants and residential developments, affecting 72%. Transportation corridors affect 48% of all threatened species, tourism and recreation 41%. Recreational Activities (mainly off-road-driving) affect 35% of all threatened species. In this analysis, clearly overgrazing and development emerged as the greatest threats, together affecting</p>	<p>Aichi Target 5 National Target B.1 National Target B.2 Aichi Target 2 WA.D.1.1 WA.D.2.2 WA.E.1.1 WA.F.1.1 WA.G.2.2</p>	<p>Improving</p> <p>OAPGRC established a genetic Resources Information Platform (GRIP) to document genetic resources and monitor their habitats.</p> <p>The Sultanate organized the grazing activities to reduce the destruction of habitats and allowed only the traditional tool for wood cutting in order to reduce pressure on habitats.</p> <p>Coral reefs are under restoration and side support through the establishment of artificial reefs. Mangrove forests are given a distinguished protection.</p> <p>Impact assessment is an effective tool to avoid habitats fragmentation or degradation.</p> <p>Loss of habitats due to overgrazing is under management through re-organization of</p>
--	---	---	---

	<p>more than 97% of the threatened plant species in Oman. The reduction of the harmful agricultural activities by the government through organized grazing resulted in protection of several species. OAPGRC established a genetic Resources Information Platform (GRIP) to document geneticresources/biodiversity</p>		
<p>B.2- By 2016 a national red list of habitats established and by 2020, prioritized plans for the safeguard of the most endangered habitats, including wetlands are implemented</p>	<p>In north Oman, an area of 40000 m was planted and fenced for the protection of ex-situ conservation releases. In Dhofar, there are about 25 enclosed areas, of which nearly 22 were planted with 175 thousand local and forage trees and shrubs. A complex covering 10 acres was established for germplasm. Loss of habitat through over- grazing, poaching, pollution, oil and gas extraction, dam construction, road construction, wadi alteration, fishing nets and anchors, and mangrove wood destruction were identified as contributing to the destruction of habitats and decimation of many of their wild animal populations.</p>	<p>Aichi Target 5 National Target B.1 National Target B.2 Aichi Target 4 National Target A.3 WA.G.2.2</p>	<p>Improving</p> <p>Development of lists of threatened birds, whales, plants, genetic resources, mammals, reptiles (including marine turtles) are in obvious and continuous progress.</p>



Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>According to MOAF, fish is the number one earner of foreign currency in Oman after oil. This is despite the fact that the government has imposed restrictions to prevent overfishing and ensure the environmental sustainability of fisheries.</p> <p>Oman protects the fishermen activities and ensures sustainability of the fishery industry. Oman' policy is a very cautious when it comes to expansion. That is why there is restriction on commercial licenses and elimination of the big industrial trawlers.</p> <p>Working with many consultants from the UK, the US, Canada, the FAO, with whom we discuss this issue and we are aligned with most advice they give us.</p> <p>Oman is part of the FAO agreement to fight illegal, unreported, and unrecorded (IUU) fishing and has that action plan in place now.</p>	<p>WA.H.1.1 WA.H.2.2</p>	<p>Improving</p> <p>Fish is the number one earner of foreign currency in Oman after oil. This is true despite the fact that the government had imposed restrictions to prevent overfishing and ensuring the environmental sustainability of fisheries.</p> <p>Seagrass is studied and located on maps, mainly after the Gonu cyclone had destroyed many sea beds where marine turtles among others use to feed. These are given a great conservation attention.</p>



Target 7

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

National Target	Progress	Correspondence National Targets-Working Areas (WA)	Aichi-Targets-Working Areas (WA) Assessment of change over time 2009-2013
	<p>The country's successful project engagements include: mangrove reforestation, captive breeding of selected fish species, and some agro-biodiversity research efforts. They proved to be as evidences of the country's ability and willingness to cope with international expectations to conserve the Oman's biodiversity.</p> <p>MECA is still promoting the sustainable conservation of the country's biodiversity resources. Well-thought management plans, investing in manpower development and more links with interest groups are seen as some keys in attaining the country's goal to progressively and sustainably conserve its Biodiversity based productive areas.</p> <p>An afforestation program is running and has two-fold objectives: 1) formulate a master plan on restoration, conservation and management of mangroves, comprising of site-specific plans in the priority areas as well as public awareness programs and 2) transfer the relevant technology through on-the-job training in the course of the study.</p>	<p>WA.K.2.2</p>	<p>Improving</p> <p>A pre-management study of agro-biodiversity showed a location-specific with diverse mosaic of crops in Omani mountain oases that merits further attention and conservation effort.</p> <p>Captive breeding of selected fish species aims at reducing the pressure on marine fish and promoting fish sustainable management.</p>



Aichi Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>B.7- By 2018 a map of various pollution impacts in the Sultanate is produced.</p>	<p>A major boost to efforts by the Sultanate of Oman to reduce oil (tar ball) contamination of its coastline was met by the successful submission to the International Maritime Organization (IMO) at the first pass in 2002 for designation of Special Area status for the Arabian Sea coast of Oman. This will allow Oman to issue specific mandatory methods for protection of its marine environment. Oman had been vigilant in monitoring its territorial waters from polluting local, regional and international ships and tankers to protect its sensitive coasts and beaches.</p>	<p>Aichi Target 8 National Target B.7 National Target B.8 WA.G.2.2 WA.H.1.1</p>	<p>little or no overall change.</p>
<p>B.8- By 2019, sources of pollution are put under control and monitored.</p>	<p>Research projects on the sources of coastal wastes in the areas of Muscat and Batina paved the way for monitoring and evaluation.</p>	<p>Aichi Target 8 National Target B.7 National Target B.9 National Target B.9</p>	<p>Little or no overall change</p>
<p>B.9- By 2020, the pollution is brought to levels of little impact on ecosystem function and biodiversity.</p>	<p>New EIA requirement from the MECA has expanded to include impact of projects on climate which generated consciousness on how pollutants may affect biodiversity and climate; its strict implementation at least now guarantees reduction in use pollutants</p>	<p>Aichi Target 8 National Target B.7 National Target B.8 National Target B.9 WA.F.1.1 WA.G.2.2 WA.H.1.1</p>	<p>Little or no overall change</p>



Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
B.4- By 2018, a coordinated national program for monitoring, surveillance and control against invasive alien species is developed..	The uprooting of Mesquite (<i>Prosopis juliflora</i>) on areas invaded by this species is already practiced in Salalah and Dhofar Governorate, so far the practice had been sustained and able to control Mesquite population.	WA.E.2.1.1 WA.F.1.1	Little or no overall change
B.5- By 2018, legislation is enacted to manage pathways to prevent alien invasive species introduction and installation.	Management plans for declared nature reserves and other wilderness areas specified strict prohibition of introducing exotic species but only endemic or native species are considered, i.e., reforestation or landscaping. It is now being followed. This is also being practiced in the implementation of the Environmental Management Plan as an EIA requirement.	WA.E.2.1.1 WA.F.1.1	
B.6- By 2020, Oman controlled and/or eradicated 20% of the all identified invasive species in the country. .	The task has to consider a number of alien bird species that has spread alarmingly in recent years. Three species are currently considered invasive: Ring-necked Parakeet (<i>Psittacula krameri</i>), House Crow (<i>Corvus splendens</i>) and Common Mynah (<i>Acridotheres tristis</i>). All three species are exceedingly common on Al Batinah coast and these have colonized the Salalah region. Aquatic invasive species (AIS) are a global environmental issue in both marine and freshwater ecosystems and have had significant impacts on global ecosystems and economies. AIS are spread through a wide range of vectors including shipping, stocking, and live trade. Minimizing the ecological and economic impacts of AIS involves understanding the risks they pose and the preventative and control actions required to minimize those risks. AIS are known to have multiple synergistic impacts on ecosystem health and may be contributing factors to numerous other stressors including harmful algal blooms and fish kills.	WA.E.2.1.1 WA.F.1.1 WA.H.1.1	Insufficient or no comparable data



Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>B.3- By 2020 an inventory of national marine genetic resources is developed, a program for preservation is established, including plans for the conservation and management of coral reefs.</p>	<p>Coral reef restoration project in collaboration with PDO was already started in 1998. Campaigns for cleaning the coral reef environments by MECA in cooperation with ESO have regularly been conducted particularly in Dimaniyat Island to clear the reef of all types of wastes. Authorities have so far deployed several buoys in Bandar Al-Kheeran, Bandar Al-Jissa, Dimaniyat and Fahal Islands to protect coral reefs from the damage caused by boat anchors dropped at the seabed. OAPGRC will initiate project in collaboration with national partners on the conservation and sustainable use of marine genetic resources.</p>	<p>WA.G.1.1 WA.H.1.1</p>	<p>Improving</p> <p>Within the efforts of combating desertification, there are many measures taken such as limiting the grazing activities to non-sensitive areas, rehabilitating rangelands, improving soil capability, maintaining the green cover away from overharvesting, regulating the water extraction and use.</p> <p>Authorities have deployed several buoys in many areas in the sea of Oman to protect coral reefs from the damage caused by boat anchors dropped at the seabed.</p>



Aichi 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

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>C.1- By 2020, the extension of protected areas is steered to have a national system of ecologically representative protected areas, to cover 17% of terrestrial ecosystems and inland waters and 10% of marine and coastal areas..</p>	<p>The rate of marine and terrestrial PAs in Oman is 3.78%. During 2009-2014, 3 protected areas are declared with about 381150 ha surface area or 3.1% of the country's surface area. The Sultanate total protected areas coverage is presently more than 1.23% of the Oman area.</p>	<p>Aichi Target 11 National Target C.1 National Target C.2 Aichi Target 5 National Target B.1 National Target B.2 Aichi Target 1 National Target A.1 National Target A.2 National Target A.3 WA.A1.1 WA.A2.2 WA.H.1.1</p>	<p>Improving</p> <p>During 2009-2014 only, 3 new protected areas covering about 381150 ha were declared reserves by the government. These 3 PAs added 1.23% of the country's surface area to the existing reserves in Oman.</p>
<p>C.2- By 2020 mechanisms for integrating economic, social and cultural values of national biodiversity and ecosystem services in decision-making and sector planning are strengthened.</p>	<p>A National Strategy for protected areas that will integrate economic, social and cultural values of national biodiversity and ecosystem services in decision-making and sector planning is planned and will be developed soon.</p>	<p>Aichi Target 11 National Target C.1 National Target C.2 Aichi Target 5 National Target B.1 National Target B.2 WA.H.1.1</p>	<p>Improving</p> <p>The protected areas in Oman are in regular and progressive increase. Their area is now 3.78% of the country surface area.</p>

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



Aichi 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. function

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>C.4- By 2018 a prioritized list of endangered species in Oman is established and adequate scenarios to stabilize their populations is implemented by 2020.</p>	<p>IUCN has declared the Humpback Whales population Endangered (see attachment) based on its low numbers and limited regional range, and it is widely acknowledged that this is one of the rarest baleen whale populations in the world.</p>		<p>Little or no overall change .</p>
<p>C.5- By 2019, national red-lists of species are elaborated and action plans for most of the globally endangered species are developed and implementation is initiated.</p>	<p>Ministerial Decision No. 101/2002 prohibiting killing, hunting or capture of wild animals and birds.</p> <ul style="list-style-type: none"> · The wildlife rangers in the Arabian Oryx Sanctuary and Royal Oman Police shall protect the Oryx. · The wildlife rangers in the Turtles Reserve shall protect the nesting sea turtles on the reserve beaches. · The wildlife rangers in Jabel Samhan Nature Reserve shall protect the Arabian leopard and the local plants and trees. · The wildlife rangers in the Dimaniyat Islands Reserve shall protect the coral reefs and birds nesting sites in the reserve. · The wildlife rangers in the Sareen Reserve shall protect the Arabian Tahr. · Oman Botanical Garden was established to conserve Omani native plants, where until now about 100 rare and endangered plants were cultivated. 	<p>WA.B.1.1 WA.B.2.2</p>	<p>Little or no overall change</p>



Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>C.3- By 2020, the establishment of adequate programs for in situ and ex situ conservation of the genetic diversity of cultivated plants, domestic and wild animal species, microorganisms, as well as for the conservation of forest species and other species of flora spontaneous with a socio-economic value have safeguarded and maintained the genetic diversity of species and the services of ecosystems..</p>	<p>Studies and field surveys on plant genetic resources for food and agriculture had been carried out. Local breeds of vegetables are being raised in the farms through the cooperation of farmers. A National Gene Bank was established and developed through a Seed Technology Unit established by the Government. The collections of the Oman Botanical Garden represent a wide range of genetic diversity from all over the country. The collections comprise the living collection, the herbarium, and/or the seed bank. Very recently, a Road Map for the management of Genetic Resources was developed in 2013 and submitted to MECA. OAPGRC has In situ and Ex situ conservation programs that will focus on genetic resources</p>	<p>Aichi Target 13 National Target C.3 WA.C.1.1 WA.H.1.1</p>	<p>Improving</p> <p>A draft strategy is now developed to manage the genetic diversity. It was revised by the MECA. Genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives is the day to day preoccupation of the OAPGRC to the extent that ex and in-situ conservation programs focusing on genetic resources are in function.</p>



Aichi Target 14

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
<p>D.1- By 2020 watershed areas, forest lands, outstanding scenic terrestrial, coastal and marine views, oases, and Aflaj (traditional water channels) are restored and safeguarded.</p>	<p>The Mangrove that offers many ecosystem services is under reforestation. Khwars and Jabal Al Akhdar of scenic views and biodiversity importance are declared reserves or eco-tourism sites.</p>	<p>WA.A2.2 WA.H.2.2 WA.I.1.1</p>	<p>Little or no overall change</p>
<p>D.2- By 2020, a national assessment about the state of provisioning, regulating and cultural services supplied by natural ecosystems and their importance for people and on management options to be developed for the sustainable supply of ecosystem services, is developed..</p>		<p>WA.H.1.1 WA.H.2.2</p>	<p>Little or no overall change</p>



Target

15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>Efforts to reforest mangroves in certain <i>khwars</i> through intensive transplantation activities have brought some success. Thus, restoring the integrity of important lagoons in the country despite the felt impact of world climate change.</p> <p>Corals resilience is improved through projects.</p> <p>Sea grasslands which are used as sink for CO2 received maintenance actions MECA imposes a 50-300 m setback lines for development on beach areas to protect coastal biodiversity as contained in a ministerial decision. It is also a caution for any expected sea level rise.</p> <p>Gaps and constraints to the preparation of a national strategy for climate change adaptation and mitigation are known.</p>	<p>WA.F.1.1 WA.H.1.1 WA.H.2.2</p>	<p>Improving</p> <p>Within the National Action to Combat Desertification and the climate change mitigation and adaptation measures taken in Oman, there are several programs ran to restore mangrove forests, rangelands, coral reefs areas, sea grasses domains, etc.</p> <p>A National Strategy for Climate Change is witnessing advanced development steps.</p>



Target

16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>Farmers have access to the different varieties of crops that are recommended by the Ministry of Agriculture. Research institutions such as SQU and the Ministry of Agriculture and Fisheries were instrumental in preserving various accessions and cultivars.</p>	<p>WA.J.1.1 WA.J.2.2</p>	<p>Little or no overall change</p>

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



Target 17

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>In progress</p>	<p>WA.J.1.1 WA.J.2.2</p>	<p>Little or no overall change</p>



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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	<p>Traditional agriculture and farming activities in Oman that normally avoids using large areas for monoculture, and allow the persistence of marginal areas and eco-tones are promoted as they enhance preservation of biodiversity, and provide necessary connection between areas serving as dispersal corridors.</p> <p>Full respect on traditional knowledge and practices had been afforded to the local people particularly on their production and harvesting methods. Implementation around 60%</p> <p>Fully respected and adopted, local communities are properly consulted whenever there will be planned developments in their areas and where their interests are at stake. 80% accomplishment.</p>	<p>WA.I.1.1 WA.I.2.2</p>	<p>Improving</p> <p>Oman described the state of traditional knowledge on biodiversity in Oman, assessed capacity building requirements, and provided a set of recommendation and implemented some of them for the protection and maintenance of traditional knowledge on biodiversity conservation.</p>



Aichi 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 Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
E.1- By 2018, the CHM is enriched with information and massively accessed by visitors on internet.			Little or no overall change
E.2- By 2019, the assessment of economic, social and cultural values of national biodiversity and ecosystem services is improved	A Strategy for protected areas that will integrate economic, social and cultural values of national biodiversity and ecosystem services in decision-making and sector planning is planned and will be developed soon.	WA.H.1.1	Little or no overall change
E.3- By 2020, knowledge about the resilience of ecosystems to climate change is improved and the indicators for its monitoring and evaluation are developed and applied.	There are studies to identify: 1-Specific reef areas where natural environmental conditions are likely to result in low or negligible temperature-related bleaching and mortality (i.e., areas of natural “resistance” to bleaching) and 2- Reef areas where environmental conditions are likely to result in maximum recovery of reef communities after bleaching mortality has occurred (i.e., areas of natural community “resilience”). These target areas where environmental conditions appear to boost resistance and resilience during and after large-scale bleaching events, could then be incorporated into strategic networks of marine protected areas designed to maximize conservation of global coral reef biodiversity.	WA.F.1.1 WA.H.1.1	Improving The Royal Court Affairs, Sultan Qaboos University, Office of Conservation of the Environment, Petroleum Development Oman, Research Council, Oman Animal and Plant Genetic Resources Center, Oman Botanic Garden, and Environment Society of Oman are all relying beside ministries on science based management and conservation of biodiversity and nationally sharing their findings. This constitutes a half way towards internationally sharing and transferring knowledge through CMH.



Target 20

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels.

National Target	Progress	Correspondence Aichi-National Targets-Working Areas (WA)	Assessment of change over time 2009-2013
	Oman tries to play a role in international donor activities by taking into account issues such as responsible management of natural resources and environmental health considerations.	WA.K.1.1	Insufficient or no comparable data

18. PROGRESS TOWARDS THE GOALS AND OBJECTIVES OF THE STRATEGIC PLAN OF THE CONVENTION

The progress towards the Aichi Targets reflects the progress towards the goals of the strategic plan of the Convention and their objectives. However, these goals of the international strategic plan were hit each by different intensities of actions incorporating national targets and activities of working areas as shown in the Table 10 below:

Table 10: Working Areas of relevant activities implemented and national targets per goal.									
GOALS	Aichi Targets	National Targets			Working Areas of relevant activities implemented				
A	1	A.1	A.2	A.3					
	2				WA.F.1.1	WA.G.2.2			
	3				In progress				
	4				WA.D.1.1	WA.D.2.2	WA.H.2.2		
B	5	B.1	B.2		WA.D.1.1	WA.D.2.2	WA.E.1.1	WA.F.1.1	WA.G.2.2
	6				WA.H.1.1	WA.H.2.2			
	7				WA.K.2.2				
	8	B.7	B.8	B.9	WA.G.2.2	WA.H.1.1	WA.F.1.1		
	9	B.4	B.5	B.6	WA.F.1.1	WA.E.2.1.1	WA.H.1.1		
	10	B.3			WA.G.1.1	WA.H.1.1			
C	11	C.1	C.2		WA.A1.1	WA.A2.2	WA.H.1.1		
	12	C.4	C.5		WA.B.1.1	WA.B.2.2			
	13	C.3			WA.C.1.1	WA.H.1.1			
D	14	D.1	D.2	D.3	WA.A2.2	WA.H.1.1	WA.H.2.2	WA.I.1.1	
	15				WA.F.1.1	WA.H.1.1	WA.H.2.2		
	16				WA.J.1.1	WA.J.2.2			
E	17				In progress				
	18				WA.I.1.1	WA.I.2.2			
	19	E.1	E.2	E.3	WA.F.1.1	WA.H.1.1			
	20				WA.K.1.1				

This ongoing and progressive achievement of the goals and of course their objectives derives from the fact that the country is well aware of its responsibility to conserve its biodiversity as signified in its promulgated laws pertaining to the protection of the national reserves, its flora and fauna and other resources. Even for non-declared reserves, the government has expressed its serious concern in protecting the integrity of Oman environment. MECA employs full time rangers to patrol and protect important wilderness and ecotourism areas such as the landscapes and seascapes of Musandam, Masirah Island, Barr Al Hikman, Hallaniyat Islands and many other places. Problems on logistics, lack of training, ambiguous programs for the rangers are among the causes that may hamper to some extent the proper execution of their duties. Many sectors of the government and non-government entities had actively participated in the campaign to conserve its national treasures. Various projects and efforts had been implemented which highlighted the importance of biodiversity in particular and environment in general. However, the realization of goals and objectives requires additional coordination between agencies and additional funds and manpower to pursue programs and projects. Additional sectors to conduct research on biodiversity, monitoring and evaluation are also desired.

Oman is rich in several initiatives in the field of biodiversity conservation and sustainable use and aims to make a strategic development priority (Already a National Strategy for the sustainable development of animal resources is developed in 2012 and another Strategy for Protected Areas is on its way for development). However, the cost of such a policy is undoubtedly a considerable burden for facing the challenges of economic development and securing basic services (education, health, the fight against poverty) for its growing population each year.

Q11: WHAT HAS BEEN THE CONTRIBUTION OF ACTIONS TO IMPLEMENT THE CONVENTION TOWARDS THE ACHIEVEMENT OF THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS IN YOUR COUNTRY?

19. THE CONTRIBUTION OF ACTIONS TO IMPLEMENT THE CONVENTION TOWARDS THE ACHIEVEMENT OF THE RELEVANT 2015 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS IN OMAN

The year 2000 was a special milestone for the global agenda to improve quality of life and especially important for developing countries. In that year, 192 nations of the world met at the United Nations (UN) and signed the “Millennium Declaration”. In the Declaration, 8 Millennium Development Goals (MDGs) were identified to be achieved by 2015. The hope is that they will reduce poverty, hunger and disease in developing nations, and provide universal access to health care and education, with emphasis on gender equality in both areas and access to political representation. The 8 Goals (G1-G8) are accompanied by 18 Targets and 62 Indicators. It is important to know how fared the Sultanate of Oman has in relation to the MDG benchmarks. Oman is rich in several initiatives in the field of sustainable development and aims to make a strategic development priority. However, the cost of such a policy is undoubtedly a considerable burden for facing the challenges of economic development and securing basic services (education, health, poverty alleviation) for its continuous growing population. But much more

penalizing is the cost of inaction. In this regard and as an example, few reports on climate change, economics of ecosystems and biodiversity showed the degradation of ecosystem services caused by the magnitude of the economic impacts.

The promotion of sustainable development requires 1) a comprehensive vision of the country and the technical tools and 2) the support of individual and collective participation. That is why there is no sustainable development without building appropriate governance. Recognizing this challenge, Oman has built a new framework for a green and sustainable economy. Oman created new job opportunities not only in agriculture and fisheries, but also in fields like eco-tourism. There is an increase in economic benefits to the local population through opening of investment in nature reserves. In fact, the United Nations (UN) Environment Program has credited Oman with having one of the best records in environmental conservation, pollution control and maintenance of ecological balance. Oman is even stated as having one of the world's most rigorously "green" governments. Oman's biodiversity is catered for by varying topographic features, from vast arid deserts in the West, to a belt of grass and woodland in the mountainous region of the South, and the Arabian Sea in the East. The economic benefits may need to be kept strengthened, and the activation of coordination with the Ministry of Tourism to develop a mechanism and guidelines for eco-tourism, especially the importance of focusing on employment of local people in eco-tourism projects is one of the essential means towards supporting eco-tourism in and/or outside nature reserves.

Oman's environmental regime is primarily regulated by the Law on the Conservation of the Environment and Combating of Pollution (Royal Decree No. 114/01). Although its forerunner (of the same name – Royal Decree No. 10/82) now stands repealed, it enabled the enactment of a series of environmental legislation, most of which continues to be in force today. Although there are some challenges to be faced:

- At the social level, further efforts in the fight against poverty, illiteracy and social equity to achieve the MDGs should be considered. Training local people in the hope of engaging them into the world of work is also an important challenge.
- At the environmental level, the mainstreaming of biodiversity in the implementation of policies, strategies and programs, the development of environmental accounting and green taxation, mainstreaming of climate change in public policy are issues to address in the short term, preferably before 2020.

Oman's development in the last 44 years has exceeded all expectations as will become apparent in the following paragraphs:

- With respect to the first goal (G1), "Eradicate extreme poverty and hunger", Oman has reduced extreme poverty to beyond the target set by the UN. This goal has 2 targets, halving both the number of people living in extreme poverty and those who suffer from hunger by 2015. While it is clear that Oman is winning the war against extreme poverty and hunger, some challenges still persist. The number of underweight children below 5 years is still unacceptably high in Oman at 17.9% in 2010 and 8.6 in 2012. These figures cannot perhaps be generalized as they refer only to clinic registered patients. Nonetheless, the mortality rate among children under 5 has fallen from 39 since 1990 to 12 in 2012. Thus many G1 targets have been met.

- With respect to G2, “Achieve universal primary education”, Oman, with universal free education up to and including tertiary level, has been paying particular attention to the quality of education from early childhood onwards. Indeed, Ministry of Education efforts have boosted primary school enrolment to almost 100% in Oman; however, there is a gradual drop-out during primary and secondary school and in tertiary education. This hinders the fulfillment of one Target of this Goal which is for children to complete a full course of basic education (GRADES 1-10) schooling. Another indicator in this target is the illiteracy rate among the 15–24 year-olds. A barrier to achieving this in Oman, considering the number of high school graduates, is that more opportunities for higher education are still needed. This is despite the fact that the country has instituted major initiatives in developing higher education aiming to increasing vocational skills as well as academic learning. This is an increasing need given Oman’s young population.
- As for G3, “Promote gender equality and empower women”, the Target is to eliminate gender disparity in primary and secondary school. The Indicators are the ratio of girls to boys in primary, secondary and tertiary education, and ratio of literate women to men. There may still be some way to go in addressing the gender gap in primary and secondary education, but the Target should be fully achieved before 2015. On the contrary, in the tertiary education, female enrolment is about to exceed that of males and women also play a significant role in the public and private sector workforces. Another Indicator is the portion of seats held by women in national parliaments. Women, in Oman, have taken over many leadership positions with the continued encouragement, support and care of His Majesty, Sultan Qaboos bin Saeed. For example, we currently have three female government ministers in Oman, and 14 (19.4%) of the 72 seats in our Senate are held by women.
- With respect to G4, “Reduce child mortality”, Oman has successfully reduced child mortality rates, both for under 5 year-olds and infant mortality. The former dropped a staggering 94% from 181 per 1,000 live births in 1972 to 11 in 2008 and to 9 in 2012. The other Target is the proportion of one year-olds immunized against measles. Our immunization rate in Oman is at 99%, well above the MDG indicators.
- There have been significant advances in G5, “Improve maternal health.” in Oman. The MDG Target is to reduce maternal mortality ratio (MMR) by 75% by 2015. Indicators are the MMR and the proportion of births attended by skilled health personnel. The proportion of births attended by skilled medical staff in Oman is close to 99%. In addition, Oman currently has almost 100% coverage for antenatal care, reflecting an outstanding development of child and maternal health care infrastructure in the last 40 years.
- Oman has made efforts to tackle HIV/AIDS to meet G6 “Combat HIV/AIDS, malaria and other diseases”. The Target is to halt the disease by 2015 and begin reversing the spread of HIV/AIDS. The number of reported HIV/AIDS cases in Oman fell to 116 in 2009 from 145 in 1990. Another Target is the percent of population with comprehensive and correct knowledge of HIV and AIDS. Oman has also gone out of its way to educate young people about HIV/AIDS with the help of UNICEF officials. Malaria has been

almost completely eliminated in Oman with only 965 cases in 2008 compared to 32,720 in 1990, and most of those likely to have contracted malaria outside Oman.

- In ensuring the fulfillment of G7, “Ensure environmental sustainability”, Oman is playing its role by trying to green the country and reduce carbon dioxide emissions by ensuring no old cars are on the road. The Ministry of Environment is setting high standards for all new factories. One Indicator is carbon dioxide emissions and consumption of ozone-depleting chlorofluorocarbons (CFCs). There is now only limited consumption of substances such as CFCs in Oman, with a drop from 452 tons in 1992 to 29 tons in 1997 and to Zero in 2009 (UNEP, Geo Data Portal, 2013). The other Targets of this goal are to halve by 2015 the proportion of people without sustainable access to safe drinking water and sanitation; and to significantly improve the lives of at least a 100 million slum-dwellers. Oman has not fully achieved sustainable access to safe drinking water and sanitation in all regions, but the authorities are working diligently on this issue and winning ground.
- As for G8, “Develop a global partnership for development”, Oman cooperates with the private sector to make available new information and communications technologies, exactly one of the G8 Targets. Another Target includes commitment to good governance, development and poverty reduction. Oman is on track for all 4 targets of G8 “through national and international measures”, under the visionary direction of the Sultan Qaboos Bin Saeed.

Q12: WHAT LESSONS HAVE BEEN LEARNED FROM THE IMPLEMENTATION OF THE CONVENTION IN YOUR COUNTRY?

20. LESSONS LEARNED FROM THE IMPLEMENTATION OF THE CONVENTION

The Sultanate of Oman has been able to satisfy its commitments to the CBD, through the implementation of the NBSAP, particularly as regards the establishment of a national framework for the contribution of Oman to the preservation of global heritage that is mainly composed from the biodiversity and the ecosystem services. The country could have a framework for decision-making in environmental policy in the field of biological resources. The provision of information on natural resources and biodiversity for different actors, particularly NGOs, has enabled each productive or management sector to be responsible for the protection of various elements of biodiversity. Some of the planned activities in Oman were successful, mainly because they were applied in cooperation with multi-stakeholders and partners.

Among the main lessons that can be considered positive in the implementation of the CBD at the national level:

Provision of a political support for the development of the strategy and its action plan in a participatory way, involving all stakeholders. A matter that allows for inclusion of most Omani needs and to the identification of their priorities.

Improved determination to the international commitment: the awareness of the importance of natural heritage in the socio-economic development of the Sultanate and the need to conserve heritage has resulted in a greater determination of the competent authorities to honor all its

commitments to the Convention on Biological Diversity, in particular as regards the establishment of a national framework for the contribution to the conservation of global biodiversity heritage.

Increased awareness: about the biodiversity in term of concept and as a definition and importance. This awareness is boosted by the fact that His Majesty, Sultan Qaboos bin Saeed is himself an environmentalist and a nature lover. It has become imperative that all his ministers and supporters mainstream biodiversity conservation and the principles of nature conservation in all their programs, and that all disseminate the knowledge that is the fuel of awareness to people of Oman through appropriate media.

Improved self evaluation of the national potential that consists of the national studies of biodiversity, and national institutional capacity, through the identification of partners and national stakeholders directly or indirectly involved in the field of biodiversity, as well as the skills available to each of them.

Availability of a national framework for the actions that are contained in the NBSAP. This NBSAP reflects the ambition of all for a better utilization, legitimate and sustainable natural resources. The NBSAP is a framework that determines priorities, directions to be taken, activities and tasks to be undertaken by each partner to optimize the use of national natural heritage. It also speaks of instruments to assist in the implementation of these actions.

At the institutional level, there is a need for further joint efforts to enable the biological heritage of being managed by a variety of departments and their specific services. Sometimes, an ecological system or a very restricted area is managed by many players. It follows, inter alia, a multiplicity of inconsistencies and delays in decision-making or even lack of synergy.

At the legislation level, Oman has legislation governing the field of natural resources. However, worn by time and the evolution of approaches, many of these legal texts require avoiding the loss of their relevance.

The Red Lists of threatened species and areas are some of the aspects of our nature need better legal framework. There is a multidisciplinary knowledge deficiency: Analytical studies from different departments show that the country still lacks scientific information and knowledge in many areas of biodiversity. Admittedly, since the signing and ratification of the CBD by Oman, many initiatives have been undertaken to improve knowledge of ecosystems, species and genetic resources. It remains that there is still a lot of gaps for better management and better use of national biodiversity.

Finally, there is a lack of database concerning the annual progress towards the implementation of the convention, specifically concerning the implemented projects and activities of relevance, the established reserves and their surface areas, and concerning the development of strategies, management plans, action plans, policies and programs.

21. APPENDICES

21.1. APPENDIX I - INFORMATION CONCERNING THE REPORTING PARTY AND PREPARATION OF THE FIFTH NATIONAL REPORT

Contracting Party	Sultanate of Oman
National Focal Point	
Full name of the institution	Ministry of Environment and Climate Affairs
Name and Title of Contact Officer	Mohammed Rashid Al Sinaidi Assistance Director of International Cooperation Department
Mailing address	P.O.Box 323 PC 100
Telephone	00968-24404817
Fax	00968691232
Email	picmeca@hotmail.com
Submission	
Signature of officer responsible for submitting the national report	
Date of submission	

1.2. APPENDIX II - FURTHER SOURCES OF INFORMATION

PROCESS OF PREPARATION OF THE FIFTH NATIONAL REPORT

The fifth national report was prepared by the drafting committee that is representing most of the ministries and the SEO NGO in coordination with the Ministry of Environment and Climate Affairs and the National Focal Point to the CBD in Oman.

The data collection for the fifth national report coincided with the revision and update process of Oman's National Biodiversity Strategy and Action Plan in 2014. During one year process the biodiversity status and trends were evaluated in details with the involvement of relevant experts from various sectors, such as nature and biodiversity conservation, agriculture, fishery, education, landscape, water management, livestock, genetic resources, etc. Several reports, studies, statistical data and scientific literature were revised and regular consultations and meetings were organized to discuss emerging questions. If needed, supplementary information were provided by scientific and research institutions and experts. As most information was available only in Oman, the evaluations had to be translated from Arabic into English for some of the national reports. After compilation of the draft national report, it was reviewed and improved by the international consultant and circulated to relevant departments for review. The inputs, suggestions and comments received have been incorporated in the final 5th report to the CBD.

ANNEX 1. REFERENCES

- AL-AZRI, A.R. (2009). Checklist of Oman phytoplankton. Sultan Qaboos University.
- AL JABIRI RASOUL (2001): The Economic Valuation of Biodiversity in Oman. Working paper for preparing the biodiversity conservation Strategy in Oman. IUCN.
- AL RASBI, A.B.N. (undated). Perennial plants and trees of the Sultanate of Oman. MRMEWR.
- AL RAWAHY, S.H., AL DHAFRI, K. AND AL BAHLANI, S.S. (2003). Germination, growth and drought resistance of native and alien plant species of the genus *Prosopis* in the Sultanate of Oman, *Asian J. Plant Sci.* 2: 1020-1023.
- AL-YAHYAI, R. AND S. AL-KHANJARI. (2008). Biodiversity of date palm in the Sultanate of Oman. *Afr. J. Agric. Res.* 3(6):389-395
- ANNETTE PATZELT AND GHUDAINA AL ISSAI (2014): National Biodiversity Strategy and Action Plan – Flora and Vegetation. Report submitted by Oman Botanical Garden to MECA in May 2014.
- BALDWIN, R. (2003). Whales and Dolphins of Arabia. Muscat: Mazoon Printing Press, L.L.C., 1-116 p.
- BALDWIN, R. (2009). Cetaceans and Turtles: A Contribution towards the National Report for the Convention on Biological Diversity. Marine Sub-committee, Environment Society of Oman.
- BARRATT, L., ORMOND, R. F. G., CAMPBELL, A. C., HISCOCK, S., HOGARTH, P. J., AND TAYLOR, J. D. (1984). An ecological study of the rocky shores on the South Coast of Oman. Report of IUCN to the UNEP Regional Seas Programme. (Tropical Marine Research Unit, University of York, York, 104 pp).
- BIOSPHERE EXPEDITIONS (2013): Status of the Arabian Leopard in Dhofar, Sultanate of Oman. Expedition Report.
- CBD (2014): Fifth National Report of UAE to CBD (2014):<http://www.cbd.int/nr5/default.shtml>
- CBD (2014): Fifth National Report of Kuwait to CBD (2014):
<http://www.cbd.int/nr5/default.shtml>
- CBD (2014): Fifth National Report Guidelines: <http://www.cbd.int/nr5/default.shtml>
- CBD (2014): [Fifth National Report Resource Manual: http://www.cbd.int/nr5/default.shtml](http://www.cbd.int/nr5/default.shtml)
- CBD (2014): Training Module on National Reporting (with a focus on the Fifth National Report):<http://www.cbd.int/nr5/default.shtml>
- CLAEREBOUDT, M.R. (2006). Reef corals and coral reefs of the Sea of Oman. The Historical Association of Oman, Al Roya Press and Publishing House.
- DIRECTORATE GENERAL OF NATURE CONSERVATION (2009). Checklist of Oman biodiversity. Ministry of Environment and Climate Affairs. Unpublished.
- EARTH TRENDS (2003): Biodiversity and Protected Areas-Oman. Country Profile. <http://earthtrends.wri.org>
- ERIKSEN, J. (2009): Biodiversity report on birds. 28 September.
- GHAZANFAR, S.A. (1998). Status of the flora and plant conservation in the Sultanate of Oman. *Biological Conservation* 85: 287-295.
- GHAZANFAR, S.A. (2002). A new species of *Helianthemum* (Citaceae) for the Sultanate of Oman. *Willdenowia* 32: 69-72.
- IUCN (2012): Tourism Concept Master Plan and Management Plan for Wadi Darbat. 5th draft.
- JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) and MRMEWR. (2004). The Master Plan Study on Restoration, Conservation and Management of Mangrove in the Sultanate of Oman. Final Report. Vol. 1 Main Report.

JORDAN M. WEST AND RODNEY V. SALM†(2003): Resistance and Resilience to Coral Bleaching: Implications for Coral Reef Conservation and Management. Conservation Biology, Pages 956–967; Volume 17, No. 4, August 2003.

LIST OF BIRDS OF OMAN (2014): Wikipedia: http://en.wikipedia.org/wiki/List_of_birds_of_Oman

MOE (2010) International year for Biodiversity. A National Report prepared by a Team from the Ministry of Education for the Celebration of YIB (in Arabic).

MOE (2010) International year for Biodiversity. A National Report prepared by a Team from the Ministry of Education for the Celebration of YIB (in English).

MECA (2001): National Biodiversity Strategy and Action Plan (NBSAP1). IN ARABIC.

MECA (2009): Fourth National Report of Oman to CBD <https://www.cbd.int/doc/world/om/om-nr-04-en.pdf>

MECA (2013): Initial National Communication under the United Nations Framework Convention on Climate Change. Report.

MECA (2014): Roadmap for Oman Animal and Plant Genetic Resources Center's (OAPGRC) Report.

MOMP (2014): Information needed for the updates of the NBSAP in Oman. Submitted by the Ministry of Manpower to MOESA.

MOSD (2014): Activities of the Ministry of Social Development in Oman for the updates of the NBSAP. Submitted to MOESA.

MOAF (2012): National Strategy of sustainable development for animal resources [NSSDAR, 2012] Volumes 1 and 2.

MOAF (2012): Oman Salinity Strategy (OSS). Governance, Legal/Regulatory Frameworks and Policies in agriculture and water. MOAF (Oman)/ ICBA (Dubai).

MRMEWR (2004) CORALS OF THE SULTANATE OF OMAN. *English version prepared by V. Mendonca. Translated to Arabic by T. Al Sariri at the Ministry of Regional Municipalities, Environment & Water Resources.*

MOT (2012): Tourism Concept Master Plan and Management Plan for Wadi Darbat.

NADIA AL SAADI & ALI AL LAWATI (no date): Databases of Oman's Genetic Resources and Intellectual Property Protection.

OMAN

OVERVIEW

(2014): https://www.google.com.lb/?gws_rd=cr,ssl&ei=bpOuU8ilFMuN4gTbpYGIBw.

MOAF (2014): Information needed for the revision of the Omani NBSAP. Department of Research for the Agriculture and Livestock Sectors. Report submitted to MECA (in Arabic).

MOE (2014): Information needed for the revision of the Omani NBSAP. Submitted by the Ministry of Education to MECA. (in Arabic).

OCE (2013): Reserves and Projects

McGrady, M. J., W. Al Fazari, M. Al Jahdhami, Q. Al Rawahi, A. Al Amri and N. Al Sharji. 2014. Report on sooty falcon (*Falco concolor*) research and conservation in Oman - 2013. Office for Conservation of the Environment and International Avian Research.

MOAF (2014). Results of the Agricultural census, 2012-2013. Report submitted to MECA in 2014.

OMAN PLANT RED DATA BOOK AS CITED IN DIWAN OF ROYAL COURT (2009). Contribution to Fourth National Report to the UN Convention of Biological Diversity, Report of the Office for Conservation of the Environment

PATZELT, A., AL RASHDI, I. AND LASER, S. (2007). *Barleria samhanensis*: discovery of a beautiful new plant species in Oman. *Man and the Environment* XVI (68):24-25.

PDO (2014): Overview on Biodiversity Protection in PDO. A report submitted by PDO to MECA in 2014.

REGINALD VICTOR (2014): Biodiversity Conservation in Oman. *Current Status and Future Options*. USQ. Oman. <http://www.nizwa.net/env/biodiversity/biodiversity.html>

RICHARD H. CURTISS (1995): Omani Conservation Laws Protect Flora, Fauna, and Even Architecture. Washington Report on Middle East Affairs, July/August 1995, pgs. 52-53. Oman: Environment and Ecology.

SAID AL HABSI & NASSER AL HOSNI (unknown): Water Sector in the Sultanate of Oman. MRMWR. <http://www.watergovernance.org/documents/WGF/ReWaB-files/rw-ppts/Egypt/Oman.pdf>

SALIM SAID AL-WAHAIBI (undated) Omani guidelines on environmental and health impact assessment of development projects.

SALM, R.V. AND S.W. SALM. (1991). Sea turtles in the Sultanate of Oman. The Historical Association of Oman, Ruwi. 31pp.

SHAHINA GHAZANFAR (unknown): Plants of Oman. Downloaded in 2014: <http://www.enhg.org/portals/1/resources/Oman/PlantsOfOman.pdf>

SIMON WILSON (undated): The EIA Process and Sustainability in Oman. <http://www.sesam-uae.com/muscat/presentations/Simon%20Wilson,%205%20Oceans.pdf>

STEVE COLES (unknown): Corals of Oman. <http://pbs.bishopmuseum.org/Oman-coral-book/>

SUZANNE SHARROCK (unknown): Establishing a National Genetic Resource Centre –policy and practice. <https://www.trc.gov.om/TRCWebsite/files/Oman%20presentation2.pdf>

TOM SCHILS (unknown): Benthic macroalgae of the Arabian Sea Algal assemblages of Masirah Island (Oman) and the Socotra Archipelago (Yemen), a case study, Ghent University. Belgium.

WIKIPEDIA (2011): Khwar of the Coast Salalah Reserve http://en.wikipedia.org/wiki/Khawrs_of_the_Salalah_Coast_Reserve

WILLIAM GLADSTONE, MARC STALMANS, ROBERT WILD (2011): Bandar al Khayran Public Ecotourism Area - Management Plan. IUCN.