Supreme Council for Environment| Kingdom of Bahrain

BAHRAIN NATIONAL BIODIVERSITY TARGETS & INDICATORS REPORT

November 2015

Project Title

Updating the National Biodiversity Strategy and Action Plan of the Kingdom of Bahrain. Kingdom of Bahrain, 2015.

Executing partner

Supreme Council for Environment (SCE)
Directorate of Biodiversity
Bldg 3550, Road 2849
Al Seef 428, Manama - Bahrain

Supporting partner

United Nations Environment Programme (UNEP)
Diane Klaimi, Regional Programme Officer
Regional Office West Asia (ROWA)
P.O. Box 10880 | Manama| Bahrain
Email: diane.klami@unep.org
http: www.unep.org

Funding partner

Global Environment Facility (GEF)
GEF Secretariat
1818 H Street, NW, Mail Stop P4-400 | Washington, DC 20433 USA
Tel: (202) 473-0508 | Fax: (202) 522-3240/3245

Project team

Dr. Mohamed Mubarak Bin Daina, Chief Executive, SCE
Mr. Abdulqader Khamis, Former Acting Head of the Directorate of Biodiversity, SCE
Mr. Mohamed Abdulrazzaq Alqassim, Acting Head of the Directorate of Biodiversity, SCE
Ms. Nouf Al Wasmi, Project Supervisor, SCE
Ms. Reem Al Mealla, Project Coordinator, SCE
Ms. Eman Hussein, Project Support, SCE
Ms. Tamera Al Husseini, Project Intern, SCE

Prepared by

Elsa Sattout, PhD. | International Lead Consultant
Biodiversity Conservation & Sustainable Development | Lebanon
E-mail: e.j.sattout@gmail.com | Webpage: elsasattout.com

Acknowledgments

Experts
- Prof. Jameel Al Khuzai| National Consultant
- Dr. Ameer Abdulla | International Consultant

Reviewers
- Dr. Abdelmawgoud Ragab | Directorate of Agricultural Affairs
- Mr. Bassam Al Shuwaikh | Directorate of Fisheries
- Dr. Humood Naser | University of Bahrain
- Mrs. Nouf Al Wasmi | Supreme Council for Environment

Government Sector
- Bahrain Authority for Culture and Antiquities (BACA)
- Central Informatics Organisation (CIO)
- Chamber of Commerce and Industry
- Economic Development Board
- Electricity and Water Authority
- National Oil and Gas Authority
- Ministry of Education
- Ministry of Finance
- Ministry of Interior
  - Customs
  - National Coast Guard
- Ministry of Transport
- Ministry of Works, Municipality and Urban Planning
  - Directorate of Fisheries
  - Directorate of Agriculture Affairs
- Supreme Council for Environment
- Supreme Council for Women
- Survey and Land Registration Bureau
  - Topographic Survey Directorate
  - Hydrographic Survey Directorate

Private Sector
- Environment Arabia Consultancy Services
- Gulf Petrochemical Industries CO. (GPIC)
- Mattar Jewelry
- The Bahrain Petroleum Company (Bapco)
- The National Initiative for Agricultural Development

Academic Sector
- Arabian Gulf University
- Bahrain Center for Strategic, International and Energy Studies
- University of Bahrain

Civil Society & NGO's
- Arab Youth Climate Movement, Bahrain Chapter
- Bahrain Environment Society
- National Institute for Human Rights
- Youth and Environment Association

Intergovernmental
- United Nations Development Programme (UNDP)
- United Nations Environmental Programme – Regional Office of West Asia (UNEP-ROWA)

Acronyms

AHTEG	Ad Hoc Technical Expert Group
AGB	Arab Gulf University
CBD	Convention on Biological Diversity
CCI	Chamber of Commerce and Industry
CIO	Central Information Organization
COP	Conference of the Parties
DOA	Directorate of Agriculture
DOF	Directorate of Fisheries
EWA	Energy and Water Authority
KoB	Kingdom of Bahrain
GEF	Global Environmental Facility
IMO	International Marine Organization
MMUP	Ministry of Municipality and Urban Planning
NBSAP	National Biodiversity Strategy and Action Plan
NCSR	National Council for Scientific Research
NES	National Environmental Strategy
NIAD	National Initiative for Agricultural Development
PAs	Protected Areas
SCE	Supreme Council for Environment
UOB	University of Bahrain
UNEP	United Nation Environment Programme
UNDP	United Nation Development Programme

Notes for the readers

The present report is 'book keeping' document recording the chronological development of the National Biodiversity Strategy and Action Plan (NBSAP) of Bahrain in three different parts.
The first part gives an overview of the Convention on Biological Diversity (CBD) and the Strategic Goals and Aichi targets adopted in the tenth Conference of Parties (COP10) to the CBD. It presents an update on the status of biodiversity conservation in the Kingdom of Bahrain.

The second part highlights the threats to biodiversity and priority actions for its conservation. It combines those identified by national stakeholders during the second national workshop and those resulting from the biodiversity baseline assessment studies. The 2nd part presents the methodology adopted to define the national targets and corresponding actions as well as the final national targets and indicators, while keeping the records of the various stages of the development of the national targets and indicators.

The third part introduces the basic concept of indicators. It includes the review of the 2011 list of indicators to monitor the expected trends. Those are developed to follow up on the assessment of the progress of work of the NBSAP implementation. The list includes the expected trends and their corresponding indicators to ensure that the CBD Strategic Goals and all Aichi targets are met.

As a future practitioner, we invite you through this report to be aware of the guiding principles of the NBSAP of the Kingdom of Bahrain, to gain full understanding of the specificity of the biodiversity in the country, to grasp the role of indicators in the monitoring and evaluating the progress of work of the Kingdom of Bahrain towards reaching the set strategic goals, objectives and SMART targets.

Contents

Section I. Introduction 10
I.1. An overview of the Convention on Biological Diversity 10
I.2. The Convection on Biological Diversity in the Kingdom of Bahrain 12
I.3. Biodiversity in the Kingdom of Bahrain 13
I.4. Methodology of work 16

Section II. 2021 Targets settings 18
II.1. Context 18
II.2. Threats to biodiversity and priority actions 19
II.3. Setting up targets for NBSAP's updating 20
Scenario 1: Bookkeeping stakeholders participation exercises 21
Scenario 2: Analyzing baseline assessments outcomes 27
Scenario 3: Integrating stakeholders and experts involvement chapters 31

Section III. Identifying indicators 34
III.1. Definition 34
III.2. Purpose 34
III.3. Criteria for successful indicators 34
III.4. Procedures for identifying indicators (BIP) 35
III.5. 2011 List of indicators report analysis 35
III.6. Scenarios for lead agencies and partners for 2015 List of indicators analysis 47
References 48
Annex 50

Table 1. Terrestrial and marine species diversity in Bahrain..... 15
Table 2. Conservation status of the biodiversity in Bahrain..... 19
Table 3. Priority ranking of organisms and ecosystems and defined national priority actions for each ecosystem..... 20
Table 4. Priorities actions identified and defined targets and actions for coral reefs..... 21
Table 5. Priorities actions identified and defined targets and actions for marine ecosystems..... 23
Table 6. Priorities actions identified and defined targets and actions for mangroves..... 24
Table 7. Priorities actions identified and defined targets and actions for agricultural ecosystems..... 25
Table 8. Priorities actions identified and defined targets and actions for freshwater springs..... 26
Table 9. The strategic goals and targets developed based on scenario 2..... 28
Table 10. Proposed indicators, availability and competent authorities for Strategic goals A..... 37
Table 11. Proposed indicators, availability and competent authorities for Strategic goals B..... 39
Table 12. Proposed indicators, availability and competent authorities for Strategic goals C..... 41
Table 13. Proposed indicators, availability and competent authorities for Strategic goals D..... 43
Table 14. Proposed indicators, availability and competent authorities for Strategic goals E..... 45

List of figures

Fig. 1. Geomorphology represented in five physiographic zones... 13
Fig. 2. Distribution of the natural habitats in Bahrain..... 14
Fig. 3. The methodology of work adopted for setting national targets and for the analysis of the 2011 indicators list..... 16
Fig. 4. Strategic goals and AHTEG potential headlines of indicators..... 18
Fig. 5. Biodiversity indicator development framework (UNEP-WCMC | BIP, 2011)..... 35
Fig 6. Development framework of '2011 list of national indicators' in Bahrain..... 36

List of annexes

Annex 1. AHTEG headlines for indicators..... 50

.

List of tables

Section I. Introduction

Setting the scene for the development of biodiversity conservation targets and indicators in the Kingdom of Bahrain

Convention on Biological Diversity: Overview

"Biological diversity underpins ecosystem functioning and the provision of ecosystem services essential for human well-being. It provides for food security, human health, the provision of clean air and water; it contributes to local livelihoods, and economic development, and is essential for the achievement of the Millennium Development Goals, including poverty reduction".

In the early 90s, the world communities convened during the Earth summit in Rio de Janeiro to halt the loss of biological diversity. More than 190 countries got together to sign the Convention on Biological Diversity (CBD) while recognizing the need for a global framework to better conserve biological diversity, its sustainable use and ensure the benefit sharing of its benefit.

To date, 196 parties who joined the CBD are investing efforts to ensure the fulfillment of the 2011-2020 Strategic Plan for biodiversity and the Aichi Biodiversity Targets (Decision x/2). The Strategic Plan of Biodiversity 2011-2020, adopted at 10th Conference of the Parties held in Nagoya (2010) requested the parties to update their NBSAPs. NBSAPs are the principal instruments for implementing the CBD at the national level (Article 6). As of March 2013, 177 Parties (92%) have developed NBSAPs. Decision x/2 urges parties to translate the framework of the Strategic Plan into their own national planning activities by setting national targets and revising their NBSAPs. Indicators are a key part of countries NBSAPs.

2011-2020 Strategic Plan Vision *"Living in Harmony with Nature"*

The strategic plan aim is that *"By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*." It calls parties to "take effective and urgent action to halt the loss of biodiversity in order to ensure that '***by 2020 ecosystems are resilient and continue to provide essential services***, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication'. To reach this goal, parties have to set their targets to reduce pressures on biodiversity, restore ecosystems, use sustainably biological resources and equitably share the benefits arising out of utilization of genetic resources while providing adequate financial resources, strengthening capacities, and mainstreaming biodiversity issues and values into national policies and ensure a scientific sound-base decision-making process.

"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".

I.1. The

Under the same COP10 decision (Decision X/2), parties have to define national indicators to monitor the progress towards their set national targets. These indicators support countries in the production of their National Reports to the CBD. These reports will allow the secretariat to track global progress towards the Strategic Plan for Biodiversity and the Aichi Targets, as well as towards the Millennium Development Goals and other Conventions.

Decision X/2 focuses among many others on:

In the Kingdom of Bahrain, participatory approach was adopted through the Delphi technique, Horizon scanning, and working group sessions during the third national workshops held.

1. Adopting participatory approaches leading to the involvement of all stakeholders,
2. Updating the national biodiversity strategies and action plans (NBSAPs),
3. Integrating **national targets into the revised and updated NBSAPs**,
4. Adopting it as a policy instrument (i.e. national development and poverty reduction policies and strategies, national accounting, economic sectors and spatial planning processes),
5. Monitoring and reviewing of NBSAP implementation making use of **the set of indicators** developed,
6. Mainstreaming of biodiversity conservation into national policies and strategies.

I.2. CBD in the Kingdom of Bahrain

The Kingdom of Bahrain (KoB) ratified the CBD in 1996. In 2007, Bahrain developed the first draft NBSAP in collaboration with the United Nation Development Program (UNDP).

CBD Ratification 1996
NBSAP development 2007

Wildlife conservation and nature protection is at the heart of Bahrain constitution in ***articles 9h, 11 and 117a***. The management of natural resources is mainly driven by national economy and political situation. Their exploitation should follow regulatory measures during limited times and should follow a transparent procedures. Through the national environmental statement, the government is striving towards economic development while adopting sustainable management of its resources.

Article 9h: The State shall take the necessary measures for the protection of the environment and the conservation of wildlife

In 2006, the National Environmental Strategy was endorsed. It was built on the precautionary approach principle to prevent environmental degradation and depletion of resources, polluters pay principle, partnership and improvement of the state of the environment.

Article 11:All natural wealth and resources are State property. The State shall safeguard them and exploit them properly, while observing the requirements of the security of the State and of the national economy.

In 2007, the NBSAP of Bahrain was developed with one main goal which is reversing the loss of biodiversity within Bahraini terrestrial, marine and freshwater ecosystems. It drew on various programmes among which management framework, public communication, strategic environmental assessment, protected areas, environmental trust fund and environmental compensation framework.

Article 117a: Any commitment to exploit a natural resource or a public utility shall be only by operation of law and for a limited time. The preliminary procedures shall ensure that the search and exploration work are facilitated and that openness and competition are realized.

A project for updating Bahrain NBSAP and development of the Bahrain Fifth National Report to the CBD was signed in December 2012 between the Supreme Council for Environment (SCE) and the United Nations Environment Program (UNEP). The project is funded by the Global Environment Facility (GEF) and is co-financed from the SCE. Two national workshops were held in preparation of the update of the NBSAP of Bahrain.

In 2011, a national workshop funded by UNEP-ROWA was organized to introduce biodiversity indicators in the context of the CDB and Aichi targets. Participants developed a list of indicators targeting the expected changes to happen in 2015. In 2015, the 2011 list of indicators was presented during the second national workshop. It was revised and analyzed in accordance with the CBD strategic goals and Aichi targets.

In that light, the present document was conceived. It gives an overview of the status of biodiversity in the Kingdom of Bahrain. It highlights the threats and priority actions identified by national stakeholders resulting from working group sessions organized during the second national workshop, a questionnaire combined with the application of the Delphi technique and horizon scanning exercises applied during the third national workshop. It also includes the review of the 2011 list of indicators and indices developed to follow up on the implementation of the NBSAP. The list includes the observations that should be done and indices to be measured to ensure that the twenty Aichi targets falling under the five 2011-2020 Strategic Goals of the CBD are met.

Fig. 1. Geomorphology represented in five physiographic zones.

I.3. Biodiversity in the KoB

The Kingdom of Bahrain is originally made up of 33 natural islands with 36 small ones as part of Hawar Islands. Nowadays, the country is an archipelago consisting of more than 84 natural and man-made islands. It is located in the middle of the southern coast of the Arabian Gulf. It lies between the eastern shore of Saudi Arabia and the western coast of Qatar. Bahrain's land mass covers a total area of 769.6 km^2 with a total marine area of 7497.1 km^2. The arid climate is characterized by low rainfall and high temperature and humidity levels. The average summer and winter temperatures recorded between 2009 and 2013 are 35.14^{O}C and 18.82^{O}C respectively. The annual rainfall noted during the same period ranged between 20.2 to 98.9 mm (CIO, 2013).

There are a number of islands that are exposed to little anthropogenic activities. Some of these islands are of different geomorphological formations, such as cliffs. Hawar Islands represent the main group of islands in Bahrain.

These islands contain diverse coastal and terrestrial habitats. The vegetation provides shelter for many species, particularly birds among which the internationally important Socotra cormorant and Osprey. Suwad Island accommodates the largest population of Socotra cormorant in the world, which is estimated to be around 250,000 individual

LANDFORMS OF BAHRAIN

Bahrain is divided into five physiographic zones (Doornkamp *et al*. in Alkhuzai, 2015) (fig. 1). Those are the central plateau and Jabal, the interior basin, the main backslope and the coastal lowlands.

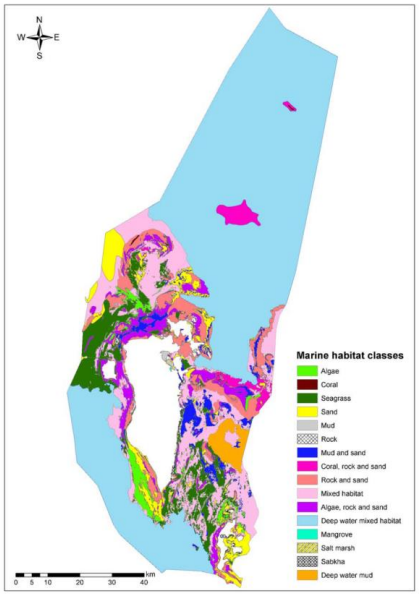

Fig. 2. Distribution of the natural habitats in Bahrain

The **JABAL AND CENTRAL PLATEAU** is an anticlinal dome located at an altitude of 40-66m in the centre of the island consisting of sedimentary limestone rocks. There are numbers of steep-sided and flat-topped residual hills. These named Jabals rise to a maximum elevation of 122.4m above sea level at Jabal ad Dukhan.

The **INTERIOR BASIN** was created in the form of an asymmetric ring surrounding the central plateau resulting from erosion that modified the domes over million of years.

The **MULTIPLE ESCARPMENTS**, surrounding and overlooking the interior Basin is a continuous belt of multiple, inward-facing escarpments with a maximum height of 20m above sea level.

The **MAIN BACKSLOPE,** declining away from the crest of the escarpment is an extensive, gently inclined surface (less than 5°).

The **COASTAL LOWLANDS** represents about 50% of the total area of the main island. The products of erosion of the slopes are washed and deposited in many areas in the coastal lowlands forming sand sheets. Salt flats, named Sabkhas occupy much of the coast, especially in the southwestern area. On the other hand, tidal mudflats are mainly located on the eastern coast.

PLANTS AND ANIMALS: A total number of 1301 species have been identified in Bahrain ranging from microbes to large mammals in the existing natural habitats (fig. 2). The numbers are underestimated since many taxa are yet to be identified. There is likely to be a notable decline in the number of flora and fauna species and their diversity (AlKhuzai, 2015).

SPECIES DIVERSITY

The estimated total number of flora is 415 including algae (88) and vascular plants (327). Bahrain hosts various species of desert plants and palm trees. The total number of terrestrial and marine animal species is 1040 including among many others corals, crustaceans, insects, fishes, amphibians and reptiles, birds and mammals (). Despite its small geographical area, Bahrain hosts a high diversity in bird species (329) among which 40 breeding species and a high percentage of migratory species.

Table 1. Terrestrial and marine species diversity in Bahrain

Group	Nb. of Species	Group	Nb. of Species
Plants	327	Arachnids	6
Algae	88	Insects	32
Fungi	12	Crustaceans	83
Mammals	22	Echinoderms	13
Birds	329	Mollusks	190
Reptiles	20	Corals	24
Amphibians	1	Jelly Fish	1
Fishes	238	Sea worms	69
Total		1455	

According to the IUCN Redlist (2013), the total number of threatened species is 33 including 3 mammals, 3 birds, 4 reptiles, 9 fishes, 1 mollusk, and 13 other invertebrates.

Genetic diversity of native Arabian horse breeds and palm tree species is of high historical and cultural value; this in addition to various agricultural crops and fruit trees species (4th NR to the CBD, 2011).

THREATS TO BIODIVERSITY

The anthropogenic factors play a major role in the loss of biodiversity and ecosystems degradation in Bahrain. A simple list identified by Alkhuzai (2015) included the following:

1. Dredging and Reclamation
2. Urbanization
3. Pollution
4. Overfishing
5. Industrial and Ships Waste

I.4. Methodology of work

The present report was prepared based on stocktaking exercise coupled with the analysis of the available data and information. The methodology of work relied on a well-rounded environment supported by literature review to interactions with stakeholders on individual or community basis to the field visits (fig. 3). The methodology included the three following stages:

AHTEG identified a list of indicators to be considered at global and national levels to monitor the progress of work of Parties towards meeting the Strategic Goals at global level.

1.STOCKTAKING AND GAP-ANALYSIS

Documents provided by the Supreme Council for Environment (SCE) were reviewed. The documents included grey literature, scientific studies and working documents, and national references related directly or indirectly to biodiversity conservation, governance and practices.

2. DEFINING BIODIVERSITY CONSERVATION STATUS

Monitoring the trends defined in 2011 required the identification of a set of indicators which was missing from the 2011 list of indicators report. Through, a review of the list of trends was done and a set of indicators was proposed. The progress of work allowed refining the proposed indicators based on the indicative list of indicators identified by the Ad Hoc Technical Expert Group (AHTEG); stakeholders meetings and field visits, availability of data, identification of data holders as well as competent authorities that will take the lead in data gathering and analysis in the future.

3. SETTING TARGETS AND DEFINING INDICATORS

Two scenarios were developed for the proposed targets.

The first scenario relies on fine-tuning the priority actions identified, the targets set, and the national policies and list of actions defined during the second national workshop for each of the ecosystems found in the country.

The second scenario proposes a set of strategic goals and targets based on the baselines studies done. A synthesis of the priority actions led to the development of national targets. These have been discussed during the third national workshop in the different groups and finalized based on the stakeholders' feedback.

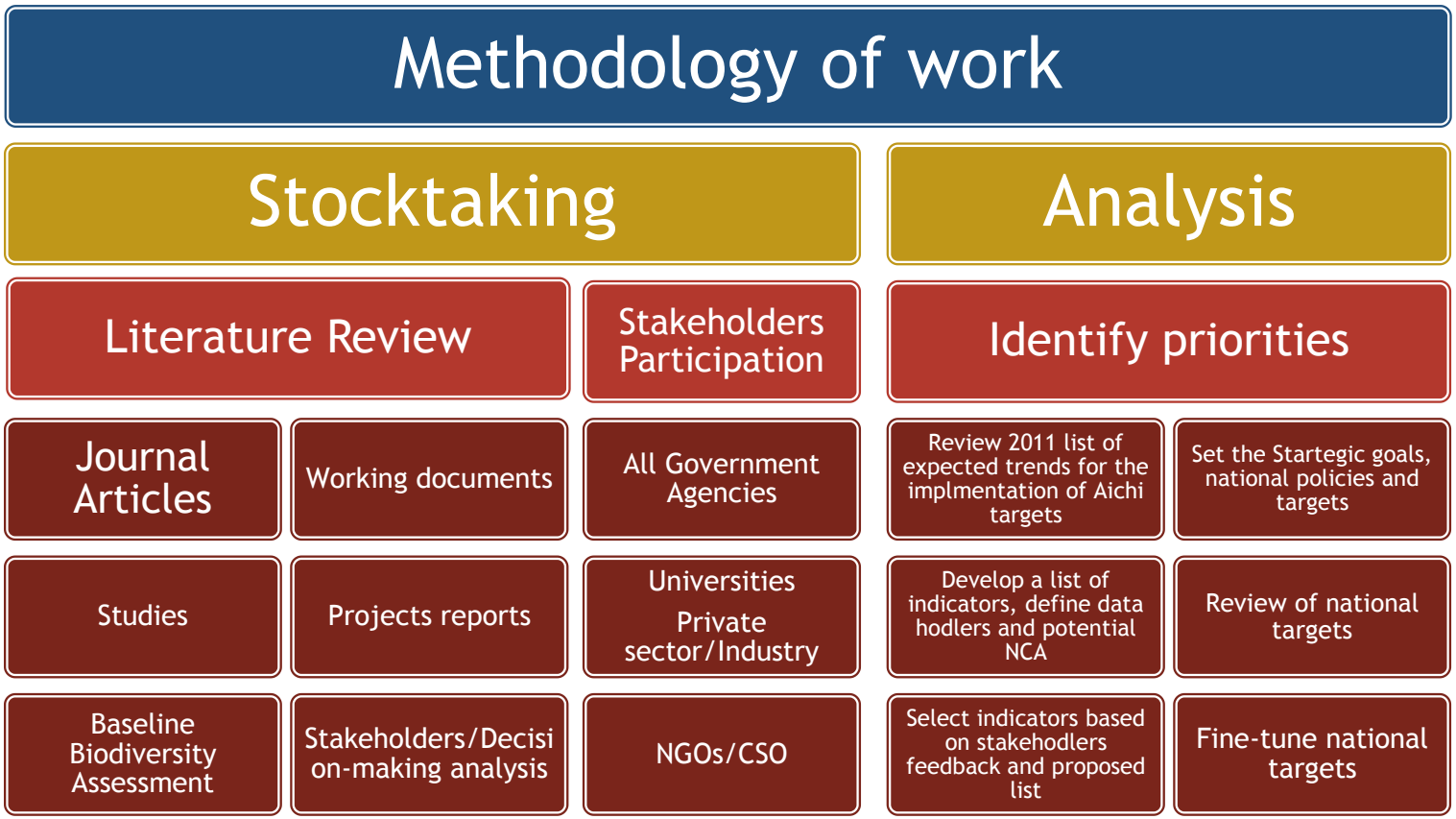

Fig. 3. The methodology of work adopted for setting national targets and for the analysis of the 2011 indicators list.

Section II. 2021 Targets setting

II.1. Context

The strategic plan aim is that *"By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*." It calls parties to "take effective and urgent action to halt the loss of biodiversity in order to ensure that '***by 2020 ecosystems are resilient and continue to provide essential services***, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication'. To reach this goal, parties have to set their targets to reduce pressures on biodiversity, restore ecosystems, use sustainably biological resources and equitably share the benefits arising out of utilization of genetic resources while providing adequate financial resources, strengthening capacities, and mainstreaming biodiversity issues and values into national policies and ensure a scientific sound-base decision-making process.

Following the tenth Conference of the Parties (COP10), parties were invited to set their own targets on the basis of the five strategic goals (fig. 4) and twenty Aichi targets while taking into account national needs and priorities. Parties shall bear in mind national contributions to the achievement of the global targets.

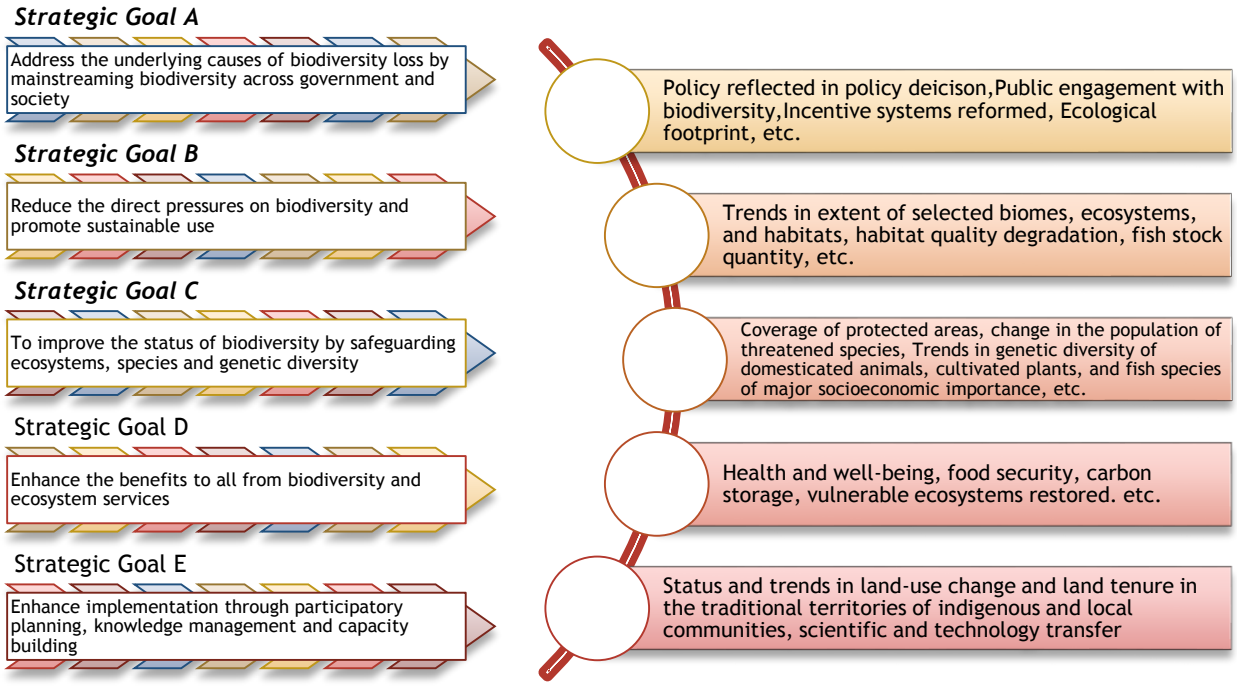

Fig. 4. Strategic goals and AHTEG potential headlines of indicators (Annex 1).

II.2. Threats to biodiversity and conservation status[1]

A recent study done by AlKhuzai (2015) revealed that the major threats to biodiversity are [1] dredging and reclamation, [2] urbanization, [3] pollution, [4] overfishing, and [5] industrial and ships Waste. An in depth analysis of the root causes of ecosystems degradation and biodiversity loss shows that the low priority given to biodiversity conservation in governance and the low compliance with regulatory measures are among the major drivers of biodiversity losses. Other drivers are the low awareness level among Bahraini's community, uncontrolled economic growth and non-conformity with the standards of sustainability. Based on these major drivers, the second scenario for setting up national strategic goals and targets was developed (page 24).

A recent study indicated that overfishing is the major cause of fish stock depletion during period 2004-2014 (DOF, 2014). Meanwhile, an increase in the catchment size of finfish (around 70-74) during the period 2004-2012 resulted in having fish stocks outside the safe biological limits. Consequently, a decline is observed in both catchment size and abundance index of fishes (DOF, 2014). On the other hand, steady increase especially in the amount of agricultural crop varieties including ornamental plants following the expansion in import operations is observed. This is likely to continue among agricultural plant species and varieties whilst the occupation areas of native plants continue to decrease especially in the northern half of Bahrain.

Based on the combination of the major threats and the expansion of the ecosystems, the highest threats are observed in the marine ecosystem namely coral reefs, seagrass beds, mangroves; agriculture ecosystems as well as freshwater springs and streams (table 2).

Table 2. Conservation status of ecosystems in Bahrain.

High threats/pressures	**Very high threat value** Seagrass beds Mangroves Freshwater springs and streams Agriculture ecosystem	**High threat value** Coral Reefs
Medium threats/pressures	**Medium Threat value** Algal beds Salt Marsh and Coastal Sabkhas Sand dunes	**Low threat value** Desert ecosystem Mixed habitat
	Low distribution	**High distribution**

The state of ecosystems has not registered any significant improvement in comparison to 2010. Declines have been noted in most population sizes, geographic ranges and genetic diversity seen across and within most ecosystems and a wide range of species that live among these. There are no current or recent studies describing the status or trend of both wild terrestrial (e.g. hedgehogs, Arabian Oryx, black tailed gazelle) and marine (e.g. bottleneck dolphin, Indo-Pacific humpback dolphin) species nationally. Lately, a survey was done on populations of marine dolphins and dugongs revealed respectively very small and small populations of both mammals (Hodgson, 2009).

[1] Refer to workbooks series and biodiversity baseline assessment for more details on threats and conservation status of the ecosystems.

II.3. Priority actions towards targets settings

Defining priority actions is the basis for setting up national targets. These are normally identified based on the threats to biodiversity and an analysis of the root causes of biodiversity losses and ecosystem degradation. Table 3 presents the prioritization of flora and fauna based on the results of the biodiversity baseline assessment studies (AlKhuzai, 2015), while the list of priority actions resulted from the working group sessions held during the second national workshop. These priorities were fine-tuned according to the stakeholders' feedback during the third national workshop (table 3).

Table 3. Priority ranking of organisms and ecosystems and defined national priority actions for each ecosystem.

			National priorities
	Organisms	Ecosystem	
1	Plants	Agriculture	1.Emphasize on the cultural and historical value of Palm groves 2.Maintain balance in the ecological functioning of the agricultural systems 3.Develop value chain of Palm tree to increase local communities livelihood.
		Freshwater Springs	1.Identify and map freshwater springs and their water flow 2.Take necessary administrative, legal and financial measures to protect freshwater springs, improve their water flow, and control development activities in Spring Important Areas (SIAs); 3.Ensure good governance through the appointment of a management body to coordinate between the authorities to ensure the protection of freshwater spring; 4.Integrate 'SIAs' within the eco-tourism strategy.
2	Crustaceans	Marine & Coastal	1. Survey & Map all marine organisms (native an invasive spp.); 2. Ensure the accession to relevant international treaties; 3. Develop legal and administrative measures to curb activities that contribute towards marine ecosystem degradation.
		Coral reefs	1.Take immediate actions and emergency measures for the protection of remaining live corals (ministerial decision); 2.Develop a sustainable management plan of the corals and their surroundings; 3.Develop a communication strategy to raise awareness and initiate science policy interface.
		Mangroves	1.Take necessary measures to stop illegal activities/violations undertaken; 2.Reinforce the management program for restoration and plantations plans; 3.Develop a communication strategy to raise awareness on the importance of mangroves.
3	Fishes	Desert	N/A
4	Amphibians		

SCENARIO 1: BOOKKEEPING STAKEHOLDERS PARTICIPATION EXERCISES

Based on the group exercises held during the second national workshop, the identified priority actions and set targets were sorted out and combined for each of the ecosystems found in Bahrain (table 4 to 8). ***The guiding principles were:***

- Precautionary principle
- Ecosystem-based management
- Sustainability
- Rights to the land and resources
- Reconnecting with nature and ensuring human well-being

Marine ecosystems

CORAL REEFS

Coral reefs[2] are mainly distributed in the east and north of Bahrain with very few in the west. They occupy a total area larger than Bahrain itself (Alkhuzai *et al.*, 2009). The main coral reefs include the 200 km^2 Fasht Al-Adhm immediately to the east of Bahrain, Khawr Fasht and Fasht Al-Jarim 20 km to the north, and Bulthama 70 km northeast. Various smaller reefs are interspersed around eastern Bahrain (Vousden, 1988). Corals cover less than 5% of the reef areas in the first three 'fashts' (AlZayani *et al.*, 2009). A total of 30 species of coral were recorded (Sheppard, 1988).

Table 4. Priorities actions identified and defined targets and actions for coral reefs.

Ecosystem	Coral Reefs	Aichi targets	Short-term	Medium-term	Long-term
Priority actions	1.Conduct scientific studies led by research institutions to determine the status of coral reefs in Bahrain's territorial waters; 2.Strengthen regulation means to implement and enforce current and future laws; 3.Enhance community awareness on the socio-economic importance of coral reefs.				
National policy	*To preserve the balance in the existing coral reefs and restore the degraded ones*				
Target 1	*By 2020, protect no less than 25%[3] of remaining coral reefs*	5,10			
Actions	Assess the ecological, social and economic values of the coral reefs				
	Issue laws and regulatory measures with implementation mechanisms and tools for the conservation of existing coral reefs				
	Develop and implement integrated management and restoration plans				
	Design and implement a monitoring program and evaluation mechanism; Develop capacities on the implementation				
Target 2	*By 2020, raise awareness among no less than 80% of key stakeholders*	1,2			
Actions	Design and implement a mechanism for the engagement of key stakeholders				
	Develop and implement a communication strategy to raise awareness on the ecological, social and economic values of coral reefs and design means for measuring behavioral change.				

[2] known as 'fasht' in the local Arabic dialect.
[3] 5% per year was set taking into account the importance and high conservation value of the coral reefs in Bahrain

Conservation value:

- Nurseries for fishes;
- Oyster beds;
- Shorelines stabilization and beach nourishment;
- Alternative source of economic benefits (ecotourism and domestic tourism, recreational activities).

Coast and shorelines

This is one of the main marine habitats in Bahrain. Coast and shorelines are heterogeneous and they host various types of physical environment (i.e. rocky shores, mudflats, and rock pools). These types are home for diverse groups of plants and animals including algae, invertebrates, and resident and migratory birds (e.g. flamingo).

SEAGRASSES

Dense seagrass beds with 75-100% coverage occur mainly on sandy substrate. In Bahrain territorial waters, the majority of the seagrass beds are located in the eastern subtidal waters, beginning south of Fasht Al-Adham extending to the Hawar Islands. There are three well-known seagrass species in Bahrain: *Halodule uninervis* (Forsskal) Asch., *Halophila ovalis* (R. Brown) Hooker, and *Halophila stipulacea* (Forsskal) Asch. (AlZayani, 2009). Crustaceans, polychaetes, and mollusks are main communities that dominate seagrass beds.

Conservation value:

1. Source of primary production;
2. Main foraging ground for the endangered marine mammal dugong;
   D. dugon largest population after Australia
3. Breeding and foraging areas for the endangered Green Turtle (*Chelonia mydas*);
   C. mydas exhibits continuous decline in populations worldwide (Sheppard *et al.*, 2010).

ALGAL BEDS

The algae-dominated habitat is mainly found in the eastern intertidal and subtidal zones Bahrain (Al Zayani *et al.*, 2009) and around Hawar Islands (AlKhuzai, 2009). Traditionally, green algae including *Ulva sp.* and *Enteromorpha sp.* are collected from intertidal zone and used as fish bait.

Conservation value:

- Primary habitat for all organisms living on macroalgae (Sheppard *et al.*, 2010).

SALT MARSHES AND COASTAL SABKHAS

Salt marshes are small and fragmented. Some pockets are found on the western and eastern shores of Bahrain Island. Many Sabkhas occur in the southern areas, near Ras Bar, and also in Hawar Islands. Coastal Sabkhas are characterized by a high salinity with large expansion of salt crusts and by the occurrence of algal mats. Salt marshes are dominated by salt tolerant halophytes such as *Phragmites australis*, *Arthrocnemum macrostachyum*, and *Sueda spp.* This is a habitat for birds such as reef heron and some terrestrial birds (Al Zayani *et al.*, 2009).

Conservation value:

- High flora and fauna richness.

INTERTIDAL MUDFLATS

They are limited to the eastern coast of Bahrain, eastern Hawar Islands and some internal areas of Muharraq's island. These habitats are the most valuable for migratory birds. They have a higher biomass than any other intertidal area. They are important habitat for many invertebrates, including commercially important crustaceans and mollusks, and vertebrates such as fish and sea snakes (AlZayani *et al.*, 2009).

Conservation value:

- High biological productivity;
- Home for migratory and roosting bird species.

Table 5. Priorities actions identified and defined targets and actions for marine ecosystems.

Ecosystem	Marine	Aichi Target (s)	Short-term	Medium-term	Long-term
Priority actions[4]	1. Survey and Map all marine organisms (i.e. native and alien species); 2. Ensure the accession to relevant international treaties; 3. Develop legal and administrative measures to curb activities that contribute towards marine ecosystems degradation.				
National Policy	*To conserve marine biodiversity in the Kingdom of Bahrain while reducing the loss of biodiversity and ensuring resilient ecosystems.*				
Target 1	By 2020, protect an additional 15% of Bahrain territorial marine area	11			
Actions	Update the marine ecosystems assessments and identify sites with higher environmental values				
	Issue decree/decision (s) for the protection of new sites				
Target 2	By 2020, decrease the number by catch from fishing by 10%	6			
Actions	Design a long-term plan of actions to implement the regulatory measures to reduce the by catch from fishing				
	Mobilize the competent authorities for monitoring the fishermen and by catch quantity				
Target 3	By 2020, 50% of marine species would be identified whilst reducing invasive marine species by 15%[5]	9			
Actions	Conduct a national assessment of all marine species including invasive species and map marine areas with zero extinction				
	Develop and implement an eradication plan for invasive species				
	Accession of the IMO Ballast Water Management Convention				
Target 4	By 2020, improve water quality by 10%	14			
Actions	Design a monitoring program for the discharge of industry and wastewater				
Target 5	By 2020, increase of crustacean population by 25%	6			
Actions	Update assessment of crustacean and define population demography, density, etc.				
	Design and implement a monitoring plan of crustacean				

[4] Priority actions were not worked out during the 2nd national workshop. They were retrieved from table 2.
[5] I would increase the % as it is important to have an eradication program for all invasive. Percentage reduced following the DRC comment

MANGROVES

Mangrove areas are one of the most important marine ecosystems in Bahrain populated by *Avicennia marina*. It is located on the northeastern coast of Bahrain where Palm groves are distributed in the coastal margins. Tubli bay is home to mangrove plants while in Bay Arad, the occurrence of *A. marina* is the result of plantation by the Department of Fisheries in the mid 1990s (AlZayani, 2009).

Conservation value:

1. Home to rich diversity of animals including shrimps, crabs, bivalves, and birds;
2. Nurseries for fishes and shrimps;
3. Shoreline stabilization.

Table 6. Priorities actions identified and defined targets and actions for mangroves.

Ecosystem	Mangroves	Aichi target (s)	Short-term	Medium-Term	Long-term
Priority actions	1.Take legal and administrative action to stop destructive activities in mangrove habitats; 2. Sustain mangrove restoration program based on updated scientific studies to identify current trends and diagnosis causes and solutions. 3.Develop an executive action plan to raise awareness and increase environmental education.				
National Policy	***To protect mangroves ecosystems through community and stakeholders participation***				
Target 1	By 2020, to rehabilitate mangrove ecosystem by 25%	**5**			
Actions	Develop and implement integrated management plans of mangrove ecosystems	**11**			
	Take immediate measures to reduce polluted effluents from the industry sector and wastewater	**8, 10**			
Target 2	By 2020, Increase the number of migratory birds by 50%	**12**			
Actions	Update the assessment of migratory birds populations				
	Refer to target 1 – Management plan would integrate this target				
Target 3	By 2020, contribution of mangroves to the national GDP by 0.1%	**2,4**			
Actions	Assess the ecological, economic and social values of mangroves				
	Design and implement a system for the application of the science-policy interface				

Desert

Bahrain falls in a desert belt extending from North Africa to Central Asia. It is part of Arabian Peninsula which is largely arid and dominated by deserts. Away from the coasts, arid and semi-arid climatic features dominate the inland part of Bahrain. The plants are mainly xerophytes and the animals are largely of desert types.

SAND DUNES

Sand dunes in Bahrain occupy small area. They occur mainly on the western coastal lowland of the island. Many of these are phytogenic mounds that formed due to accumulation of sand by plants such as *Zygophyllym qatarense*, *Panicum turgidum*, and *Pennisetum divisum*.

Conservation value: Should be provided.

INLAND SABKHAS

The habitat is typical of desert areas of inland drainage and dune areas. The supply of water comes from rare rainfall and the water table within capillary reach of the surface. The presence of algae is not common and the gypsum crystals form a layer below the surface. This habitat has been degraded by infilling and fragmentation cause through development (AlZayani et al., 2009).

Conservation value:

- The landforms are of interest for protection as they reflect a landform found along Bahrain coastline.

JABALS (SMALL MOUNTAINS)

Jabal Aldukhan[6] and the surrounded plateau are rocky formation and hard surface with highest point reaching 124 m above sea level. The mountain is inhabited by xerophytic plants such as *Lycium shawii*, *Zygophllum qatarense*, and *Calligonum polygonoides*.

Agricultural & freshwater springs

PLANTATIONS AND FARMS

Plantations and farms are mainly located along the northern, eastern, and northwestern coastal strips. Date palm is the main crop. They constitute part of the history and tradition of Bahrain.

Table 7. Priorities actions identified and defined targets and actions for agricultural ecosystems.

Ecosystem	Palm groves	Aichi Target (s)	Short-term	Medium-	Long-term
Priorities	1.Increase green spaces through creating sustainable farming systems to change the culture within communities. 2.Prioritize agricultural land systems in land use and management plans 3. Increase the space devoted to agriculture 4. Increase palm cultivation and financial allocations				
National policy	*To protect and revive Palm groves through the creation of a network of sustainable farming systems*				
Target 1	By 2020, increase farmland by 30%	5,7			
Actions	Design and implement sustainable voluntary standards in Palm groves and agricultural land.				
	Assess the ecological, socio-economic and cultural values of Palm groves.				
	Develop a value chain of the Palm trees/groves				
	Design and implement agricultural schemes for palm groves /green corridors[7]				
Target 2	By 2020, decrease pest infestation and the number infected trees with red weevil by 100%	7			
Actions	Design and implement an integrated pest management in Palm groves and farmlands				
	Design and implement a treatment plan for the red weevil				

[6] Smoke mountain.
[7] Agricultural schemes would be targeting the green corridors and its expansion through time.

Plantation and farms are home to *Ziziphus spina-christi* locally known as Bahraini Almond and naturally occurring plants such as *Alhagi maurorum*, *Capparis spinosa* and *Convolvulus arvensis*.

Conservation value:
Palm groves are the natural repository for the nesting of the white cheek bulbul.

FRESHWATER SPRINGS AND STREAMS

Freshwater springs and streams represented a great value for the villagers and farmers throughout the history of Bahrain. Natural water springs and wells have been always the landmarks where old civilization settled as for their importance to their survival. Verbal records transmitted by the people of Bahrain reveal the existence of an important number of freshwater springs and streams, most of which, if not all, have degraded. Ain Adhari, the most famous spring was one of the biggest natural springs in Bahrain. It had runnels that extend for relatively long distances passing through agricultural area with riparian vegetation thriving alongside the banks. Other springs included Abu Zaidan, Um Shuoom, and many others. Fresh water fish and amphibians such as turtles and frogs were found in these springs. Small water streams can still be seen in agricultural areas as part of flood irrigation network in plantations and farms. These spot are the only sites were few individuals of the frog could be seen.

Table 8. Priorities actions identified and defined targets and actions for freshwater springs.

Ecosystem	Freshwater springs	Aichi Target	Short-term	Medium-term	Long-term
Priorities	1.Develop monitoring programs before 2017 2.Develop a program to control and protect all natural springs before 2020 (100%[8] of the natural springs) 3.Increase in the number of farms that do not use groundwater by (not stated)%				
National policy	*Protect existing freshwater springs and revive their cultural values.*				
Target 1	By 2020, protect no less than 40% of remaining natural water springs	9			
Actions	Develop the sites for tourism, recreational & heritage activities to preserve the springs				
	Map freshwater springs and assess their status				
	Develop monitoring and management plans aiming at the reduction/banning the use of groundwater by farmers and desalination process				
Target 2	By 2020, declare 50% of the remaining freshwater springs as protected spots	2			
Target 3	By 2020, reduce the proportion of contaminated water leaked into the soil by 50%	8			
Target 4	By 2020, reduce domestic consumption of groundwater by 30%	14,15,16			
Action	Develop and implement an integrated water management program				

[8] These springs represent fossil water. Mapping all freshwater springs is a priority and the protection of all of them should be considered as part of emergency measures.

Recently, a small spring called the Eskharah (Rocks) Spring located on government-owned land between Saddad and Shahrakan, has now been declared as a site of historical significance by the Ministry of Culture (Trade Arabia, 2014).

Conservation value:

- Water source for agriculture and community settlement;
- Cultural and historical value.

SCENARIO 2: ANALYZING BASELINE ASSESSMENTS OUTCOMES

Based on the baseline biodiversity assessment (Alkhuzai, 2015), the defined national priorities were set under five strategic goals to halt the loss of biodiversity. The SGs are related to governance, education, gaps between science, society and decision systems, regional and international cooperation, improve functions of ecosystems.

Strategic goal 1: Strengthen the governance of biodiversity conservation

Target 1. Mainstream biodiversity conservation in national development strategy

Target 2. Update laws and put in place mechanisms for their implementation

Target 3. Strengthen institutional, administrative and technical capacity on biodiversity conservation laws and the existing tools for their implementation

Strategic goal 2: Infuse biodiversity conservation in schools and universities curricula

Target 4. To upgrade schools and universities curricula and teaching programs to integrate biodiversity of Bahrain in books and courses

Target 5. Develop a communication strategy on biodiversity conservation for the public

Target 6. Develop a framework for strengthening capacities and increasing awareness on the value of biodiversity and its role in human well-being.

Strategic goal 3: Bridging the gaps between science, society and decision-makers

Target 7. Design and develop a national research policy in partnership with universities, civil society and politicians;

Target 8. Establish a national research council/center responsible of monitoring the implementation of the national research and providing guidance where appropriate;

Target 9. Put in place a science-policy interface system.

Strategic goal 4: Foster international and regional cooperation

Target 10. Increase the visibility of Bahrain in biodiversity conservation at international and national level;

Target 11. Participate in regional networks as active members and take the lead in setting up a regional hub n island and marine biodiversity.

Strategic goal 5: Strengthen existing ecological functioning systems and improve resilience of all habitats in Bahrain

Target 12. Design conservation practices towards increasing the abundance of marine organisms;

Target 13. Establish a network of protected areas;

Target 14. Safe management of marine stock/natural resources;

Target 15. Restoration of coral reefs and introduction of artificial reefs.

Table 9. The strategic goals and targets developed based on scenario 2.

Strategic goal 1: Strengthen the governance of biodiversity conservation
Target 1. Mainstream biodiversity conservation into national development strategy[9]
Act 1.1. Develop road map of an action plan to build and/or strengthen institutional capacity on biodiversity conservation
Act 1.2. Mobilize the community of practices formed of high government officials at the SCE to boost the NBSAP implementation
T 2. Update laws and put in place mechanisms for their implementation
Act. 2.1. Perform a complete study including mapping competent authority roles and a gap analysis of the governance of biodiversity conservation in all sectors and define effective implementation mechanism and tools for the implementation
Act 2. 2. Develop a framework on the governance of biodiversity conservation (administrative, legal and technical)
T 3. Strengthen systemic, institutional, and individual capacities on biodiversity conservation laws and the existing tools for their implementation
Act 3.1. Present, discuss, get approval and signature of the parliament on the NBSAP
Act 3.2. Develop a training of trainers program and materials addressed for all government officials on the governance of biodiversity conservation (Trainers will then transfer the knowledge to public sectors and citizens)
Strategic goal 2: Infuse biodiversity conservation in schools and universities curricula
T 4. To upgrade schools and universities curricula and teaching programs to integrate biodiversity of Bahrain in books and courses
Act. 4.1. Review and analyze the present curricula at schools and universities
Act. 4.2. Adapt the educational systems to a participatory learning approaches while integrating the objectives of the Convention on Biological Diversity
Act. 4.3. Design and develop guidebooks with the necessary materials for trainers and teachers addressed to all schools and university levels

[9] Strategic goal 1 is a cross-cutting goal.

Table 9. The strategic goals and targets developed based on scenario 2 (Cont'd).

T 5. Develop a communication strategy on biodiversity conservation for the public and its role in human well-being
Act. 5.1. Develop a complete study on the social dynamics in Bahrain and their evolution with economic growth and social media
Act. 5.2. Develop a framework for strengthening capacities and increasing awareness on the value of biodiversity
Act. 5.3. Design a road map for the implementation of the framework
Strategic goal 3: Bridging the gaps between science, society and decision-makers
T 6. Develop a national research policy in partnership with universities, civil society and politicians
Act. 6.1. Execute an assessment and gap analysis of the existing research projects/programs and national capacities in Bahrain
Act. 6.2. Design a framework including research programs on biodiversity conservation, their principal investigators and identify conservation finance mechanisms[10]
Act. 6.3. Establish a national research council/center responsible of monitoring the implementation of the national research and providing guidance where appropriate
T 7. Put in place a science-policy interface system[11]
Act. 7.1. Establish a national scheme to promote citizen science involving all stakeholders
Act. 7.2. Establish a network at national levels managed by a designated lead agency
Strategic goal 4: Foster international and regional cooperation on biodiversity conservation and all cross-cutting issues
T 8. Increase the visibility of Bahrain in biodiversity conservation at international and national level
Act. 8.1. Design a 5 years plan for the participation in international, regional and national forums and congresses[12]
Act. 8.2. Participate in regional networks as active members and take the lead in setting up a regional hub on island and marine biodiversity.

[10] Principal investigators are meant the institution which will take the lead.
[11] This target can be a cross-cutting one.
[12] A yearly congress, which would be landmark for scientists, practitioners and volunteers, can be part of the 5-years plan.

Table 9. The strategic goals and targets developed based on scenario 2 (Cont'd).

Strategic goal 5: Strengthen existing ecological functioning systems and improve resilience of all habitats[13] in Bahrain
T 9. Establish a network of protected areas to increase the PAs coverage by 20%
9.1. Assess the present status of protected areas and the economic values of ecosystem services
9.2. Develop a strategy for effective management of the network of protected areas [14]
9.3. Develop a management plan for each protected areas within the network
T 10. Work towards increasing the abundance of marine organisms by 60%
Act. 10.1. Develop an ecosystem-based management of marine stock/natural resources
Act. 10.2. Design and implement a sustainable management/ecosystem-based scheme of fish stock and marine resources
Act. 10.3. Develop a framework including administrative and regulatory to leverage the livelihood of fisherman and direct and indirect users of marine resources
T 11. Restoration of coral reefs and introduction of artificial reefs.
Act. 11.1. Assess the status of coral reefs and develop stakeholders map
Act. 11.2. Develop a restoration and management plan for coral reefs
Act. 11.2. Develop a value chain for coral reefs goods and services

[13] Farms, Palm groves and freshwater springs were not mentioned – targets and actions will be considered as above (pages 25 and 26).
[14] Consider AZE (Areas with Zero extinction)/multi-functionality and exclusivity for equitable sharing of resources for the local communities (improving livelihood).

SCENARIO 3: INTEGRATING STAKEHOLDERS AND EXPERTS INVOLVEMENT CHAPTERS

The third scenario represents the essence of all previous studies. The resulting outcomes integrate the workshops and stakeholders' participations chapters as well as all national assessments. The strategic goals and targets developed under the second scenario were set as the strategic goals and objectives. The corresponding actions were finalized during the third national workshop. Afterwards, they were fine-tuned to capture all national priorities as well as the Drafting and Review Committee's and SCE's feedback.

SG I: Strengthen the governance of biodiversity conservation in national development strategies
Objective 1. Mainstream biodiversity conservation in national development strategies
Objective 2. Revise and update the existing laws and put in place effective mechanisms and tools for their implementation
Objective 3. Strengthen institutional, administrative and technical capacities on biodiversity conservation laws and the existing tools for their implementation

SG II: Infuse biodiversity conservation in schools, universities curricula and develop outreach programs addressed the general public.
Objective 4. Upgrade schools and universities curricula and teaching programs to integrate biodiversity of Bahrain in books and courses
Objective 5. Develop a communication strategy on all aspects of biodiversity conservation addressed to decision-makers, investors and the general public
Objective 6. Develop a framework to strengthen capacities and increase awareness on the value of biodiversity and its role in ensuring human well-being

SG III: Bridging the gaps between scientists, citizens and decision-makers by fostering innovation and research
Objective 7. Design and develop a national research policy in partnership with universities, civil society and politicians, industries and Non-Governmental Organizations (NGOs)
Objective 8. Establish a national research council/center responsible of monitoring the implementation of the national research program with its appropriate guidance
Objective 9. Put in place a science-policy interface system

SG IV: Strengthen existing ecological functioning systems and improve resilience of all habitats in Bahrain
Objective 10. Work towards increasing the abundance of all organisms
Objective 11. Establishment of a management network of protected areas
Objective 12. Ensure sustainable management of marine stock/natural resources
Objective 13. Restoration of coral reefs and introduction of artificial reefs

SG V: Foster international and regional cooperation
Objective 14. Increase the visibility of Bahrain in biodiversity conservation at international and regional level
Objective 15. Participate in regional and international networks as active members and take the lead in setting up a regional hub on island and marine biodiversity

NATIONAL TARGETS AND ACTIONS

By 2021, the Kingdom of Bahrain would have met its commitment to the following set targets. Some of the actions are cross cutting over more than one target. This will be illustrated in the NBSAP document.

Marine and Coastal Ecosystems

Target 1: Protect an additional 10% of Bahrain's territorial marine and coastal area

1. Update Marine assessment inter alia invasive species and identify zero extinction areas
2. Issue decision (s) and develop management plans for the protection of newly identified sites
3. Develop and implement 5-year eradication plan for invasive species
4. Accession of the Ballast Water Management Convention -IMO

Target 2: To reduce the number of by catch from fishing by 10%

1. Design a long-term action plan for the application of regulatory measures to reduce the by catch from fishing
2. Mobilize the competent authorities to gather all records to monitor the fishermen and their by catch quantity

Target 3: Improve seawater quality by 10% from wastewater and sewage discharge from municipal treatment plants

1. Design a monitoring program for sewage treatment plants
2. Implement regulatory measures and treatment plants to control sewage discharge

Coral Reefs

Target 4: Protect no less than 25% of remaining coral reefs

1. Map ecosystem services, their values and the socio-economic dynamics of stakeholders
2. Issue laws for the protection of the remaining coral reef areas and put in place mechanisms for their conservation
3. Develop and implement an integrated management plan based on the existing restoration program
4. Design and implement a monitoring program including strengthening existing capacities

Target 5: Raise awareness among 90% of key stakeholders and 50% of the general public

1. Design and implement mechanisms for engagement of key stakeholders
2. Develop and implement a communication strategy on the values and services of coral reefs to induce behavioral changes

Mangroves

Target 6: Rehabilitate mangroves by 25% and increase migratory bird species by 10%

1. Update the ecological and socio-economic assessment of the existing mangroves and develop a 'bookkeeping' for bird species populations
2. Develop and implement integrated adaptive management plans for mangroves
3. Take immediate measures to reduce polluted effluents from the government treatment plants and wastewater by the industrial sector

Desert ecosystems

Target 7: To protect at least 60% of remaining desert ecosystems and wildlife

1. Assess, map, collect and store information to develop a comprehensive database including desert plants and animals, plant genetic resources and traditional knowledge
2. Develop regulatory measures to protect identified sites exempting any urban development
3. Establish a gene bank for desert plants and wildlife

Target 8:Rehabilitate desert ecosystems for the promotion of eco-tourism by 17%

1. Develop an eco-tourism strategy to revive traditions and reconnect Bahraini with nature
2. Develop an integrated management plan aligning with the eco-tourism strategy
3. Develop and implement a communication strategy including outreach materials for potential cultural services

Target 9: Increase green area in the governorates by 30%

1. Develop an action plan and management strategy for streetscapes, pocket gardens and public spaces
2. Rehabilitate the green corridor and establish ecotones within the various landscape structures
3. Develop a communication strategy and action plan to enhance the value of the green corridors and urban biodiversity to induce behavioral changes
4. Agriculture ecosystem and freshwater springs

Target 10: Revive agricultural land systems including Palm groves by 25%

1. Assess the status of agricultural land systems and map their potential services
2. Develop an integrated management plan for the existing agricultural land systems in partnership with farmers, shareholders and stakeholders

Target 11: Decrease pest infestations in Palm grove by 100%

1. Develop and implement an integrated pest management program to reduce red weevil among other pest
2. Eradicate the introduced palm varieties

Target 12: Protect no less than 75% of healthy freshwater spring

1. Map and assess the status of existing freshwater springs
2. Develop regulatory measures and action plan to protect freshwater springs

Section III. Identifying Indicators

III.1. Definition

A biodiversity indicator can be a simple measure or metric based on verifiable data that conveys information about more than itself, such as a population estimate of a key predator, or a more complex 'proxy', such as the Marine trophic index, calculated from data of harvested fish and their average trophic level in the food web. They are a vital means of measuring progress towards targets at the global, regional, national and sub-national levels.

The criteria for successful indicators include scientific validity, availability of data at the national level, responsive, easily understandable and used.

A measure: a standard unit used to express size, amount or degree.

A metric: a system or standard of measurement.

An index: A numerical scale used to compare variables with one another or with some reference number.

Ref: Biodiversity Indicators Partnerships, 2011.

III.2. Purposes of setting up indicators

Biodiversity indicators are set in order to:

1. Measure the progress and success of policies, including in reporting for national strategies and international conventions
2. Support decision-making and adaptive management to achieve objectives and targets
3. Act as an early warning system to detect problem
4. Raise awareness about an issue
5. Provide an important interface between policy and biodiversity-related science to help simplify and communicate often complex issue

For example, data on coral reefs extent could be interpreted as an indicator of the following issues, depending on the purpose of the analysis or the issue of concern:

- Change in the availability of pearls (quantity and quality)
- Progress in coral reefs conservation
- Intensity of threats to coral reefs ecosystems
- Change in corals population
- Likely change in conservation status of coral reefs dependent species

III.3. Criteria for successful indicators

A set of criteria has been identify to reflect successful indicators, those are:

1. Scientifically valid
2. Based on available data
3. Responsive to change in the issue of interest
4. Easily understandable
5. Relevant to user's needs
6. Used

III.4. Procedures for identifying indicators

The logical framework for the identification of indicators in the context of monitoring the progress of NBSAP implementation include 6 phases which focuses on participatory approaches, assessing national capacities, identification of indicators, data gathering, testing, and monitoring and evaluation (fig. 5).

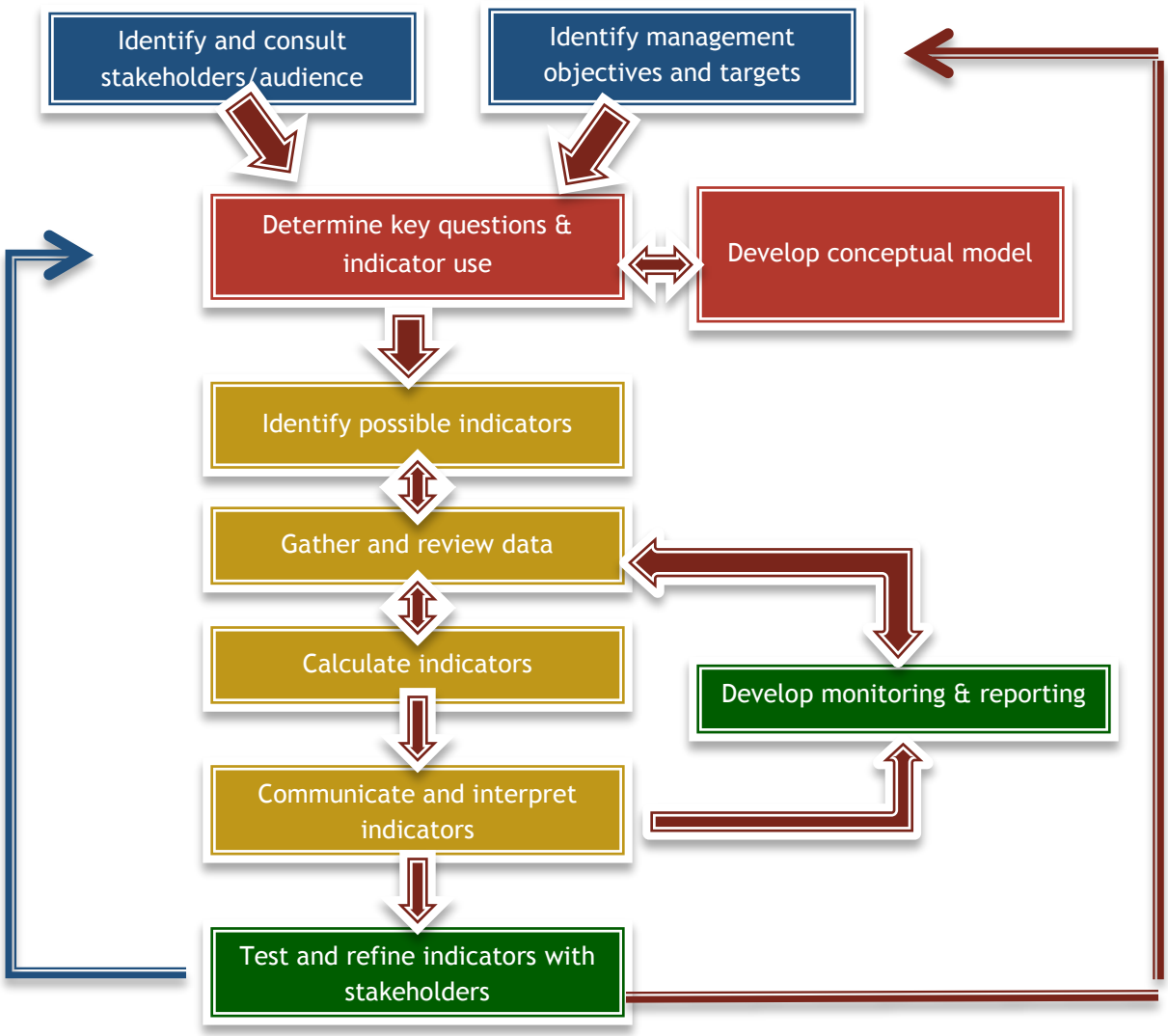

Fig. 5. Biodiversity indicator development framework (UNEP-WCMC | BIP, 2011).

III.5. 2011 List of indicators report analysis

The named '2011 list of national indicators' was developed during a stakeholder engagement workshop (following the BIP logical framework for indicators identification (fig. 6). The review of this list revealed the absence of indicators; instead the list included the expected trends in biodiversity status following the adoption of Aichi targets in the Kingdom of Bahrain. The workshop funded by UNEP-ROWA was lead by an

international expert and resulted in a gap analysis to identify data holders, assessment of national capacity and information needs and a 'list of trends'. The ultimate aim of monitoring these trends through a set of defined indicators is to be able to observe the progress of work in NBSAP implementation.

At this stage, the analysis of the changes and measurement of progress of work in NBSAP implementation was not possible because of the lack of data. Therefore, potential availability of data, competent authority (ies) and partners for the data collection and analysis were reviewed (Table 10,11,12,13 and 14). The validation of the proposed indicators and the corresponding main players and measurements will be done during the upcoming third national workshop. Following the validation of the indicators during the workshop, indicators might be combined in certain cases if possible to reduce the load of work and efforts to be invested.

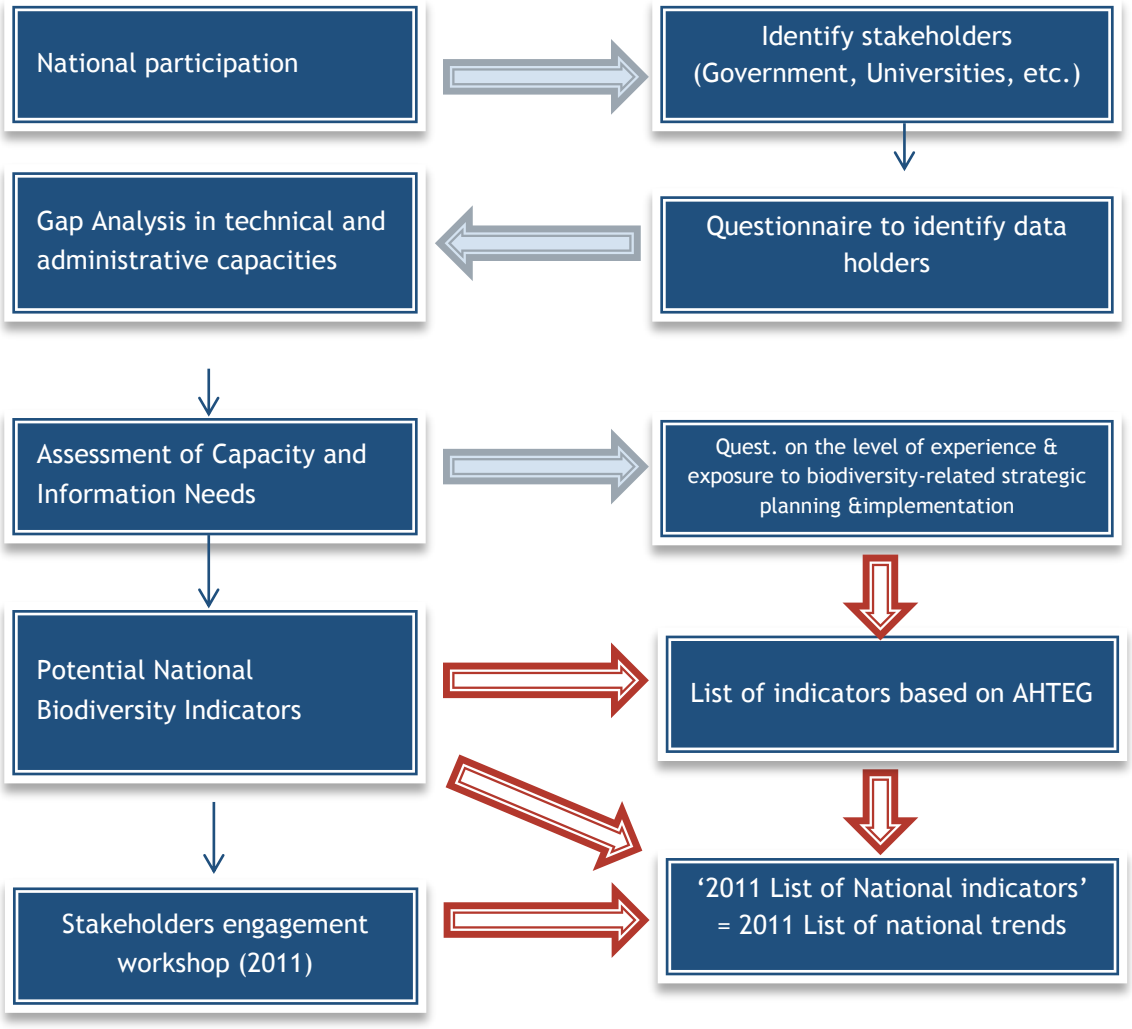

Fig 6. Development framework of '2011 list of national indicators' in Bahrain.

Table 10. Proposed indicators, availability and competent authorities for Strategic goals A.

Targets	Measurement purpose	Proposed Indicators	Availability of data	Proposed NCAs	National needs
T1: Awareness of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Trends in awareness and attitudes to biodiversity	Biodiversity barometer, Citation of biodiversity in media,	Y	NIAD, NGOs, Ministry of Education	Biodiversity Barometer: Consumer interviews
	Trends in public engagement with biodiversity	Citizen-science activity, Number of visitors to nature reserves, consumer preferences to green/organic products, revenues of organic/green products, producers of organic/green products	Y	SCE, NGOs, NIAD, DOA	Set system for recording numbers and data (Could be CHM as the hub or CIO)
	Trends in communication programmes and actions promoting corporate social responsibility	Number of talk shows about biodiversity (direct or indirect)	Y	Ministry of Education, NGOS (CHM), CCI	Set programme between SCE and CIO
T2: Biodiversity values integrated into national and local development and poverty reduction strategies and planning processes	National accounting systems incorporates natural resource, biodiversity, and ecosystem service values	Figures of the TEV of ecosystem services/natural resources shares from GDP	N	DERASAT, Individual Consultants (Local with international Lead Consultant)	National Studies on Ecosystem services and their values/Science-policy interface programme
	Values of biodiversity assessed, in accordance with the Convention	TEEB studies on the ecosystems encountered in the three main ecosystems: Marine and Costal, Arid and Semi-arid, Agriculture	N	DERASAT, Individual Consultants (Local with international Lead Consultant)	Same as F8
	Biodiversity and ecosystem service values integrated into sectoral and development policies	Use of the values for developing national policies, number of referenced TEEB studies in national documents	N	CHM can be the tool for monitoring records	Same as F8
	Number of EIAs and SEAs published that consider biodiversity and ecosystem services*	Avoidance, Mitigation, Rectification, Compensation	Y	SCE	Set indicators to be sorted out from EIA and SEA/Review selected EIAs and SEAs covering various project categories to set indicators
T3: Harmful Incentives, including subsidies eliminated, phased out or reformed	Trends in the number and value of incentives, including subsidies, harmful to biodiversity, removed, reformed or phased out.	Value of negative incentives, Number of positive incentives	Y	SCE, DOA,DOF, NIAD	Shall we select one institution to follow up on agriculture data and could t be NIAD?!
	Trends in identification, assessment and establishment and strengthening of incentives that reward positive contribution to biodiversity and ecosystem services, and penalize adverse impacts.	Decrease in fossil fuel subsidies, Investment in renewable energy projects	Y	EWA, NOGA, SCE[15]	National records, users register.

[15] Climate change project

Table 10. Proposed indicators, availability and competent authorities for Strategic goals A (Cont'd).

Targets	Measurement purpose	Proposed Indicators	Availability of data	Proposed NCAs	National needs
T4: Governments, business and stakeholders at all levels have taken steps to respect carrying capacity/lifestyle	Trends in Ecological Footprint and /or related concepts.	Measures of ecological footprints	Y	NGOs or NIAD or Bahrain Science Center	Snowball sampling/random sampling consumers and citizens
	Trends in population and extinction risk of utilized species, including species in trade.	Demographical structure of population of utilised species	Y	UOB, SCE (CITES)	Develop list of the utilized species that are threatened with extinction, Develop and implement a monitoring programme
	Trends in extent to which biodiversity and ecosystem service values are incorporated into organizational accounting and reporting.	Number of time biodiversity/values are taken into account in the accounting and reporting	N	CCI	Records of reference/NGOs or related NCAs
	Ecological limits assessed in terms of sustainable production and consumption.	Carrying capacity of sites/indicator species	Y	SCE -Database and monitoring programme developed and implemented	Fisheries sector/fish stock/consumption rates
	Trends in biodiversity of cities	Streetscapes, 'urban forests' [To discuss during upcoming third national workshop]	N	MMUP	Indicators measured in the cities

Table 11. Proposed indicators, availability and competent authorities for Strategic goals B.

Targets	Measurement purpose	Proposed Indicators	Availability of data	Proposed NCAs	National needs
T5:Loss of all natural habitats (halved and brought close to zero), and degradation and fragmentation is significantly reduced.	Trends in extent of selected biomes, ecosystems and habitats	Coverage of the selected ones	Y	CIO, MMUP	Spatial data and analysis
	Population trends of habitat dependent species in each major habitat type	Number of individuals/demographic data on population	Y (Partially)	UOB, AGU	Identify and select habitat dependent species, Develop monitoring programme
	Trends in proportion of degraded / threatened habitats	Indicator sp. of degradation, Chemical measurements (DIO)	Y	UOB, AGU	Identify indicator sp., develop monitoring program
	Trends in fragmentation of natural habitats	Coverage area of fragmented habitats	Y*	MMUP, CIO	Location of fragmented habitats, Spatial data and analysis
	Trends in condition and vulnerability of ecosystems	Keystone sp./indicators of resilience of ecosystems	To validate	AGU,UOB, DOF	Define keynote and indicator species
	Trends in the proportion of natural habitats converted	Surface area of converted habitats	Y	MMUP	Spatial analysis (over time)
	Trends in primary productivity	Proportion of nutrients specific to the different habitats	Y	UOB	
	Trends in proportion of land affected by desertification	Surface area of land affected by desertification	Y	AGU, SCE or DOA	Spatial analysis (over time)
	Level of land degradation (including salinization, water and wind erosion, etc.)	Concentration of Salt in the soil/Transpiration, evapotranspiration	To validate	Meteorological Directorate	Wind erosion: Spatial analysis
	UNEP Aridity Index	Mean annual precipitation/Mean annual potential evapotranspiration	To validate	Meteorological Authority, CIO, DOA, DOF	Spatial Analysis
T6: All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably and applying ecosystem based approaches	Trends in extinction risk of target and by catch aquatic sp.	Volume of targeted and by catch spp./month/year	Y	DOF	Develop list of species with high risk of extinction
	Trends in population of target and by catch aquatic species	Volumes of targeted and by catches sp./month/year	Y	DOF	Targeted species
	Trends in proportion of utilized stocks outside safe biological limits.	Volume of catch/month/year	Y	DOF	Benchmarking carrying capacity
	Trends in proportion of depleted target and by catch species with recovery plans.	Volume depleted targeted and by catch spp.	Y	DOF	List of depleted spp.
	Trends in area, frequency, and/or intensity of destructive fishing practices.	Number of fines	Y	DOF	Define spots of destructive fishing
	Trends in catch per unit effort	Volume of Catch/unit effort	Y	DOF	
	Wetland sites with successfully implemented conservation or wise use management plans.	Indicators for wise use put in place	N	SCE, UOB, AGU	Develop Management plan/define carrying capacity

Table 11. Proposed indicators, availability and competent authorities for Strategic goals B (Cont'd).

Targets	Measurement purpose	Proposed Indicators	Availability of data	Proposed NCAs	National needs
T7: Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Trends in population of agriculture dependent species in production systems.	Number of individual/population demography	Y	DOA/NIAD	Define agriculture dependent species
	Trends in production per input	Volume or Kg/unit	Y	DOA/NIAD	Set mechanism for data collection
	Trends in area of agricultural and aquaculture ecosystems under sustainable management.	Surface area/number of fish farm	Y	NIAD/DOA and DOA	Set criteria of sustainable management, and communicate these criteria to farmers
	Trends in proportion of products derived from sustainable sources.	Volume/ Kg produced with conservation agriculture, green or organic products	N	NIAD/farmers association	List of farmers with green/organic products
	Level of land degradation (including salinization, water and wind erosion, etc.).	Concentration of Salt in the soil/Transpiration, evapotranspiration	To validate	Meteorological Directorate	Wind erosion: Spatial analysis
T8: Pollution has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Trends in incidence of hypoxic zones and algal blooms.	Number of incidence	Y	UOB, DOF	Existing studies
	Trends in water quality in aquatic ecosystems.	Chemical/nutrients	Y	UOB, DOF + SCE	System for quality measurement
	Impact of pollution on extinction risk trends.	Proportion of pollutants +population demography	Y	UOB, DOF	Existing studies/scientist working on this
	Trends in pollution deposition rate.	Pollutants deposition volume	N	UOB, DOF	Existing studies/scientist working on this
	Trends in sediment transfer rates.		To validate	UOB, Fisheries Directorate	Existing studies/scientist working on this
	Trend in emission to the environment of pollutants relevant for biodiversity.	Volume of emission of pollutants	To validate	UOB, DOF, Industries emissions/car emissions	
	Trend in levels of contaminants in Wildlife.	Volume of contaminants	To validate	UOB, DOF	Define contaminants to be measured

Table 12. Proposed indicators, availability and competent authorities for Strategic goals C.

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCAs	National needs
T11: 17%of terrestrial and inland water, and 10 % of coastal and marine areas conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes	Trends in extent of marine protected areas, coverage of key biodiversity areas and management effectiveness.	Surface area, Proportion, Indicators for management effectiveness (PAs Strategy)	Y	SCE, CIO	Spatial analysis/IMP*
	Trends in protected area condition and / or management effectiveness including more equitable management.	Surface area, Proportion, Indicators for management effectiveness (PAs Strategy)	Y	SCE, CIO	Spatial analysis/IMP
	Trends in representative coverage of protected areas and other area-based approaches, including sites of particular importance for biodiversity, and of terrestrial, marine and inland water systems.	Coverage and categories	Y	SCE, CIO, MMUP	Spatial analysis, Developing PAs categories in Bahrain
	Trends in the connectivity of protected and other area-based approaches integrated into land and sea-scape	Coverage of PAs with corridors	Yes (The Hayrs) To validate	SCE, CIO	Spatial analysis combined with field data
	Trends in the delivery of ecosystem services and equitable benefits from protected areas.	Number of visitors, population density/frequency of indicator species, number of community members involved, revenue from eco-tourism activities (this latter depends on the management programme of the PA)	Y (Not all of course)	SCE	Set a data network for all of the above/CHM databank?!
	Trends in the status of the ecological character of RAMSAR sites		To validate	SCE, CIO	Define the ecological character of RAMSAR sites**
T12:Extinction of known threatened species prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Extinction risk trends of habitat dependent species in each major habitat type	Living plant index	N	SCE, CIO	Adapt the global LPI to national measurements
	Trends in abundance of selected species.	Number of individuals of species/population density	N	SCE, Agriculture Directorate, Marine Resources Directorate ++ Universities	Define list of selected threatened species/criteria for selection
	Trends in extinction risk of species.	Population density/frequency	N	SCE, Agriculture Directorate, Marine Resources Directorate ++ Universities	Define criteria for extinction risk, Develop list of threatened species with extinction risk
	Trends in distribution of selected species.	Population frequency of the selected species in a defined area, Water bird population status index, index of coverage of water bird	N	SCE, Agric. Directorate, Marine Resources Directorate ++ Universities	Define location of the selected species, mapping, spatial analysis

Table 12. Proposed indicators, availability and competent authorities for Strategic goals C (Cont'd).

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCAs	National needs
T13: Genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Trends in genetic diversity of cultivated plants, and farmed and domesticated animals and their wild relatives.	Ex-situ conservation crop collections/Number of accessions	To validate	UOB	Develop a list of the species, Establish a Gene bank, Develop protocols for gene mapping/DNA print
	Trends in number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources.	Number of signed agreements, ex-situ conservation record	N	SCE, Agriculture Directorate	Record of existing policies, Develop needed/missing policies
	Trends in genetic diversity of selected species.	DNA prints (To discuss during third national workshop)	N	UOB or AGU	Develop the list of species

Table 13. Proposed indicators, availability and competent authorities for Strategic goals D

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCA	National needs
T14: 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.	Trends in benefits that humans derive from selected ecosystem services.	Volume of fish catchment, monetary value	Y	DOF	
	Trends in proportion of the population using improved water services	Number of household, Number of plants for improvement of water	Y	EWA	
	Trends in proportion of total freshwater resources used.	Volume of freshwater/month/year	Y	EWA	
	Population trends and extinction risk trends of species that provide ecosystem services.	Population density/frequency	Y	UOB, AGU	Development of monitoring programme
	Trends in delivery of multiple ecosystem services.	To define	To validate	To define	
	Trends in economic and noneconomic values of selected ecosystem services	yearly TEV	N	DERASAT or Local consultant/ILC	Develop study on the National TEV of ecosystem services
	Trends in health and well-being of communities who depend directly on local ecosystem goods and services.	Health record/cost of medicine/Well-being index	N	AGU, UOB, AYCM	
	Trends in human and economic losses due to water or natural resource-related disasters.		N/A		
	Trends in nutritional contribution of biodiversity: Food composition		N		
	Trends in area of degraded ecosystems restored or being restored	Number of restoration projects, Coverage of restored area	Y (partially)	MMUP	Identify and record restoration projects
	Trends in prevalence of underweight children under-five years of age.	To define	Not applicable to Bahrain	To define	
	Trends in natural resource	Production, revenues	Y		
	Trends in the condition of selected ecosystem services.	Volume of Chemicals, density or frequency and distribution of keystone species, presence or absence of key stone species	To validate	UOB, SCE, DOF	Define keystone spp. And type of chemicals to be measured
	Trends in biocapacity	Volume of Production, waste, water consumption	Y	SCE in cooperation with relevant NCAs	Carrying capacity measurements/bench marking
	Water availability per capita	Volume/capita	Y	EWA	yearly database
	Level of land degradation (including salinization, water and wind erosion, etc.).	Measurement of Salinity/wind erosion/water erosion	Y	UOB, AGU, Agric. Direct, EWA	
	Trends in incidence of emerging zoonotic diseases.	Number of patients	To validate	Health Authority	Yearly records at the Ministry of Health

Table 13. Proposed indicators, availability and competent authorities for Strategic goals D (Cont'd).

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCA	National needs
T15: Ecosystem resilience and the contribution of biodiversity to carbon stocks enhanced, through conservation and restoration, including restoration of at least 15 % of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification	Status and trends in extent and condition of habitats that provide carbon storage	Concentration of C in the soil/coral reefs/algae	A study is currently being conducted by AGU	SCE	
	Level of land degradation (including salinization, water and wind erosion, etc.).	Volume g/l of salt, Electric conductivity	To validate	UOB, AGU, Agriculture Directorate, EWA	
	UNEP Aridity Index	Mean annual precipitation/Mean annual potential evapotranspiration	To validate	Meteorological Authority, CIO, Agric. Direct., DOF	Spatial Analysis
T16: 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.	Nagoya Protocol adopted and enforced.	Nagoya protocol ratified and signed, Law developed, Number of measures related to access, benefit-sharing and compliance as users and providers of genetic resources	Bahrain is yet to ratify the protocol.	SCE, NIAD	Record of users, Records of providers

Table 14. Proposed indicators, availability and competent authorities for Strategic goals E.

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCA	National needs
T17: 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	NBSAP adopted and implemented	Signature by parliament, Number of stakeholders participated in NBSAP update, Number of MOUs signed with national parties to implement the NBSAP	No	SCE/Biodiversity department	SCE president discusses and get the approval of the updated NBSAP at parliament, Designate partner (s) for each priority action and sign MOU for implementation
T18: 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.	Trends in land-use change and land tenure in the traditional territories of indigenous and local communities.	Coverage of the types of land use, regulations put in place	Y	MMUP - Survey & Land Registration Bureau	Spatial analysis over time, database on land tenure and land use, develop law/decree
	Trends in the practice of traditional occupations	Coverage of traditional occupation (farms, fishermen yards)	Y	NIAD, Directorate of Agriculture, MMUP	Spatial analysis, farmers register
	Trends in degree to which traditional knowledge and practices are respected through full integration, participation and safeguards in national implementation of the Strategic Plan.	Ministerial decisions, decree or law emphasizing on the respect of traditional knowledge	To validate	SCE, Bahrain Women Society	Users register, TK providers register
T19: 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.	Trends in policy-relevant assessments, including related capacity building and knowledge transfer, plus trends in uptake into policy.	Number of Trainings, Outputs measures of training, Number of participants and the representativeness of sectors, CHM in place, Number of CHM users and other national platform	No	SCE with other authority, TATWEER	System for data collection
	Number of maintained species inventories being used to implement the Convention	To discuss during upcoming third national workshop	No official species list in Bahrain To validate	SCE	CHM

Table 14. Proposed indicators, availability and competent authorities for Strategic goals E (Cont'd).

Targets	Measurement purpose	Proposed Indicators	Availability of data	NCA	National needs
T20: 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. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	Aggregated financial flows, in the amount and where relevant percentage, of biodiversity related funding, per annum, for achieving the Convention's three objectives, in a manner that avoids double counting, both in total and in, inter alia, the following categories:		To investigate	SCE	An integrated monitoring system must be put in place
	(a) Official Development Assistance (ODA)			SCE	
	(b) Domestic budgets at all levels;			SCE	
	(c) Private sector	CSR activities budgets		SCE	
	(d) Non-governmental organizations, foundations, and academia	National funding amounts		SCE	
	(e) International financial institutions	International funding		SCE	
	(f) United Nations organizations, funds and programmes			SCE	
	(g) Non-ODA public funding			UNEP-ROWA/SCE	
	(h) South-South cooperation initiatives	Number of projects on South-South cooperation		SCE	
	(i) Technical cooperation	Number of Training programme		SCE, AGU, UOB, DERASAT	

III.6. Scenarios for lead agencies and partners: 2015 List of indicators analysis

The proposed scenarios reflecting the leading roles of public and private agencies are based on the stocktaking, the baselines biodiversity assessment, the stakeholders mapping and analysis, and the meetings and field visits held in April 2015.

Scenario 1: Build-up the dynamic of data gathering and analysis on the existing systems.

CIO is the main hub for data gathering. An 'interoperable' centralized system is put in place. Data curation, management and maintenance, and analysis are lead by the CIO in coordination with the SCE. A solid network of the competent authorities for the various types of indicators is put in place. Follow up with the competent authorities is the responsibility of the SCE.

Both scenarios will be discussed during the upcoming 3rd national workshop to define the best set-up for the establishment of either an independent NCSR or to have a partnership between institutions with a leading government agency.

Scenario 2: Establish a new central hub collaborating with involved parties

Independent National Council for Scientific Research (NCSR) would be established. In its constitution, there must be a committee serving the NCSR. The committee will gather representatives from universities and other related agency (NGOs, private sector) to set the national policy for research based on the priority actions identified for the NBSAP as well as on emergent needs to fulfill the implementation of the NBSAP in a timely manner. The committee will be responsible on developing national research policy and agenda based whereby the set targets and indicators are essential in the consideration of funding of research proposals.

Technicians in the NCSR will be responsible of building up the database and communicating with researcher to make sure that the data is standardized to ensure best quality of analysis.

References

AHTEG list of indicators, 2011. Ad Hoc Technical Expert Group Meeting on Indicators for the Strategic Plan for Biodiversity 2011-2020. High Wycombe, United Kingdom, 20-24 June 2011.

Alkhuzai J., Sheppard C., Abdulqader E. A. A., Alkhuzai S. A., R. A. Loughland, 2009. Subtidal habitats. In: Loughland R. A. (Editor). Marine Atlas of Bahrain. GEOMATEC, Kingdom of Bahrain, pp. 115 -167.

AlKhuzai J., 2015. Baseline biodiversity assessment. UNEP-GEF Project on updating the National Biodiversity Strategy and Action Plan of the Kingdom of Bahrain. SCE, Manama, Kingdom of Bahrain.

AlKhuzai J., 2015. Stakeholders analysis and decision-making report. UNEP-GEF Project on updating the National Biodiversity Strategy and Action Plan of the Kingdom of Bahrain. SCE, Manama, Kingdom of Bahrain.

AlMealla R., 2014. Application of Ecosystem Based Approach in the Kingdom of Bahrain. The analysis of various Socio-Economic aspects of the Oyster Beds. The Supreme Council for the Environment and The Ministry of Culture in the Kingdom of Bahrain, Manama. Kingdom of Bahrain.

AlZayani A. K., Zainal A. J. M., P. R. Choudhury, 2009. An overview of the Marine Habitats of Bahrain: Their classification and Distribution. In: Loughland R. A. (ed.). Marine Atlas of Bahrain. GEOMATEC, Kingdom of Bahrain, pp. 67 - 83.

AlZayani A. K., Loughland R. A., 2009. Conservation of Bahrain's Marine Environment. In: Loughland R. A. (ed.). Marine Atlas of Bahrain. GEOMATEC, Kingdom of Bahrain, pp. 369 - 383.

BIP (Biodiversity Indicators Partnership), 2011. Guidance for National Biodiversity Indicator Development. UNEP-WCMC, Cambridge, UK.

Constitutional Law of the Kingdom of Bahrain. February 14, 2002. http://www.legalaffairs.gov.bh/102.aspx?cms=iQRpheuphYtJ6pyXUGiNqq6h9qKLgVAb Downloaded on 25 August, 2015.

DOF (Directorate of Fisheries), 2013. Annual Fishery Statistics Report No. (96). Fisheries Resources in Kingdom of Bahrain – 2012. Fisheries Assessment Section. Ministry of Municipalities Affairs and Agriculture, Agriculture and Marine Resources Affairs.

Drew C., O'Donovan D., Simkins G., Al Dosary M., Al Khaldi A.M. et al. 2008. Lepus capensis. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 08 May 2015.

GoB, UNDP, 2007. Bahrain National Biodiversity Strategy and Action Plan. V4.0. December. pp. 338. Government of Bahrain/United Nations Development Programme. Woods Hole Group Middle East.

Hodgson A., 2009. Marine Mammals. In: Loughland R. A. (Editor). Marine Atlas of Bahrain. GEOMATEC, Kingdom of Bahrain, pp. 235-261.

SCE, 2015. Fifth National Report to the Convention on Biological Diversity. Manama, Bahrain.

Sheppard C., Al-Husiani M., Al-Jamali F., Al-Yamani F. et al., 2010. The Gulf: A young sea in decline. Marine Pollution Bulletin 60, 13–38.

UNEP-ROWA, 2013. A preliminary & rapid assessment of ecosystem services associated with the pearling area & UNESCO World Heritage Serial Site, Kingdom of Bahrain (Unpublished).

Vousden D.H., 1988. The Bahrain marine habitat survey. A study of the marine habitats in the waters of Bahrain and their relationship to physical, chemical, biological and anthropogenic influences. Vol.1. The technical report. Environmental Protection Secretariat, Bahrain.

Annex 1

AHTEG Headlines for Indicators

Possible indicators for the Strategic Plan for Biodiversity 2011-2020												
Aichi Biodiversity Target	**Possible headline indicator (bold=indicator agreed in previous decision; regular face=proposed indicator)**	**Possible primary indicator (bold=indicator agreed in previous decision; regular face=proposed indicator)**	**Possible sub-indicators**	**Possible secondary indicator**	**Possible national indicator**	**Proposed lead agency/data source**	**Number of data points**	**Years of baseline & subsequent points**	**Scale**	**Type of review**	**Decision**	**Reference**
Strategic goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society												
	Surveys of awareness and attitudes towards biodiversity			Regional awareness surveys (Eurobarometer)		European Union and Gallup	1	2007	Regional			http://ec.europa.eu/public_opinion/flash/fl_219_en.pdf
		"Biodiversity Barometer"				Union for Ethical Biotrade	3	2009, 2010, 2011	Cross national			
		Citation of biodiversity in media				Google trends, Meltwater,			Regional, Global, National			
				World Wide Views on Biodiversity		Secretariat of the Convention on Biological Diversity, Plus Danish Technology Institute	1	2012	Cross Regional			
				Absolute/relative number of viewers/readers/listeners of environmental programmes, magazines and websites		Companies like Reuters, Thompson, British Broadcasting Corporation (BBC), National Geographic, TV5MONDE, Geo Magazine, Discovery, Website statistics (e.g. GBIF, Encyclopedia of Life, BioNET (Global Network for Taxonomy), Lincaocnet, European Distributed Institute of Taxonomy (EDIT) etc.)			National and global			

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.**		Number of school biodiversity education programmes or officially accredited teaching materials				Ministries of education, UNESCO, Organisation for Economic Co-operation and Development (OECD)			National			
	Public engagement with biodiversity	Number of visits to protected areas, natural-history museums and botanical gardens				CBD Consortium of Scientific Partners, World Association of Zoos and Aquariums (WAZA) and national statistics, World tourism organisations, The United Nations Educational, Scientific and Cultural Organization (UNESCO), International Council of Museums (ICOM	tbd		National			
		Public contributions to citizen science observation systems				Sites statistics e.g. GBIF, Ocean Biogeographic Information System (OBIS), observado.org, World Birds, EBird, DiveBoard, BirdLife International (e.g. Audubon Christmas Bird Count and similar initiatives in other countries)			National			

					Consumer preferences for 'greener' products/ produce	National consumer organisations, Consumer international, Eurobarometer, Union for Ethical BioTrade (UEBT), Independent certification organisations (e.g. The Forest Stewardship Council (FSC))		2009 for Eurobarometer and UEBT	National and global			
					Number of parliamentary debates on Biodiversity4	National parliamentary records			National			
		Number of people participating in environmental activities				IUCN, World Wide Fund for Nature (WWF), BirdLife International, Non-Governmental Organizations (NGOs) , Youth organizations etc.			National			for example http://www.jncc.gov.uk/page-4253
		Number of countries with biophysical inventories of biodiversity and ecosystem services	Incorporation of water related ecosystem services into national planning processes						National			
		Number of countries with national accounts reflecting the state of biodiversity and ecosystem services and if appropriate stocks and flows of natural capital							National			
Target 2: **By 2020, at**		Number of countries with poverty reduction strategies and national development plans which incorporate biodiversity				UNCEEA (United Nations Committee of Experts on Environmental-Economic Accounting), UN (United Nations) statistical division		1993	National			

the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	Biodiversity reflected in policy decisions	Number of planning processes reflecting biodiversity							National			
		Number of countries with strategic environmental impact assessment or similar assessment tools				IUCN, The Netherlands Commission for Environmental Assessment (NCEA)6, IAIA (International Association of Impact Assessment)			National			
		Number of biodiversity offset programmes							National			
					Number of national indicators which reflect biodiversity							
				Number of countries which evaluate the value of ecosystem services in relation to GDP								
			Number of countries with biodiversity reflected in green economy programmes									
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**	Incentives systems reformed	Estimates of the value of harmful incentives	Biodiversity-damaging fisheries policies			FAO, The International Commission for the Conservation of Atlantic Tunas (ICCAT)			Global			
			Biodiversity-damaging agricultural policies			World Trade Organization (WTO), The Food and Agriculture Organization of the United Nations (FAO), Development Agencies			Global			
				Fossil fuel production subsidies				Variable, but last few decades	Global, National			

harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.		Number of positive incentive mechanisms developed and applied		Investments/subsidies for sustainable renewable energy and infrastructure								
				Carbon taxes				~2000	National			
		Ecological Footprint and Biocapacity				Global Footprint Network	150+ (nations) and global	1961 - 2005	Global and national (subnational footprints being developed)	1	VII/30 and VIII/15	CBD TS 53
		Water Footprint				Water Footprint Network		1997-2001	Global: Regional; National;			http://www.waterfootprint.org/downloads/WaterFootprintManual2009.pdf
		Singapore Index on Cities' Biodiversity (CBI)							Global			http://www.cbd.int/authorities/doc/User%27s%20Manual-for-the-City-Biodiversity-Index27Sept2010.pdf
		Human Appropriation of Net Primary Production (HANPP)				Institute of Social Ecology (Vienna), The National Aeronautics and Space Administration (NASA)		2000 (Conducted for 1 year only)	Global			http://www.uni-klu.ac.at/socec/inhalt/1851.htm
		Proportion of total water resources used				FAO (AQUASTAT)	continuous	tbd (probably 1970's)	Global, regional, national			- UNEP/CBD/AHTEG-SP-Ind/INF/3
		Water use intensity by economic activity				FAO AQUASTAT	continuous	tbd (probably 1970's)	Global, regional, national			- UNEP/CBD/AHTEG-SP-Ind/INF/3

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.**	**Ecological footprint and related concepts**			Ecological Footprint of Production, Imports, Exports, and consumption activities		Global Footprint Network -		1996-2001 (average of the 5 years) 1996-2005 (average of the 10 years)	National, Global			www.footprintnetwork.org
				Total Material Requirement (TMR) and related concepts.		ETC/SCP, EUROSTAT		2000-2006 (results will be available by summer 2011)	Regional			
				Material flow data (extraction and consumption) for three main categories of material: biomass, fossil fuels and minerals.		Sustainable Europe Research Institute (SERI) EUROSTAT (for the period 2000-2007 for EU countries only) OECD		1980-2007	Global			http://www.materialflows.net/
				Adjusted Net Savings and related indicators (e.g., sector specific estimates).		World Bank		1970-2008	Global, National			http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20502388~menuPK:1187778~pagePK:210058~piPK:210062~theSitePK:408050,00.html
					Percentage of food purchased which is wasted	The European Topic Centre on Sustainable Consumption and Production (ETC/SCP) will be piloting data collection for such an indicator later on this year			National			
		Status of species in trade				TRAFFIC	3	1990, 2000, 2008	Global	1	VII/30 and VIII/15	CBD TS 53

	Proportion of products derived from sustainable sources	Wild Commodities index				IUCN - Sustainable Use Specialist Group UNEP-WCMC	3	1990, 2000, 2008	Global	4		CBD TS 53
		Number of ISO 14001 environmental management certifications						1999-2009	Global Regional			
		Biodiversity-friendly certification programmes (total value, value as a percentage of total market)				Certifiers (e.g. Marine Stewardship Council (MSC))						
				Number of countries participation in regional sustainable management processes								
				Greenhouse gas (GHG) emissions per unit of Gross Domestic Product (GDP)		Multiple sources (IEA, EEA, ENERDATA, etc.)		1960	National, Global			
				Inclusion of Biodiversity in Annual reports on Corporate Social Responsibility		The World Business Council for Sustainable Development (WBCSD), WWF			Global			
					Participation in re-use and recycling (also in Target 1) as measured via total recycling amounts, recycling rates and % of recycled material in key material streams consumed.	EUROSTAT for EU countries			National			(http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_wastrt&lang=en)

					Energy statistics (e.g., electricity production mix and associated emission, energy consumption, uptake of alternative fuels, etc)	International Energy Agency (IEA) ENERDATA - Global Energy Intelligence		1960-2008	Global			
					Changes in diet composition	FAO		1990	National, Global			http://www.fao.org/economic/ess/ess-data/ess-fs/en
					Number of sustainability plans with clear and measurable targets							
Strategic goal B. Reduce the direct pressures on biodiversity and promote sustainable use												
		Trends in terrestrial habitats	Trends in extent of forest area			FAO	4	1990-2010	Global, regional, national	3	VII/30 and VIII/15	CBD TS 53
			Mountain glacier mass balance			World Glacier Monitoring Service	30	1980-2009	Global			http://www.wgms.ch/mbb/sum09.html
			Grassland extent and fragmentation			Global Land Cover 2000 (GLC2000) & GlobCover (2005, 2009), Global Land Cover Network (GLCN)		2000	Global			
			Alpine habitats			Global Observation Research Initiative in Alpine Environments (GLORIA)		In some locations since 2001, others more recent	Global (incomplete)			
			Trends in extent of mangroves			FAO Global Mangrove database and Information System (GLOMIS)	4	1980-2005 1997	Global, regional	1		CBD TS 53

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.**	**Trends in extent of selected biomes, ecosystems, and habitats**	Trends in wetland habitat as, coastal and marine areas	Trends in extent of corals			UNEP-WCMC Reefs at Risk, World Resources Institute (WRI) Global Coral Reef Monitoring Network (GCRMN, ReefBase)11	36	1968 (Indo-Pacific); 1971 (Caribbean) 1998	Global, regional	1		CBD TS 53
			Trends in oyster reef extent			The Nature Conservancy (TNC)		2011	Global			
			Trends in extent of seagrass beds			UNEP-WCMC Seagrass watch; SeagrassNet	8	1930-2005 1998;2001	Global with regional case studies	3		CBD TS 53 http://www.glomis.com/
			Trends in extent of wetlands			Global Wetlands Observation System (GWOS)/Ramsar			Global, regional - some national			
			Extent of Deltas			World Deltas Network; Delta Research and Global Observation Network (DRAGON)		2005	Global (for major rivers)			
			Sea Ice Index			National Snow and Ice Data Center	32	1979-2010	Regional (Arctic and Antarctic)			http://nsidc.org/data/seaice_index/archives/index.html
	Connectivity / fragmentation of ecosystems	River fragmentation				Nature Conservancy Umeå University	Single snapshot	2005	Global, by river basin (292 larger river basins)	1	VII/30 and VIII/15	CBD TS 53
		Forest fragmentation				UNEP-WCMC	Baseline	2005, plus potential earlier points from remote sensing	Global	4		CBD TS 53
	Habitat quality/	Forest degradation				FAO						
		Land Affected by desertification							Global			http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/land/desertification.pdf

	degradation	Land Degradation and Improvement				LADA ISRIC FAO	Single snapshot	1980-2003	Global Regional			Global assessment of land degradation and improvement. ISRIC Report 2008/01
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.**	Trends in fish stocks	**Marine Trophic Index**				UBC Fisheries Centre		1950-	Global, regional and national	1	VII/30 and VIII/15	CBD TS 53
		Percentage of fish stocks fully exploited, overexploited or depleted				FAO		1974-2008	Global			CBD TS 53
		World capture fisheries production				FAO		1950-2008	Global			http://www.fao.org/docrep/013/i1820e/i1820e00.htm
		Catch trends by valuable marine species groups				FAO		1970-2008	Global			http://www.fao.org/docrep/013/i1820e/i1820e00.htm
		Annual marine fish catch				FAO		1970-2008	Global			
	Sustainability of marine harvesting practices	Occurrence of destructive fishing practices				Regional Fisheries Management Organisations						
		Catch Per Unit Effort				Regional Fisheries Management Organisations (RFMOs)						
		% of depleted species with recovery plans				RFMOs, ICATT, Convention on Migratory Species – relevant agreements such as Agreement on the Conservation of Albatrosses and Petrels (ACAP), CAFF						
		Area of forest under sustainable management: certification				Forest Stewardship Council	multiple	Since the start of certification	Global, regional, national	4	VII/30 and VIII/15	CBD TS 53
			Agricultural ecosystems under sustainable management			FAO		National case studies	National	4		CBD TS 53

Target 7: **By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.**	**Area of forest, agricultural and aquaculture ecosystems under sustainable management**	Agricultural ecosystems under sustainable management	Crop water productivity			FAO			Global, regional, national			
			Area water-logged by irrigation			FAO			Global, regional, national			
			Area salinzed by irrigation			FAO			Global, regional, national			
			Crop productivity per unit of fertilizer/pesticide									
		Aquaculture ecosystems under sustainable management										
		Trends in agricultural area certified organic										
		Trends in area used for agriculture, aquaculture and forestry				FAO						
Target 8: **By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.**	**Nitrogen deposition**	**Nitrogen deposition**				International Nitrogen Initiative (INI)	Annual	1860-2050	Global, regional, ecosystem type	3	VII/30 and VIII/15	CBD TS 53
		Nitrogen Footprint of Production, Import, Export and Consumption activities				N-Print Initiative		2005	Mostly missing (data available for USA, The Netherlands, Germany – India, Tanzania, Brazil, China, UK expected to be ready by 2012)			
		Nitrogen Balance	Nitrogen Use Efficiency			OECD	2	1990-2 to 2002-4	Regional; National			
	Water quality	**Water Quality Index for Biodiversity**				GEMS-Water	variable	Globally 1931 – 2007, with regional variations	Global, regional and national	3	VII/30 and VIII/15	CBD TS 53
		MDG indicator 7.5- Proportion of total water resources used					1990-2000	Global; Regional National			http://unstats.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=768	

		Nutrient loading in freshwater and marine environments										
		Incidence of hypoxic zones and algal blooms										
	Waste management	MDG indicator 7.9 - proportion of population using an improved sanitation facility			Same	WHO/UNESCO	continuous	1990 (?) - current	Global; Regional; National			http://unstats.un.org/unsd/mdg/Metadata.aspx?IndicatorId=31 ;
		Wastewater Treatment			Same	UNSD	continuous	tbd	Global, regional, national			- UNEP/CBD/AHTEG-SP-Ind/INF/3
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.**	Trends in invasive alien species	**Trends in invasive alien species**				GISP Birdlife CIB IUCN-SSC-ISSG(global) CABI-IAS-Compendium(global)	Baseline	1850 onwards for some, under collection for others	Some global, others national	1, 2	VIII/15	CBD TS 53
				IAS recorded in Europe		DASIE	1100 Alien sp. Records		Regional National			
	Invasive alien species management plans	National management/ action plans							Global Regional			
			Number of invasive alien species laws									
			Number of voluntary codes/programmes in place			FAO PIJAC/pet industry Botanical gardens			Global; Regional; National;			
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.**	Extent and integrity of vulnerable ecosystems	Mean coral reef condition					Based on 3,777 surveys at 1,962 reefs	1980-2006	Global: Regional			CBD TS 53
Strategic goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity												

Target 11: **By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.**	**Coverage of protected areas**	Coverage of terrestrial protected areas				UNEP-WCMC	138	1872-2009 (annual)	Global; regional; national;	3	VII/30 and VIII/15	CBD TS 53
		Proportion of ecoregions protected				UNEP-WCMC			Global; Regional: National			CBD TS 53
		Coverage of marine protected areas										
		Coverage of inland water										
		Proportion of biomes protected				UNEP-WCMC						
		Proportion of key biodiversity areas protected	Proportion of important bird areas protected			BirdLife			Global; Regional: National			CBD TS 54
			Proportion of AZE sites protected			Alliance for Zero Extinction			Global; Regional: National			
		Number of protected areas with connectivity corridors and buffer zones										
				Proportion of cities obtaining water supplies from protected areas; and/or proportion of protected areas established and managed to protect water supplies		tbd			Global, regional, national			UNEP/CBD/AHTEG-SP-IND/INF/3
	Protected Area Management	**Number of countries with completed ecological gap analysis**										
		Protected Area Management Effectiveness				UNEP-WCMC University of Queensland	variable (7000 sites; 3000 with accessible data)	1991-2009 (variable)	Global; Regional	2		CBD TS 53
Target 12: **By 2020 the**	**Change in status of threatened species**	**Red List Index**				IUCN BirdLife ZSL	Birds = 5; Mammals = 2; Amphibians = 3; Reptiles = 3; Fishes = 2; 9 invert groups; 3 plant groups	variable	Global; regional; habitat; convention	1	VII/30 and VIII/15	CBD TS 53

extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Trends in abundance and distribution of selected species	**Living Planet Index**				WWF ZSL	38	1970-2007 (annual)	Global; system; biome; habitat; regional; thematic subset	1	VII/30 and VIII/15	CBD TS 53
		Global Wild Bird Index				BirdLife; Royal Society for the Protection of Birds	27	1980-2006 (annual)	Regional; pilot studies	1		CBD TS 53
		Arctic Species Trend Index				CAFF	34	1970-2004	Regional			Arctic Biodiversity Trends 2010
		Waterbird population status index				BirdLife		1985-2005				
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.**	**Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socioeconomic importance**	Proportion of breeds at risk of extinction				FAO	8,000 breeds of 34 domestic species	early 1980s but many gaps	Global	3		CBD TS 53
		Assessment of genetic resources for food and agriculture - covers crops, livestock and aquatic species				FAO-CGRFA						
	Strategies developed and implemented to minimize genetic erosion and to safeguard genetic diversity	*Ex situ* crop collections				FAO	3	1996-2008	Global - 3 datasets (FAO SWR) Regional - EURISCO	3	VII/30 and VIII/15	
		Number of gene bank accessions										
Strategic goal D: Enhance the benefits to all from biodiversity and ecosystem services												
		Health and well-being	Number of people impact ed by human wellbeing and livelihood projects									
			Share of women in wage employment in the non-agricultural sector									
			Number and size of restoration projects related to ecosystem services									

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.**	**Health & well-being**	**of communities who depend directly on local ecosystem goods and services**	Number of countries with national laws ensuring access to ecosystem services									
			Coral reef socio-economic parameters			Global Socioeconomic Monitoring Initiative for Coastal Management (SOCMON)		2003	Near Global			
				Number of conflicts related to access to ecosystem services		MDG indicator 3.2	20	1990 and annual figures for some countries	National			http://mdgs.un.org/unsd/mdg/Resources/Attach/Indicators/HandbookEnglish.pdf
	Biodiversity for food and medicine	**Nutritional status of biodiversity**				FAO	Baseline	2007-2009	Global; Regional; National;	4	VII/30 and VIII/15	CBD TS 53
		Biodiversity for food & medicine				Traffic	Baseline	2008-9, with some backcasting	Global; National, across all regions	4		CBD TS 53
	Water security	Human and economic losses due to water-related natural disasters				UNISDR,	tbd	annual	Global, regional, national			UNEP/CBD/AHTEG-SP-IND/INF/3
		Climate moisture index				FAO/UNSD/WMO	tbd					UNEP/CBD/AHTEG-SP-IND/INF/3
		Water related conflicts	and number/magnitude of inter-state conflicts			World Water Assessment Programme	tbd	tbd				UNEP/CBD/AHTEG-SP-IND/INF/3
				Sediment transfer (sediment regulation)			FAO/UNSD	tbd		Global, regional, national		
				Hydropower (Actual installed capacity/potential capacity)			UNSD	tbd	annual	Global, regional, national		
				Extent of terrestrial carbon storage vulnerable to water insecurity			tbd (data available)	tbd	tbd			

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.**	**Trophic integrity of other ecosystems**						Not known	Not known	Not known		VII/30 and VIII/15	
	Incidence of human-induced ecosystem failure						Not known	Not known	Not known		VII/30 and VIII/15	
	Carbon storage	Storage of carbon and other GHG (using UNFCCC inventories supplemented by scientific assessments)										
	Vulnerable ecosystems restored		Assessments of vulnerability and adaptive capacity									
		Trend in ecosystem restoration										
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.**	Implementation of the ABS Protocol	Number of countries Party to the Nagoya Protocol				CBD			Global Regional National		X/1	
		Number of countries which have taken national measures related to access, benefit-sharing and compliance as users and providers of genetic resources				CBD					X/1	
		Number of countries which have established national focal points and competent national authorities									X/1	
			Measures taken by countries to monitor the utilization of genetic resources								X/1	
		Number of countries with national ABS frameworks/legislation										

	Effectiveness of ABS policies		Number of technical assistance programmes for strengthening national ABS programmes									
					Number of ABS agreements							
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.**	Trends in NBSAP development and implementation	Number of countries with revised NBSAPs				CBD		1992-2010	Global; Regional			
		Number of national assessments of NBSAP implementation										
		Number of sub-national biodiversity strategies and action plans being implemented by local or sub-national authorities										
			Number of stakeholders who participate in the revision and updating process of NBSAPs						Global			
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**	**Status and trends of linguistic diversity and numbers of speakers of indigenous languages**	**Status & trends of linguistic diversity**				UNESCO	5600 records		Global; Regional; National	4	VII/30 and VIII/15	CBD TS 53
			Change in proportion of speakers of Arctic languages			CAFF	44 languages	1989-2006	regional		X/43	
	Status and trends in land-use change and land tenure in the traditional territories of indigenous and local communities											
	Status and trends in the practice of traditional occupations										X/43	
		Number of cooperation initiatives										

	Scientific and Technical Cooperation & Technology Transfer	Number of projects (GEF & Other donors) with STC/TT components										
		Number and effectiveness of capacity building programmes to improve, share transfer and apply knowledge and technologies										
			Number of NBSAPs with a national CHM component									
			Number of countries with significant resource allocation for their national CHM (NFP + team + institutional arrangements)									
		Projects (GEF & Other donors) with a national CHM component (number, budget, scope, impact)										
		Number of effective CHM websites										
		Number of effective national clearing house mechanisms with a focus on transferring and applying knowledge and technology										
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**		Entries in the CHM Knowledge base (number by information type, quality, source, ratings, popularity)										

widely shared and transferred, and applied.	Knowledge Sharing, Information Exchange, and Human Networking	Use of the CHM Knowledge Base (number of users, search terms, user comments made on KB entries)										
		Use of the CHM Workspace (Number of users, contributions made)										
		Number of websites with Web 2.0 plug-ins to extract information from the central CHM.										
		Number of maintained species inventories	Growth in GBIF georeferenced species record numbers			GBIF/CSP		2003-	global		X/39	
			Number of species inventories being created or maintained in a country or through collaboration with others, peer-reviewed for accuracy and completeness									
			Number of countries identifying the priority taxonomic groups for which thy require inventories									
			Number of countries demonstrating use of species inventories			Zoological record (animals), IPNI(plants), N4L(microbes)			global			
		Official development assistance				OECD	4	2004-2008	Global	4	VII/30 and VIII/15 and X/3	CBD TS 53

		Aggregated financial flows, in the amount and where relevant percentage, of biodiversity-related funding, per annum, for achieving the Convention's three objectives, in a manner that avoids double counting, both in total and in, inter alia, the following categories: (a) Official Development Assistance; (b)Domestic budgets at all levels; (c)Private sector; (d)Non-governmental organizations, foundations, and academia; (e)International financial institutions; (f)United Nations organizations, funds and programmes; (g)Non-ODA public									X/3	
		Number of countries that have: (a)Assessed values of biodiversity, in accordance with the Convention; (b)Identified and reported funding needs, gaps and priorities; (c)Developed national financial plans for biodiversity; (d)Been provided with the necessary funding and capacity building to undertake the above activities;									X/3	

		Amount of domestic financial support, per annum, in respect of those domestic activities which are intended to achieve the objectives of this Convention;									X/3	
		Amount of funding provided through the Global Environment Facility and allocated to biodiversity focal area;				GEF		~2000			X/3	
		Level of CBD and Parties support to other financial institutions that promote replication and scaling-up of relevant successful financial mechanisms and instruments;									X/3	
		Number of international financing institutions, United Nations organizations, funds and programmes, and the development agencies that report to the Development Assistance Committee of Organisation for Economic Co-operation and Development (OECD/DAC), with biodiversity and associated ecosystem services as a cross-cutting policy;				OECD-DAC					X/3	

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. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.**		Number of Parties that integrate considerations on biological diversity and its associated ecosystem services in development plans, strategies and budgets;									X/3	
		Number of South-South cooperation initiatives conducted by developing country Parties and those that may be supported by other Parties and relevant partners, as a complement to necessary North-South cooperation;									X/3	
		Amount and number of South-South and North-South technical cooperation and capacity building initiatives that support biodiversity;									X/3	
		Number of global initiatives that heighten awareness on the need for resource mobilization for biodiversity;									X/3	
		Amount of financial resources from all sources from developed countries to developing countries to contribute to achieving the Convention's objectives;									X/3	

		Amount of financial resources from all sources from developed countries to developing countries towards the implementation of the Strategic Plan for Biodiversity 2011-2020;									X/3	
		Resources mobilized from the removal, reform or phase out of incentives, including subsidies, harmful to biodiversity, which could be used for the promotion of positive incentives, including but not limited to innovative financial mechanisms, that are consistent and in harmony with the Convention and other international obligations, taking into account national social and economic conditions;									X/3	

		Number of initiatives, and respective amounts, supplementary to the financial mechanism established under Article 21, that engage Parties and relevant organizations in new and innovative financial mechanisms, which consider intrinsic values and all other values of biodiversity, in accordance with the objectives of the Convention and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits Arising out of Their Utilization;									X/3	
		(I)PES ((International) Payment for Ecosystem Services), including Reducing Emissions from Deforestation and Forest Degradation in Developing Countries + (REDD+), biodiversity banking, etc.) (number of agreements, total budget/transaction value)				OECD, FAO, Centre for International Forestry Research (CIFOR), Ecosystem Marketplace - www.speciesbanking.com		1995	Sub-national/project level			

		Number of access and benefit sharing initiatives and mechanisms, consistent with the Convention and, when in effect, with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits Arising out of Their Utilization, including awareness-raising, that enhance resource mobilization;									X/3	