The National Biodiversity Strategy and Action Plan

Kingdom of Bahrain
2016-2021

February 04, 2016
Bahrain National Environment Day

Foreword

This Kingdom of Bahrain strives towards achieving sustainable economic growth whilst recognising that these efforts would only be attainable through the achievement of environmental sustainability and good environmental management and practice. Despite its small size, Bahrain is proud to be home to many species and ecosystems, some of which are of great international and regional significance. Recognising the uniqueness of its natural heritage, which has given the country its name today and has contributed towards sculpting the country's culture and identity, the country has embarked on a two year journey (2013-2015) which has seen it revise and update its first National Biodiversity Strategy and Action Plan (NBSAP) drafted in 2007.

This document outlines the results of tremendous efforts made by the kingdom which brought together a wide range of national stakeholders that covered the public and private sector, academia and research institutions in addition to members from civil society and media. All stakeholders were engaged with the NBSAP Project Team based at the Supreme Council for Environment along with the appointed consultants for a long process of rigorous and extensive consultation. These consultations witnessed four NBSAP stakeholder engagement workshops, focus groups consultations and one-to-one sessions all of which aimed at defining the next 5 years strategy for biodiversity conservation in the kingdom of Bahrain.

Furthermore, Bahrain is proud to be one of the first countries in the region to respond to the initiative launched by the United Nations Environment Programme calling for embracing the Ecosystem Based Approach on the national and regional levels. In addition, Bahrain is also the first country in the GCC region to have established its Clearing House Mechanism (CHM). In this spirit, the kingdom embraces the committed to fulfill the international obligation as a party to the Convention on Biological Diversity. Moreover, it is committed towards the conservation and sustainable utilisation of its biodiversity for its citizens and future generations. This second NBSAP is a key step forward towards achieving this goal.

This project was conducted under the guidance of His Highness Sh. Abdullah Bin Hamad Al Khalifa, the Personal Representative of His Majesty the King and President of the Supreme Council for Environment (SCE) and the supervision of Dr. Mohamed Mubarak Bin Daina, the Chief Executive of the SCE. The Council is deeply grateful to the United Nations Environment Programme – Regional Office of West Asia (UNEP-ROWA) for their unfailing technical support and the Global Environment Facility (GEF) for their financial support. Further gratitude goes to all stakeholders and individuals who have participated and contributed towards this journey of preparing this NBSAP.

For us, our nation and future generations

The Supreme Council for Environment

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Government Sector
- Bahrain Authority for Culture and Antiquities
- The Informatics and e-government
- 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 and Telecommunications
- Ministry of Works, Municipality and Urban Planning
  - Marine Resources Affairs
  - 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.
- Mattar Jewelers
- The Bahrain Petroleum Company
- The National Initiative for Agricultural Development (NIAD)

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

Civil Society and NGOs
- Arab Youth Climate Movement, Bahrain Chapter
- Bahrain Environment Society
- National Institute for Human Rights
- Youth and Environment Society

Intergovernmental organizations

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

Acronyms

AGU	Arabian Gulf University
Alba	Aluminium Bahrain
ARCWH	Arab Regional Centre for World Heritage
ASRY	Arab Shipbuilding and Repair Yard
AZE	Areas with Zero Extinction
AYCM	Arab Youth Climate Movement
BACA	Bahrain Authority for Culture and Antiques
BALEXECO	Bahrain Aluminium Extrusion Co.
BANAGAS	Bahrain National Gas
BAPCO	The Bahrain Petroleum Company
BAS	Bahrain Airport Services
BASREC	Bahrain Ship Repairing and Engineering Company
BCCI	Bahrain Chamber of Commerce and Industry
BES	Bahrain Environment Society
BDB	Bahrain Development Bank
BWA	Bahrain Women Association
CBD	Convention on Biological Diversity
CITES	Convention on International Trade of Endangered Fauna and Flora Species
CITO	Central Informatics and Telecommunications Organization
CPB	Cartagena Protocol on Biosafety
CMS	Convention on Migratory Species
DAA	Directorate of Agriculture Affairs
DCG	Directorate of Coast Guards
DOC	Directorate of Curriculum
DOF	Directorate of Fisheries
DOT	Directorate of Tourism
EBM	Ecosystem Based Management
EDB	Economic Development Board
EFS	Environment Friends Society
ES	Ecosystem Services
EWA	Electricity and Water Authority
FWS	Fresh Water Springs
GARMCO	Gulf Aluminium Rolling Mill Company
GEF	Global Environment Facility
GIIC	Gulf Industrial Investment Company
GPIC	Gulf Petrochemical Industries Company
HNWI	High-Net Worth Individuals
IBA	Important Bird Area
IEGA	Informatics and E-Government Authority
IMP	Integrated Management Plan
MEAs	Multilateral Environmental Agreements
MIA	Ministry Information Affairs
MOE	Ministry of Education
MOF	Ministry of Finance
MP	Monitoring Program

MPA	Marine Protected Area
MRA	Marine Resource Affairs
MTT	Ministry of Transportation and Telecommunications
MWMU	Ministry of Works, Municipalities and Urban Planning
MYS	Ministry of Youth and Sports Affairs
NBSAP	National Biodiversity Strategy and Action Plan
NIAD	The National Initiative for Agricultural Development
NIHR	National Institution for Human Rights
NOGA	National Oil and Gas Authority
NBSC	National Biodiversity Steering Committee
PAs	Protected Areas
PPPs	Public Private Partnerships
PMA	Port and Maritime Affairs
ROWA	Regional Office of West Asia
RUW	Royal University for Women
SCE	Supreme Council for Environment
SCW	Supreme Council for Women
SEPPD	Sanitary Engineering Planning and Projects Directorate
SEOMD	Sanitary Engineering Operations and Maintenance Directorate
SG	Strategic Goal
SLRB	Survey and Land Registration Bureau
SMART	Specific, Measurable, Applicable, Realistic, Timeframe
UNCCD	United Nations Convention for Combating Desertification
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UOB	University of Bahrain
WHS	World Heritage Site

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Executive Summary

The Kingdom of Bahrain is an archipelago consisting of more than 84 natural and man-made islands. The country is located in the middle of southern coast of Arabian Gulf, lying between eastern shore of Saudi Arabia and 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 falling under its jurisdiction. The climate is arid with low rainfall during winter and high temperature and humidity levels during summer. Bahrain hosts a total number of 1360 species ranging from microbes to large mammals. It is believed that the number is underestimated since many taxa are yet to be identified. Genetic diversity is valuable in the native Arabian horse breeds and palm tree species having gained high historical and cultural value. The kingdom hosts four types of ecosystems. These are marine and costal ecosystems (i.e. coral reefs, mangroves, seagrass beds, mudflats), desert ecosystem and agricultural ecosystem (i.e. palm groves, fresh water springs, local varieties crops). A wide range of ecosystem services is provided including provisioning services (e.g. pearl, fish, molasses), regulating services (e.g. coastal protection), supporting services (e.g. fish nurseries, carbon fixation) and cultural services (e.g. recreation). Attempts to estimate the economic values of ecosystems services were mostly limited to the marine habitats (i.e. coral reefs, seagrass beds, mangroves, shelf soft habitats) whereby services were estimated at BHD708.76 million per year (US$1.88 billion) in 2006 (Al Khuzai et al., 2006) and the economic revenue from fisheries accounted for BHD13.161 million in 2012 (DOF, 2013). On the other hand, the cost of environmental degradation is estimated at BHD385 million (4.0% of GDP-2010). This value reveals the economic loss stemming from impacts of anthropogenic activities (e.g. dredging and land reclamation) on biodiversity and environmental resources in the Kingdom of Bahrain.

The Kingdom of Bahrain ratified the Convention on Biological Diversity (CBD) in 1996. In 2007, Bahrain developed the first National Biodiversity Strategy and Action Plan (NBSAP) in collaboration with the United Nations Development Program (UNDP). The NBSAP recognized as the principal element for CBD implementation, aimed at 'reversing the loss of biodiversity within Bahraini

terrestrial, marine and freshwater ecosystems'. Since then, various activities took place among which the empowerment of environmental governance whereby the reform of the Public Commission for the Protection of Marine Resources, Environment and Wildlife resulted in a Supreme Council for Environment (SCE) with a Directorate of Biodiversity hosting four units on species protection and protected areas management. On the other hand, national and local initiatives involving restoration, reforestation and awareness programs on biodiversity have recorded an increase in number and improvement in their implementation throughout the years.

In 2010, parties to the CBD were requested to review and update their NBSAP following the Strategic Plan of Biodiversity (SPB) 2011-2020 adopted at the 10th Conference of the Parties (COP) held in Nagoya Japan. The strategic plan calls parties to "take effective and urgent action to halt the loss of biodiversity 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'. Being keen to fulfill the Strategic Plan requirements and to align the national targets with the Aichi Biodiversity Targets, the Kingdom launched a series of activities to update its NBSAP and develop its Fifth National Report to the CBD in 2012. These activities were implemented in the context of a project funded by the Global Environment Facility (GEF). The project was co-financed from the SCE and it was executed with the support of the United Nations Environment Programme's -Regional Office West Asia (UNEP-ROWA). The project was lead by the SCE and it built on establishing close partnerships between public and private sectors as well as civil societies. The process focused on all emerging opportunities to engage stakeholders and mobilize major players to partake in the NBSAP's updating process. The methodology of work was implemented in five stages: [1] Stocktaking and assessment, [2] Stakeholders engagement, [3] NBSAP basic policy instruments development, [4] National targets setting and indicators selection, [5] Actions and implementation planning.

The NBSAP targets and actions capitalized mainly on national priorities identified during the first phase of the project and on the participation of all national stakeholders. National priorities included the need for setting the scene

for science-policy interface which calls for national assessments of all type of species and ecosystems services and improvement of institutional arrangements for cross-sectoral cooperation; strengthening biodiversity conservation governance through the development of mechanism and design of tools for effective laws implementation; increasing awareness on the value of biodiversity on the basis of communication strategy and awareness programmes, and mobilizing financial resources for NBSAP implementation. The updated NBSAP presents the Kingdom's mission and vision, strategic goals and guiding principles which aim at improving governance and cross-sectoral cooperation, strengthening national capacities to better communicate biodiversity's values, involving communities in the conservation of biodiversity while empowering women and improving the well-being of the Bahraini's citizens. It includes 12 national targets and a series of actions which fulfill its long term vision where the Kingdom is willing to *'Strive towards improving resilience of all four ecosystems in the Kingdom and managing sustainably ecosystems services to ensure good quality of life for the Bahraini citizens by 2030*.' The NBSAP draws a road map for the implementation of all actions with milestones and timeframe, priority actions and their timelines, indicators to monitor the advances towards the implementation of Aichi targets, potential for mainstreaming biodiversity conservation into national policy instruments, financial resources need and proposition for resources mobilization in the context of the Kingdom of Bahrain.

Section 1: NBSAP's Context and methodology of work

1. 1. Context

In early nineties, international community recognized the need for a global framework to conserve biological diversity. Accordingly, more than 190 countries were convened to sign the Convention on Biological Diversity (CBD) during the Earth Summit held in Rio De Janeiro. As of March 2013, 196 countries joined the CBD and 177 Parties have developed their NBSAPs. In 2010, Parties to the Convention on Biological Diversity adopted the Strategic Plan for Biodiversity 2011-2020 (SCBD, 2010; CBD-COP 10, Decision X/2) in Nagoya whose aim is to halt the loss of biodiversity and maintaining ecosystem services to deliver essential benefits for people. The Strategic Plan presents twenty targets, the Aichi Biodiversity Targets which cover a broad range of biodiversity-related issues classified under five goals: [1] addressing the underlying causes of biodiversity loss by mainstreaming biodiversity across governments and society; [2] reducing the direct pressures on biodiversity and promoting sustainable use; [3] improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity; [4] enhancing the benefits to all from biodiversity and ecosystem services; and [5] enhancing implementation. Parties are urged to translate the framework of the Strategic Plan into their own national planning activities by revising their NBSAPs and setting their national targets and defining appropriate indicators to monitor the progress towards the strategic goal. On the other hand, parties have to mobilize adequate financial resources, strengthen national capacities and ensure a scientific sound-base decision-making process. Decision X/2 focuses on the adoption of participatory approaches, integration of national targets into the revised and updated NBSAPs and adopting it as a policy instrument, monitoring and reviewing of NBSAP implementation making use of the set of indicators, and mainstreaming of biodiversity conservation into national policies and strategies (SCBD, 2010).

1.2. Methodology of work

The methodology of work included all the activities needed to build up the NBSAP of the KoB (Fig. 1). All national policies and their instruments were

reviewed before launching participatory approach and stakeholders engagement. These approaches involved around fifty representatives from thirty-five institutions including public and private sectors as well as civil society.

Phase 1. Launching of the project

The project was officially launched during the first national workshop in November 2012. The workshop participants' list built on the one stemming from a previous event organized in 2011. This side event aiming at developing the 2011 list of indicators and discussing their availability in the Kingdom, defined in fact the trends foreseen to ensure the progress towards the implementation of the Aichi Targets. It initiated the development of the first list of stakeholders whom will be involved in the NBSAP updating process. It included representatives from government agencies, universities, private sectors, NGOs and other regional and international organizations.

Phase 2. Stocktaking and assessment

In preparation for the development of national baseline assessments, national documents (i.e. surveys and inventories, scientific studies, plans and strategies) and grey literature were reviewed. Accordingly, seven national reports were produced. Those are [1] 5th National Report to the CBD, [2] Biodiversity Baseline Assessment, [3] Biodiversity Stakeholders and Decision-making Analysis, [4] National Targets and Indicators, [5] Biodiversity Mainstreaming Report, [6] Assessment and Mapping of the Potential Values of Ecosystem Services, and [7] Protected Areas Strategy. The development of the 5th national report helped in assessing the progress in biodiversity conservation activities at national level.

Phase 3. Engaging stakeholders

Stakeholder's engagement was integrated in the all the activities undertaken since the start of the project. The Delphi techniques and questionnaires addressed to all sectors resulted in the biodiversity baseline assessment and stakeholders mapping. The second national workshop (February 24-26, 2015) ensured a platform to identify national priorities, to validate the stakeholders' power/interest maps to draw the dynamics of decision-making processes.

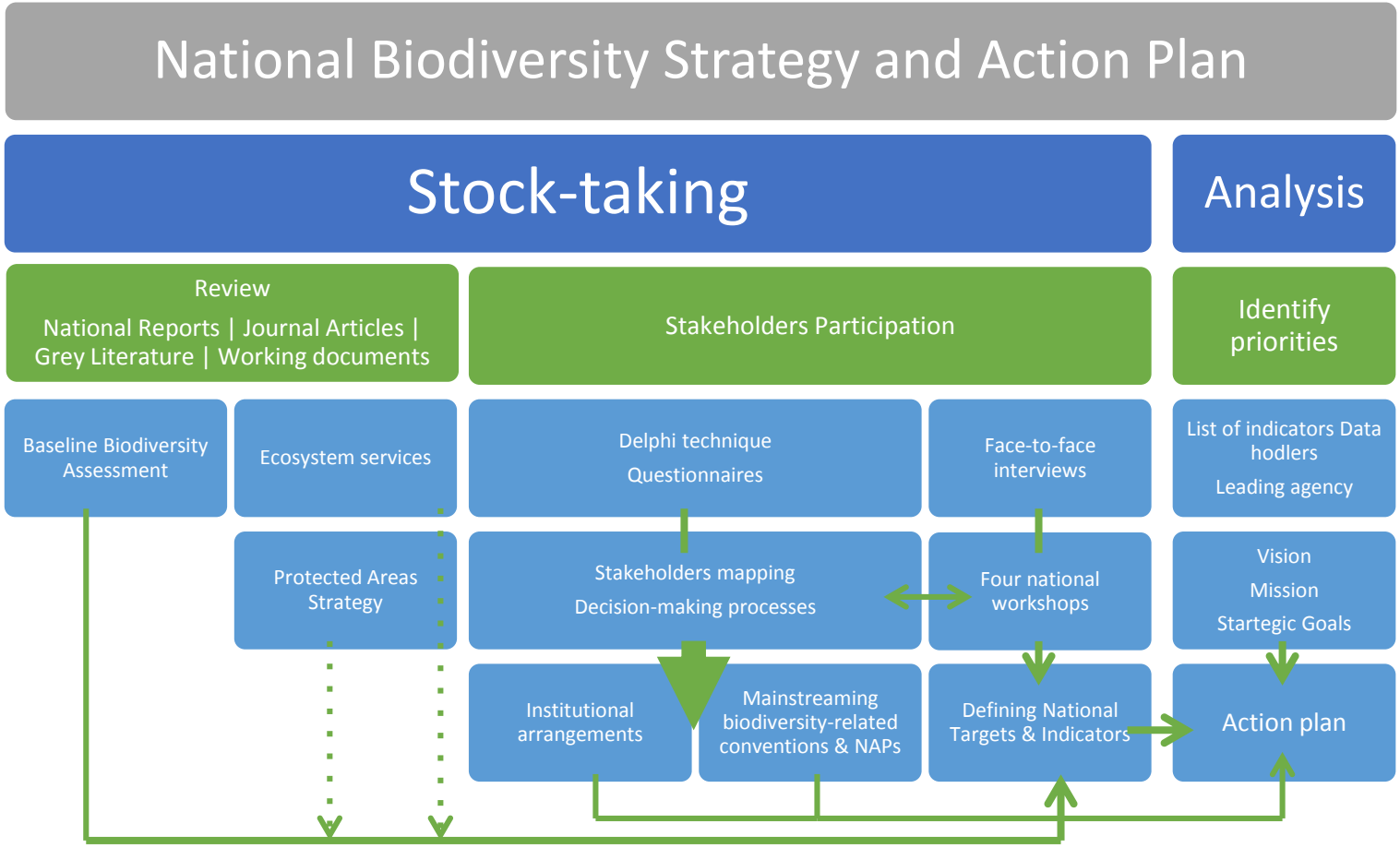


Figure 1. The methodology of work adopted in the NBSAP updating process.

The face-to-face meetings were held in March and April 2015. The focus group meetings took place in June 2015. Those meetings targeted all government agencies, industries, universities, development agencies and non-governmental organizations. They were the first steps taken towards stakeholders' engagement in the setting of national targets, definition of their roles and the identification of potential for resource mobilization. The industries were addressed to identify any opportunity for partnerships and the potential for harmonizing their Corporate Social Responsibility programs with the national priorities of biodiversity conservation; especially programs related to awareness programs and communication strategies.

The third workshop (August 2-4, 2015) aimed at validating the national SMART targets. It opened the ground for discussing necessary actions towards meeting the Aichi Targets and potential sources of funding. It explored new opportunities for partnerships. The fourth workshop (December 27, 2015) was the closing event to fine-tune all updated NBSAP components.

Phase 4. Developing NBSAP basic policy instruments

The seven national reports mentioned above provided guidance for the identification of national priorities as well as developing the mission and vision. The guiding principles were selected based on the country preference while being aligned with the needs of the SBP goals. The priorities have set the scene for defining the strategic goals, national objectives and targets as well as actions needed.

Phase 5. Setting up national targets

The national targets (SMART) for each type of ecosystem were set during the second national workshop in accordance with the SBP2011-2020 and the Aichi Biodiversity Targets. The identification of the indicators took into account national capacities and the availability of data in the various institutions. Further to the identification of data holders, those were selected to be leaders in data gathering, curation, maintenance, management and monitoring. A second round of stakeholders' involvement for finalizing the national targets was organized during the third national workshop.

Phase 6. Defining actions and implementation plan

An action plan was developed based on the revised activities listed under each of the national target and their corresponding indicators. The indicators will be measured to monitor the progress towards effective CBD implementation as well as for reporting. Biodiversity mainstreaming process was proposed to ensure effective management and cross-sectoral cooperation.

Section 2: The Kingdom's biodiversity profile

2.1. Geography and landforms

The Kingdom of Bahrain is an archipelago consisting of more than 84 natural and man-made islands. The country is originally made up of 33 natural islands with 36 small ones annexed to Hawar Islands. The Kingdom 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 falling under the jurisdiction of the Kingdom (SCE, 2015). Its climate is arid and humid and is characterized by high temperature and low rainfall. The average summer and winter temperatures recorded during the period of 2009-2013 are 35.14ºC and 18.82ºC respectively. The annual rainfall noted during this period ranged between 20.2 to 98.9 mm (CITO, 2013).

Bahrain may be divided into five physiographic zones (Doornkamp et al., 1980). The Central Plateau and Jabals, which is basically, an anticlinal dome occurring in the center of the island and consisting mostly of sedimentary limestone rocks. The general surface level is 40-66m, with numbers of steep-sided and flat-topped residual hills (or jabals), rising to a maximum elevation of 122.4 m above sea level at Jabal Al Dukhan. The Interior Basin, created over millions of years through erosion, surrounds the central plateau. The Multiple Escarpments surrounding and overlooking the Interior Basin is a continuous belt of multiple, inward-facing escarpments with a maximum height of 20 m above sea level. The Main Backslope decline away from the crest of the escarpment is an extensive, gently inclined surface. At the base of the backslope, solid geology gives way to a surrounding fringe of young, unconsolidated, superficial deposits laid down by a combination of marine and Aeolian processes. This zone represents about 50% of the total area of the main island. The products of erosion of the backslope are washed and deposited in many areas in the coastal lowlands forming sand sheets (SCE, 2015; Alkhuzai, 2015a; Zainal and Loughland, 2009).

2.2. Diversity in plant and animal species

Bahrain hosts various species of desert plants, palm trees and algae. The original total number of species recorded amounted for 1360. This number has increased

with time to reach 1455 species in Bahrain ranging from microbes to large mammals (table 1) (Alkhuzai, 2015a; SCE, 2015). Still, it is believed that this number is underestimated since many taxa are yet to be identified.

Table 1. Terrestrial and marine species diversity in the KoB (Alkhuzai, 2015).

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**	

Genetic diversity of Arabian horse breeds and palm tree varieties is of high importance in the Kingdom. Apart from the genetic diversity, both are of great historical and cultural value to the Bahrainis. Over the years, local varieties of agricultural crops and fruit trees have acquired adaptation capacity and gained specific traits, though become of high value to farmers' and conservation communities.

2.3. Ecosystems and habitats of the Kingdom of Bahrain

2.3.1. Marine and coastal ecosystems

Coastal and marine ecosystems extend on a large geographical area with a length of 126km of coastline. These ecosystems are home to an important number of species of birds, algae, fishes, corals and other animal and plant species. The coastal zones are home to a variety of species of invertebrates found in sub-tidal zones. There are more than 238 species of marine fishes (table 1). Marine and coastal ecosystems are important sites for migratory species (e.g. birds, whales and turtles). The Kingdom hosts the largest breeding population of Socotra cormorant (*Phalacrocorax nigrogularis*) (250,000) in the world in Suwad Island and the largest western reef heron (*Egretta gularis*) colony in the Middle East (KoB 2006). Hawar Island is the major breeding site in the Gulf for the White-Cheeked Tern (*Sterna repressa*) (3,408 breeding pairs), Bridled Tern (*Sterna anaethus*) (1,850 breeding pairs) (Alkhuzai and Zainal, 2009). Marine and coastal ecosystem harbors diverse habitats ranging

from sand dunes to seagrass beds, coral reefs, mangroves and salt marshes and Sabkhas (fig. 2)[1].

Sand dunes

Sand dunes 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 (Loughland and Zainal, 2009).

Seagrass beds

Most of seagrass habitats in territorial water in the Kingdom are located in the eastern subtidal waters, mainly south of Fasht Al-Adham extending to Hawar Islands and in the western subtidal areas (Alkhuzai et al., 2009). Seagrass beds constitute a habitat and rich feeding ground for a number of commercial fishes, mollusks, crustaceans, endangered dugongs (Dugon dugon)and green turtles. They provide nurseries for commercial shrimps and green turtles offspring. The dugong population in the KoB is acknowledged as the world second largest (currently about 3000 individuals) after Australia's Great Barrier Reef population (SCE, 2015). Both dugong and sea turtles recognized as keystone species, (i.e. green turtle, hawksbill sea turtles) rely both on intact and productive seagrass for feeding. Seagrass beds are habitats for pearl oysters. They play an important role in the stabilization of sediment. Seagrass beds species in Bahrain host three of eleven species of seagreasses found in the Arab region. Those are *Halodule uninervis* (Fors.) Asch., *Halophila stipulacea* (Fors.) Asch. and *Halophila ovalis* (R. Brown) Hooker (Alkhuzai et al., 2006; Sheppard et al*.,* 1992).

Coral reefs

Coral reefs locally known as 'Fasht', occupy a total area which is larger than Bahrain itself. They expand over large area in Fasht Al-Adhm and Khawr Fasht, Fasht Al-Jarim, and Bulthama. Corals cover less than 5% of the reef areas in Fasht Al Adham, Fasht Al Jarim and Khor Fasht. Smaller reef habitats are dispersed in eastern Bahrain. Those latter are in poor condition and are subject to degradation. Coral reefs maintain a large diversity of fish and shellfish species while they constitute the nurseries for commercial fish species (SEC, 2015; Alkhuzai et al., 2009).

[1] Supplementary documents: SCE 2015 and Alkhuzai 2015a.

Algal beds

Algal beds are located in between the seagrasses and coral reefs. The most commonly occurring macro-algae species belong to the brown algae. There are green algae, red algae, Brown algae, and Coralline algae. The most dominant is the *Sargassum sp.* and the *Hormophysa sp.* (SCE, 2015).

Mangroves

Mangroves, populated by *Avicennia marina*, cover a total area of 80ha with 50ha in Ras Sanad and the rest in Tubli Bay, Sitra and Al-Aker. A large area of 300 ha was destroyed in mid seventies because of land reclamation (Loughland and Zainal, 2009). They host a wide range of animals including bacteria, invertebrates, fish, birds and mammals. They play a major role in the stabilization of coastlines by promoting sedimentation (Alkhuzai et al., 2009).

Salt marshes

Salt marshes are small and dispersed. They are colonized by *Phragmites australis*, *Arthrocnemum macrostachyum*, and *Sueda spp.* They are home to the reef heron and some terrestrial birds (SCE, 2015).

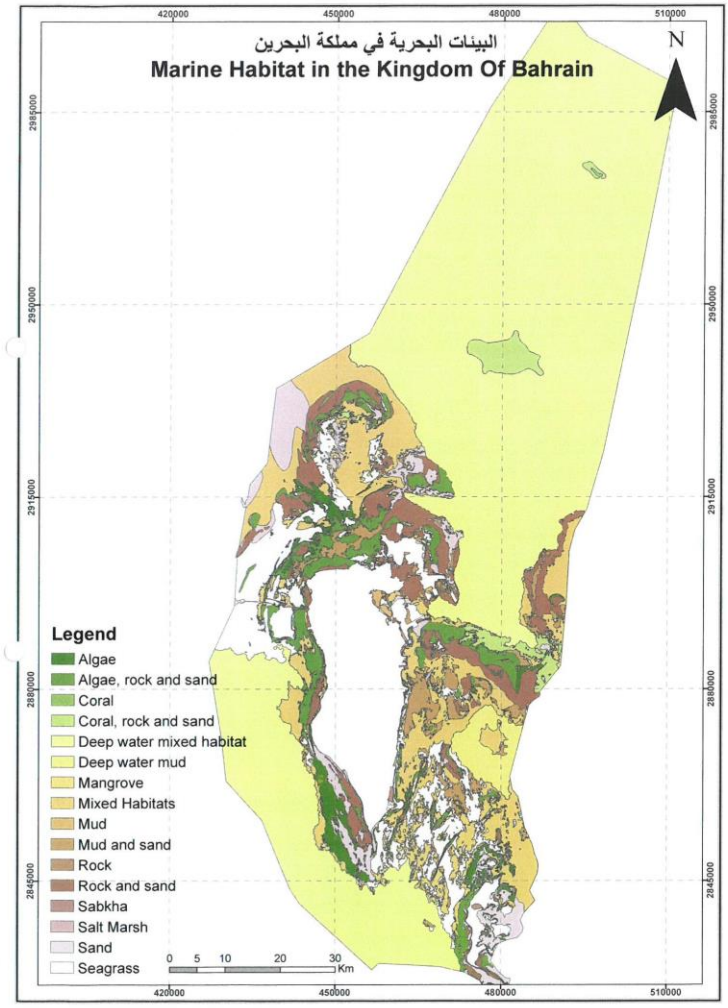


Figure 2. Distribution of marine and costal habitats in the KoB (Loughland, 2006).

Coastal Sabkhas

Coastal Sabkhas are characterized by high salinity with salt crusts. Many Sabkhas occur in the southern areas (near Ras Al Bar) and in Hawar Islands (Al Zayani and Loughland, 2006).

Intertidal mudflats

Mudflats in the intertidal areas of Bahrain are limited and exist only on the eastern coast of the main islands and some internal areas of Muharraq. They constitute habitats with higher biomass than other intertidal areas. They are of great value for migratory bird species (Al Zayani and Loughland, 2009).

Rocky shores

Natural rocky shores are rare in the Kingdom of Bahrain. They are found in Sitra, Nabih Salih Islands and to a limited extend on the Hawar Islands. They are valuable for their diverse range of intertidal inhabitants. They are home to macroalgae and invertebrate animals. Artificial rocks installed to reduce the high current flow to the Sitra Bridge are nowadays sort of very diverse habitats (Al Zayani and Loughland, 2009).

2.3.2. Agriculture ecosystem

Agricultural lands cover 6,700ha of which 58% are cultivated, constituting 1.4% from the Kingdom total surface area. The total green cover extends over 8.6% of the country surface area (CITO, n.d.) (fig. 3). Due to the harsh environmental conditions, agricultural production covers only a small fraction of the country's needs in food. The main crop is the date palm (12,887MT). Agricultural production includes 75 species among which locally known trees (i.e. Bahraini Almond, papaya, lemons, limes, bananas and nuts), vegetables such as tomatoes, okra, lettuce, chicory, cucumbers, gherkins, onions, eggplants, cauliflowers, broccoli, and indigenous meat of sheep, cattle, goat and camel (CITO, n.d).

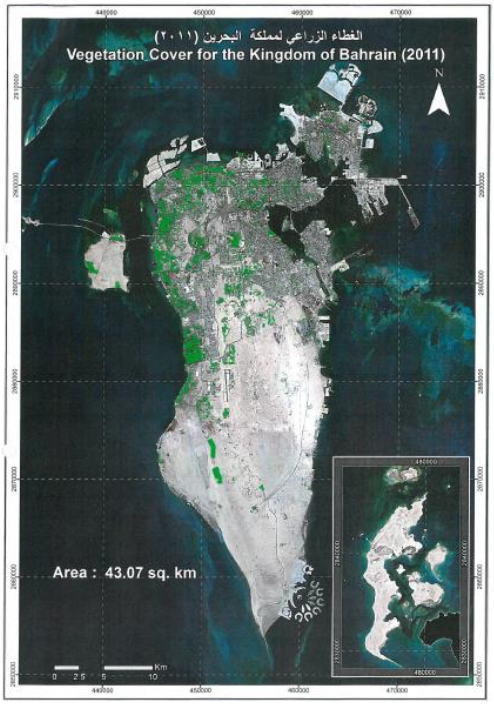


Figure 3. Distribution of the agricultural and desert ecosystems in the KoB (CITO, 2011).

2.3.3. Desert ecosystem

They are home to many species of insects, reptiles, birds and wild mammals. Inland arid regions and plateau support regional biodiversity and a wide range of migratory birds. They contain freshwater springs and streams that support further biodiversity. Deserts show three landforms including the Jabals, depressions and sand dunes. Jabals (small rocky hills), reach 130m in altitude. The most well-known mountain is Jabal Al Dukhan located at 134m altitudes. Salt-tolerant plants dominate the sand dunes (e.g. filamentous fungi). Such xeric environments are

highly sensitive to climate change and the organisms are living under extreme environmental conditions (Alkhuzai, 2015a).

Freshwater Springs and Streams

In some inland areas, depressions in the karst contain both fresh and brackish waters. Freshwater springs and streams used to be abundant in the Kingdom. These were known to exist on both land and sea and were nourished by the aquifers that fed the freshwater springs. There are several aquifers supplying freshwater. These are Damaam Aquifer recharged by the Eastern Arabian Aquifer system, and the Rus-Umm Er Radhuma Aquifer, Alat, Khobar, and Aruma subaquifers (Alshabaani, 2010) (fig. 4). In northern Bahrain, natural springs create oases and the artesian wells are used for agriculture. Date palm also can be found on the island of Nabih Salih, however these as other date palm habitats are increasingly threatened by the extraction of water. The overexploitation of those aquifers either for agriculture or for human use resulted in their salinization and depletion (KoB, 2006; Alshabaani, 2010).

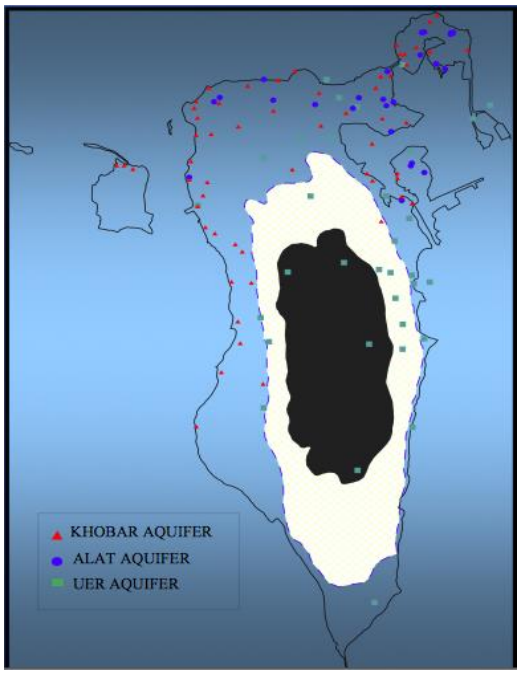


Figure 4 . Distribution of aquifers in the Kingdom of Bahrain (Alshabaani 2010).

2.4. Ecosystem services

The Kingdom's biodiversity provides a variety of ecosystem services including direct and indirect goods (fig. 5). Marine and costal habitats present a wide range of provisioning, supporting, regulating and cultural services. They provide valuable goods and services, from biomass, fisheries and pearls to heavy metal traps, coastal protection and recreation. The total economic value of three most important subtidal habitats was estimated at US$1.88 Billion/year. All three habitats of coral reefs, mangroves and seagrasses beds provide wide range of ecosystem services including carbon sequestration, shoreline stabilization, fish and shrimp breeding and spawning areas and nutrient cycling among others (Alkhuzai et al., 2009). The

economic revenues from fisheries were estimated at BHD13.161 Million in 2012 (DOF, 2013). The agricultural ecosystems constitute important transition zone supporting biodiversity, local crops varieties and biological control. The revenue from oil and gas is estimated at BHD2.662 million in 2014 (MOF, 2014). Desert ecosystem is a source of energy and has a great potential for scientific research similarly to the marine and coastal ecosystems.

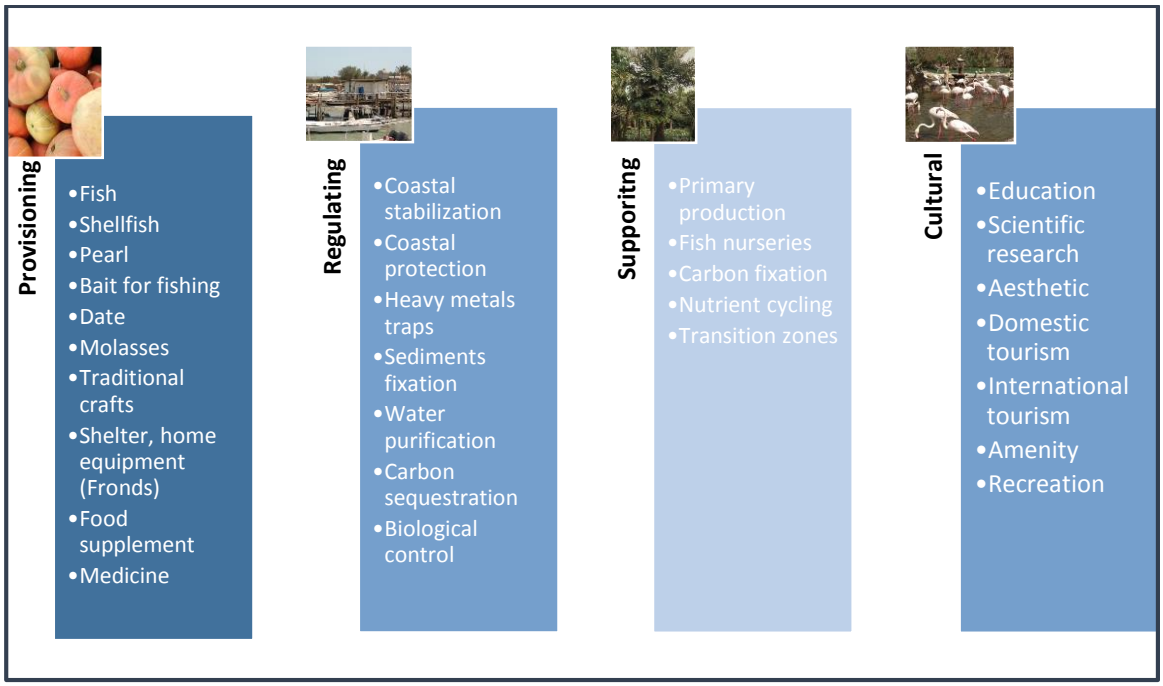


Figure 5. The ecosystems services found in the KoB (AlMealla 2014, Loughland 2006).

The estimation of cultural services is limited to the tourism sector including travel whereby the monetary value accounts for BHD540 million in 2014 with an expected growth of 5% per year (BHD882.7 million by 2024) (WTTC, 2014). It is worth noting that this value does not necessarily reflect services provided solely by the ecosystems in the Kingdom, instead it primarily reflects the economic activity generated by the international tourism industries (i.e. hotels, travel agents, airlines and other passenger transportation services) and it includes the activities of the restaurant and leisure industries. The latter activities could reflect partially values of domestic tourism. Therefore, there is a need to initiate detailed mapping and valuation exercises of the services provided by of all four types of ecosystem found in Bahrain.

2.5. Conservation value and practices

The total number of threatened species in Bahrain is thirty three among which three mammals, three birds, four reptiles, nine fishes, one species of mollusks species, and thirteen other invertebrate species (IUCN, 2013). The species with high conservation values in the Kingdom include the leatherback turtle, hawksbill turtle, green sea turtle, Socotra cormorant, dugong, whale shark and the Indo-Pacific finless porpoise. Internationally, Bahrain's territorial waters are home to the second largest population of dugongs after Australia. The Kingdom is acknowledged as a regional hotspot for seasonal migratory birds (King, 2006). Hawar islands host the largest breeding population of *Socotra cormorant* in the world. The islands are home to the largest breeding population of the western reef heron (*Egretta gularis*) in the Middle East (SCE, 2015).

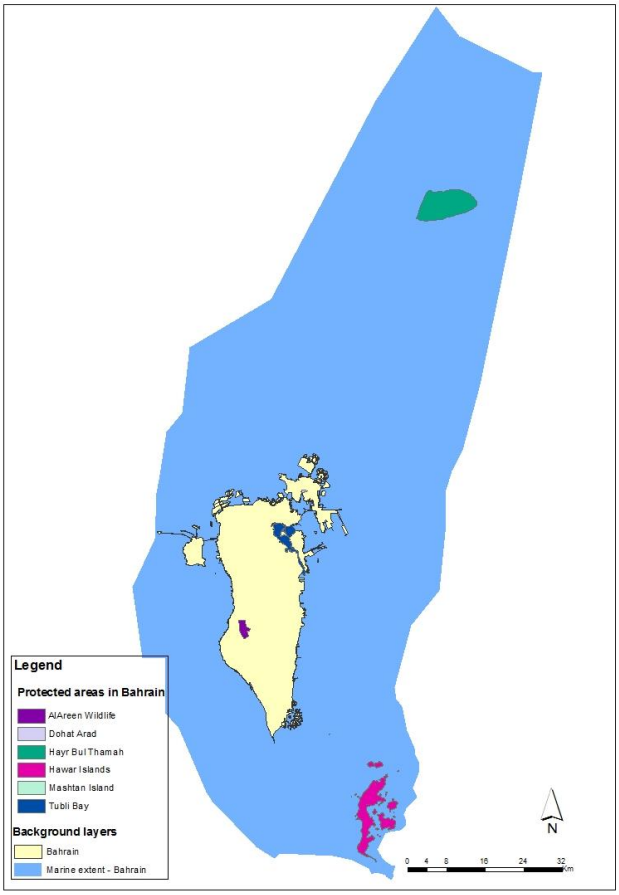


Figure 6. Distribution of PAs in the KoB (Abdulla, 2015).

On the other hand, the Kingdom hosts six protected areas (table 2, fig. 6), in addition to various sites of regional and international importance (i.e. Ramsar site, World Heritage Site). It is worth mentioning that 81 'hadrah' have been registered in northern coastal areas with different of impact (i.e. neutral, minor, moderate, major) and various protection levels (HIA maritime).

Table 2. Existing protected areas in Bahrain.

Protected Areas	Year of Declaration	Ecosystem type	Surface area (ha)	Conservation value	Threats
Al Areen Wildlife Park and Reserve	1976/1979	Desert	540	In situ conservation of Reem gazelle and endangered Arabian species Ex situ conservation of endangered Arabian wildlife (rare birds, deer, Oryx, freshwater turtles) and wild plants	Development projects and tourism (Resorts)
Hawar islands[2]	1996 1997[2]	Island, Islets	5,200	Archipelago of 36 pristine small islands surrounded by seagrasses Host the largest breeding colony of Socotra cormorants, largest herd of dugongs (following Australia), populations of greater flamingo, black-head gull and marine turtles. Cultural and Historical values	Anthropological factors Lack of regulatory measures for recreational activities management
Tubli Bay[2]	2006 1997[2]	Mangroves	1,610	Intertidal mud and sand flats and nursery for commercially important prawns and fishes Wintering area for 45 spp. of water birds Hosts remaining mangroves	Effluents from sewage treatment plants and land reclamation
Arad Bay	2000	Wetland		Home for wintering birds (e.g. Winged stilt, Whimbrel, redshank)	Waste water effluents
Mashtan Island	2002	Island	250	Seagrass beds feeding ground for dugong and sea turtles Shelter for shrimp and finfish	Pollution from maritime transport, residential and development projects
Reef Bul	2007	Marine,	5,660	Highest percentage of living hard corals (*Turbinaria peltata*), natural oyster beds	Overfishing and bycatch, pollution, trawling, fishing

[2] Ramsar site

Thamah[3]	Coral reefs	with highest incidence of pearl.	equipment, recreational activities

[3] Part of a UNESCO WHS

2.6. Governance of biodiversity

The Kingdom ratified the CBD in 1996. In 2007, Bahrain developed the first NBSAP in collaboration with the United Nations Development Programme (UNDP). Since then institutional reform (fig. 7) among many other institutional arrangements and activities took place, empowering to a certain extent biodiversity governance and fostering conservation practices. Meanwhile, it is worth noting that the institutional structure started to evolve before the issuance of the Kingdom's constitutional law in 2002.

Constitutional law and biodiversity conservation

Wildlife conservation and nature protection is at the heart of the KoB's constitution in articles 9h, 11 and 117a. In its constitutional law, the Islamic Shari'a is considered as the guiding principle for the development of any law and/or regulatory measure in the Kingdom (Art. 2). As a basis and in general, national policies in the Kingdom give equal rights and opportunities to all Bahraini citizens and they aim at ensuring social welfare (Art. 23). Government supports scientific research (Art. 7) while being strongly committed to agricultural development through the strengthening of small-holders and improvement of agricultural production (9g) and to take necessary actions for the protection of the environment (9h). In its article 11, the government appropriates the ownership of all natural resources and commits again to its conservation and use while ensuring national security and economic development. International conventions further to their ratification and signature can be used as interim measures until national laws are developed, approved and issued. Nevertheless, if these conventions are not in line with any of the Bahraini's laws, their implementation requires the issuance and approval of new laws (Art. 37) (Constitutional Law, 2002).

Institutional structures for biodiversity conservation

Over time, institutional reform for improving biodiversity conservation governance took place whereby in a 22 years time, the structure evolved from a Committee under the Ministry of Health (1980) to an independent entity named the Supreme Council for Environment (SCE) in 2012 (Fig. 7). Within the SCE's structure, the Directorate of Biodiversity is responsible for all issues related to biodiversity conservation in the Kingdom, which will be hosting the Species Protection and Protected Areas Departments. The Species Protection Department shall host two units; the Species Protection and

Biological Trade. The Protected Areas Department shall manage the Protected Areas Monitoring and Protected Areas Planning units.

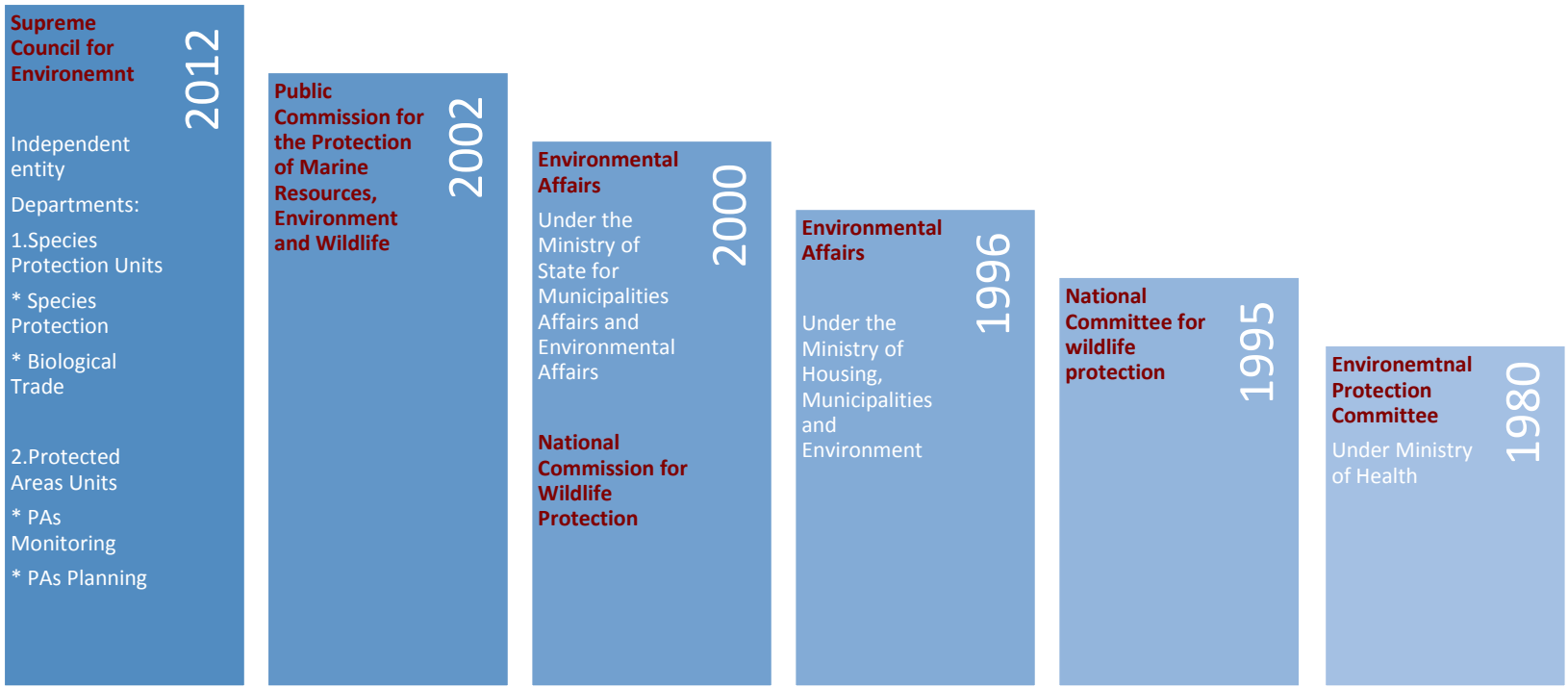


Figure 7. The evolution of wildlife conservation governance in the KoB (1980-2012).

The general terms of the SCE include setting up the environment and sustainable development strategy. It is the leading agency in its implementation and mainstreaming, this in partnership with relevant ministries as well as national stakeholders.

On the other hand, the institutional mandates of government authorities reflect their direct and indirect roles in biodiversity conservation. As shown in figure 8, these public agencies respond to the various line of activities needed for good practices in biodiversity conservation from national biodiversity baseline assessments, to policy instruments design, law development and implementation to communicating biodiversity values. The involvement of all sectors in biodiversity conservation lines of actions has evolved over the years. Institutional reform has strengthened the existing institutional and administrative structures and brought on board additional partners.

The analysis of biodiversity governance shows the direct and indirect involvement of all sectors in biodiversity conservation in the Kingdom with various weights and interests (table 3). It defines the 4 types of players based on the degree of capacity to conserve biodiversity and the degree of influence of the key stakeholders on biodiversity conservation. The four types of players are:

- Critical Players are those who are the lead agencies managing closely biodiversity conservation and involved primarily in strategic development.
- Primary players are those who are the main actors in the mainstreaming process, building capacity and raising awareness as well as planning and controlling on site.
- Secondary players are those who are good partners to collaborate for lobbying, political clout and exchanges. They provide support at financial, technical, managerial levels.
- Tertiary players are those who must be kept informed of activities and emerging issues because they can provide support in the control on ground and in law implementations.

The analysis draws a clear picture about the needed cross-sectoral cooperation for better implementation of biodiversity conservation. This is reflected in the national and sub-national structure for biodiversity conservation presented in Section 7. Meanwhile, the stakeholders and decision-making's Report[4] also gives a clear picture on the role and involvement of each of the private and public agencies involved in biodiversity conservation.

[4] Supplementary document: Alkhuzai, 2015b.

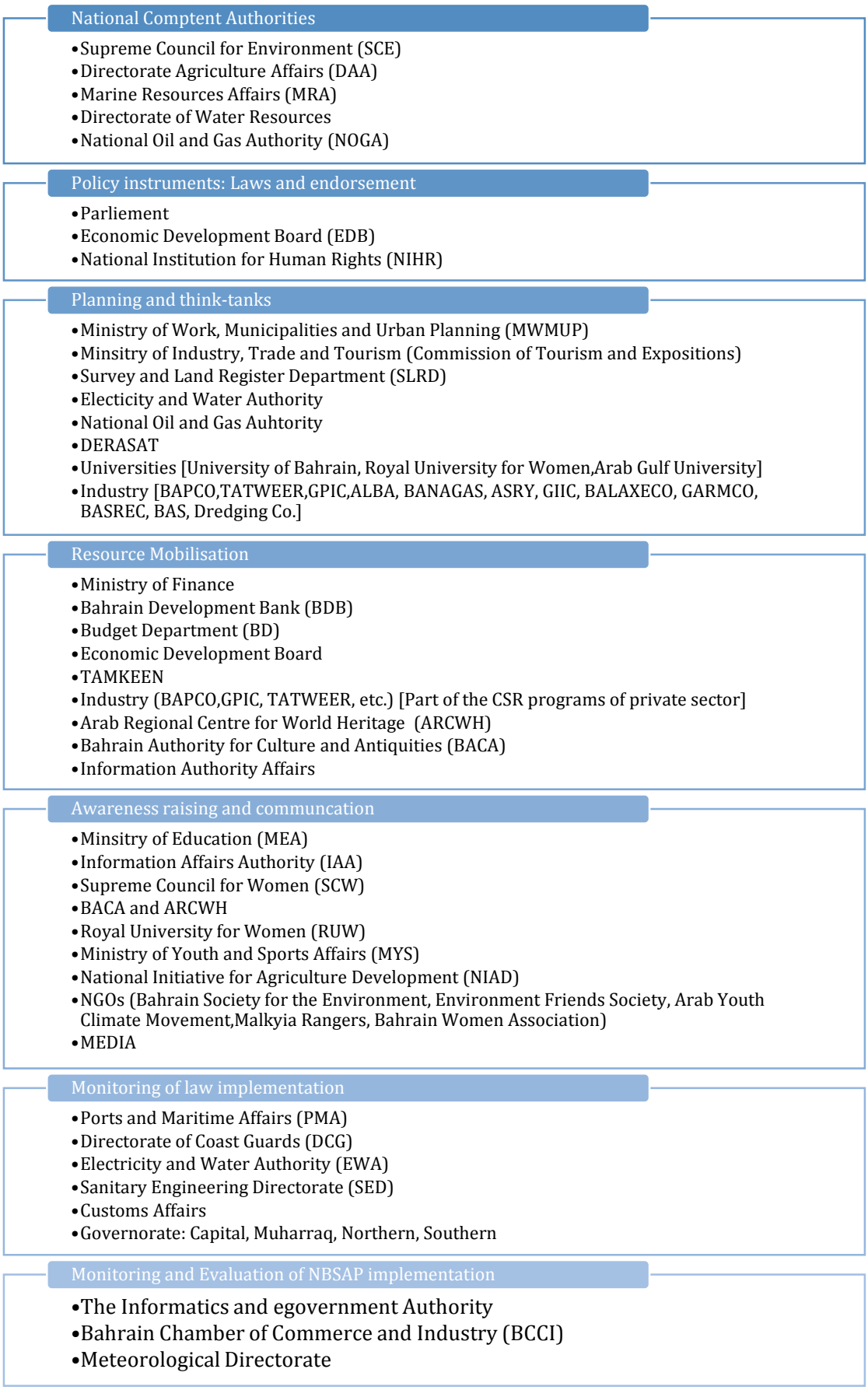


Figure 8. Roles of existing public and private agencies in biodiversity conservation.

Table 3. Key national stakeholders and their influence and capacity.

	DEGREE OF INFLUENCE BY THE STAKEHOLDER ON BIODIVERSITY			
DEGREE OF CAPACITY OF THE STAKEHOLDER IN BIODIVESITY CONSERVATION	1 Low	2 Moderate	3 High	4 Very high
1 Low	**Stakeholder type:** Tertiary players Approach: Keep informed of activities and issues, help in the control on ground. 1. Directorate of Coast Guards 2. Electricity and Water Authority 3. Customs Affairs 4. Southern, Northern, Capital and Muharraq governorates.		**Stakeholder type:** Primary players Approach: mainstream, build capacity, awareness, planning, control on site. 1. SCE 2. Directorate of Curriculum 3. Chamber of Commerce and Industry 4. NOGA 5. TATWEER 6. Survey and Land Registration Bureau 7. Landowners 8. Investors[5] 9. Direct users[6]	
2 Moderate				
3 High	**Stakeholder type:** Secondary players Approach: Collaboration for better lobbying, political clout, exchanges, and support (financial, technical, managerial assistance). 1. Arab Regional Centre for World Heritage 2. Bahrain Authority for Culture		**Stakeholder type:** Critical Players Approach: Manage closely, strategic development, lead agency. 1. Supreme Council for Environment 2. Ministry of Works,	

[5] Alba, ASRY, GIIC, GARMCO, BANAGAS, BALAXECO, BASREC, BAS, Al Hassanain Dredging Co., Rock Excavation Companies.
[6] Fisherman farmers.

4 Very high	and Antiquities 3. Supreme Council for Women 4. Information Affairs Authority 5. Budget Directorate 6. Economic Development Board 7. Environment Arabia 8. GIIC, GPIC, BAPCO 9. Environmental NGO[7] 10. Donors[8] 11. The Informatics and e-government Authority	Municipalities and Urban Planning 3. Directorate of Agriculture Affairs 4. Directorate of Fisheries 5. Universities 6. Sanitary Engineering Planning and Projects Directorate 7. Sanitary Engineering Operations and Maintenance Directorate

[7] Arab Youth Climate Movement-Bahrain, Bahrain Environment Society, Bahrain Youth and Environment Society, Bahrain Women's Association, Environment Friends Society, Mother and Child Society, Malkiya Rovers, Scubamaster.
[8] Bahrain Development Bank, Regional Development Banks.

Regulatory measures for biodiversity conservation

The first law related to the management of natural resources was issued in 1980 on the extraction of ground water in the KOB. Since then, a series of laws and decisions have been issued for the protection of species, management of natural resources and the institutional reform that gave more power for the governance of biodiversity as shown in table 4. Close observation of the chronological lining up of the issuance of laws and decisions would provide an idea about the threats to biodiversity and ecosystems services in the Kingdom.

Table 4. Regulatory measures governing biodiversity in the KoB.

	Law/Decision	Objectives	Approach/Tools
Ecosystem protection			
All ecosystems	Law No. 21/ 1996	Protect human health, Reduce pollution and degradation	Policy instruments and plans
Coral Reefs	Decision No. 8/ 2007	Ban fishing with floating or trawling nets	Marine Protected Area of Hayr Bulthama
Beaches, coasts, marine entries	Law No. 20/ 2006	Control or ban the use of beaches, reclamation.	Determining the limits of beaches, coasts, and marine entries and setting. Fines
All ecosystems	Law No. 33/ 2006	Protect ecosystems from domestic water disposal into public facilities	Permits Treatment and use of domestic water in agriculture
Mangroves	Law No. 53/ 2006	Ban all kinds of filling and reclamation	Tubli Bay Nature Reserve
Mangroves	Decision No. 70/ 2011	Delineation of Tubli Bay	Map with reclamation line
Marine submerged land	Decision 16/ 2005	Banning reclamation *Owners of marine submerged properties*	*License from municipality*
Agricultural ecosystems	Decision No. 20/ 1983	Control on port of entry	Agriculture quarantine
Soil and ecosystems	Law No. 37/ 2005	Control the production, import, and use of pesticides in the GCC	Fertilizers and agriculture soil amendments
Soil	Law No. 38/ 2005	Control the production, import, and use of fertilizers and soil amendments (GCC)	Fertilizers and agriculture soil amendments
Species protection			
Sea cows, sea turtles, dolphins	Decision No. 3/ 2003	Total ban of hunting	Fine and prison
Hubara species and Bahraini bulbul	Law No. 2/ 2005	Ban of hunting and trade	
Local varieties of date Palm	Decision No. 3/ 2006	Ban import of date palm and ornamental palm trees from	Control on Port of Entry

	countries infested by palm trees insects	

Table 4. Regulatory measures governing biodiversity in the KoB (Cont' d).

	Law/Decision	Objectives	Approach/Tools
Species protection (Cont' d)			
Shrimp	Decision No. 1/ 2007	Ban of fishing or selling Control existence of fishing gears on boats, and exhibiting fresh shrimp for sale	Defined period/schedule for fishing
Mackerel fish	Decision No. 1/ 2011	Permission to use floating net to catch with the exception of the area around Hawar Islands.	Permits
Crab	Decision No. 44/ 2011	Temporal ban of catchment, exhibition and selling	Fines and Prison
Sword fish	Decision No. 1/ 2012	Total ban of catchment and exhibition, selling, or use of the fish or any part of sword fish	Control/fines (Pending measures)
Natural resource management			
Ground water	Law No. 12/ 1980	Regulate the use of groundwater Controls wells drilling and determine the areas in which wells drilling are allowed	Licenses issued by DAA
Water from Allat and Khubar layer Clean old neglected springs or wells	Law No. 4/ 1983 (Renewal of Decision 23/ 1980)	Ban water extraction Stop issuance of license	Laws are activated for two years to ensure recovery
Ground water	Law No. 13/ 1983	Tariffs of consumption	Not applied
Pesticides	Law No. 11/ 1989	Controlling the use of pesticides in agriculture	Timely updated of list of allowable imported pesticides by Agric. affairs
Urban Planning	Law No. 2/ 1994	Develop planning projects for cities and villages.	Based on environmental, sociological, economical, and urban studies
Fish stock and marine resources	Law No. 20/ 2002	Regulate methods of fishing and excavation of sand, marketing and manufacturing of fisheries	Permits (Max 3 permits/person/year) Fines/prison
Agriculture drainage	Law No. 4/ 1985	Control the construction of agricultural drainage systems	Agriculture drainage systems are carried out by DAA
National committee	Law No. 2/ 1995	Protection of wildlife	
National Commission	Law No. 43/ 2005	Protection of Marine Resources, Environment and wildlife	Eight directorates
Fish stock and shrimp	Decision No. 11/ 2009	Temporal ban	License

National Steering Committee for Biological Diversity	Decision No. 44/ 2011 Decision No. 81/2011	Supervision Biodiversity protection policies	Nine members[9]
Supreme Council for Environment	Law No. 47/ 2012	Define SCE mandates/TOR	Strategy of Environment and Sustainable Development, Cooperation and coordination
Supreme Council for Environment	Law No. 91/ 2012	Organization	Five directorates
Sand excavation	Law No. 37/ 2014	Ban extraction and export	Permits Issued by the Minister and the Council of Ministers

2.7. NBSAP: Lessons learned

The first NBSAP (2007) was developed based on stocktaking exercises including bibliographic review, focused meetings and workshops. It was designed based on Bahrain's National Environmental Strategy (2006) in order to meet stated sustainable development goals (i.e. environment, social and economic growth). 'The NBSAP goal aims at halting the loss of biodiversity within Bahraini terrestrial, marine and freshwater ecosystems'. Under the NBSAP, six priority programmes were shortlisted. These target [1] A management framework for Bahrain biodiversity conservation, [2] Public communications for participation in Bahrain biodiversity conservation, [3] Adoption of a Strategic Environmental Assessment tool in local and national sector and cross-sector development planning, [4] Development of PAs Programme for Hawar Islands, Mashtan Island and Ras Sanad, [5] Establishment of an Environmental Trust Fund and [6] Establishment of an Environmental Compensation Framework. The 2007's NBSAP was not adopted by the Prime Minister's Cabinet. Consequently, the environmental trust fund in addition to other programs could not be established, as budget was not allocated for their implementation. Since 2007, the KoB has been striving with its capacities and governance structure to ensure the conservation and the adaptive management of biodiversity to keep the balance and the pace in socio-economic development while focusing on human well-being. Below is a briefing on what happened at the governance, national capacities and stakeholder participation levels:

- **Governance:** The institutional reform, which took place in the Supreme Council for Environment, gave more weight to biodiversity conservation and

[9] NSCB members: SCE (3), MOC (1), MOE (1), MOIT (1), MWMUP (1), UOB (1), CCIB (1).

put biodiversity conservation related public or private ventures on the national agenda. The reform boosted the importance of biodiversity conservation among all stakeholders.

- **National capacities:** Systemic and institutional capacities have been improved for better implementation processes. The development of the 2007 NBSAP improved national capacities and raised awareness so implemented activities at national and local levels were building up important cumulative effects. The enhancement of systemic, institutional and individual capacities is the main drivers for effective implementation of the strategy.
- **Stakeholder's participation:** Stakeholders participation brought more engaging during the NBSAP update process. Lasting more than eighteen months, the process was more interactive and it was built on face-to-face and focused group meetings, Delphi techniques and questionnaires. The approach followed partly the one adopted in the development of the 2007 NBSAP while giving adequate weight to the private sector as well as to representation of other sectors.

The emerging needs from lessons learned are summarized as follow:

- There is a need for an updated national database to fill in gaps in information, though mobilizing financial resources for national research programs.
- The human capital at the SCE must be increased in capacities and number of staff and internships. Those later bring innovation and boosting dynamics.
- There is a need for strengthening social capital while establishing Public Private Partnerships (PPPs) as well as partnerships between private institutions among themselves. These PPPs should visualize sustainable and long-term plans as the private sector leads to 'excellence" in the country and boost opportunity and improve capacities.
- There is a need for designing a road map for PPPs and scenarios whereby actions can be commissioned and/or sub-contracted to other bodies (whether public or private).
- Fill in the gaps that emerge when addressing the application of policy instruments. This would require the issuance of laws and the development of mechanisms and tools for their immediate implementation.

- There is a need to infuse biodiversity conservation in national curricula and to foster regional and international cooperation to increase technology transfer.

2.8. Sustainable management stories

The analysis under sustainable management is not feasible as there are no cases to show the full adoption of sustainability principles. Nevertheless, national policies in the KoB are sought based on sustainability principles. It involves the use of resources for future investments, the improvement of human capital through education and training, particularly in the field of applied sciences. In its Vision 2030, Bahrain '*aspire to shift from an economy built on oil wealth to a productive, globally competitive economy, shaped by the government and driven by a pioneering private sector – an economy that raises a broad middle class of Bahrainis who enjoy good living standards through increased productivity and high-wage jobs*'. The Kingdom foresees the society and government adopting 'the principles of sustainability, competitiveness and fairness to ensure that every Bahraini has the means to live a secure and fulfilling life and reach their full potential'. In the context of the Vision 2030, the planned initiatives include the protection of the natural environment through the [1] Conservation of natural spaces for future generations to enjoy, [2] Implementation of energy-efficiency regulations, [3] Directing investments to technologies that reduce carbon emissions, minimize pollution and promote the sourcing of more sustainable energy. Planned initiatives embrace attractive living environment through [1] Offering more public spaces for families, [2] Providing more modern facilities that promote regular cultural and sports activities, [3] Enforcing laws on cultural preservation, [4] Making archaeological and Islamic sites a more prominent part of cultural landscape and [5] Encouraging new generations to gain experience and in-depth knowledge of Bahraini's cultural heritage.

It is expected that the implementation of the updated NBSAP will build up cases with good practices in sustainable management.

3.1. Main drivers of biodiversity loss

The fifth National Report revealed that the state of ecosystems in the Kingdom has not been subject to any significant improvement in comparison to 2010 (SCE, 2015). In reality, there are no official data to monitor the trends in biodiversity at all levels. On one hand, there are no current or recent studies describing the changes in the status of terrestrial species (e.g. hedgehogs, Arabian Oryx, black tailed gazelle). On the other hand, results of the surveys done on marine mammals were published more than a decade ago (Loughland, 2006).

It is believed from direct observations that declines have been noted in most populations' sizes, distribution and geographic ranges. This is applicable for a wide range of species living across and within most ecosystems. According to local ornithologists, increasing anthropogenic pressures on birds' natural habitats resulted in the continuous decline of their populations. Nevertheless, despite these pressures, birds have recently been observed to colonize the coasts of artificial islands (SCE, 2015).

In the absence of formally adopted national indicator, the study on the cost of environmental degradation in the Kingdom can roughly present the amplitude of impact as well as the state of certain habitats. Recently, it was estimated at BHD385 million (US$1,021 million) which constitutes about 4.0 percent of 2010 GDP. The shares in the degradation cost were distributed as follow: Outdoor air pollution (47 percent), coral reefs (18 percent), water (13 percent), solid waste (10 percent) land reclamation (7 percent) and Tubli Bay (5 percent) (COED, 2013).

Population and economic growth

The Kingdom of Bahrain had a total resident population of 1.234.571. In 2014, the estimated population was 1.316 million people and it is expected to reach 1.592 million in 2020 and 2.128 million in 2030, up from 621 thousand in 1999. The population growth rate is 7.4% on average (CITO, 2010). The high rate in population growth coupled with the economic growth in the Kingdom adds more pressure on natural resources with an increase in housing demands among many other services. Economic growth averaged 5.0% annually between 2000 and

2012, driven by high oil prices, rising government spending, expansion in property and construction, as well as high demand for private social and personal services (mostly private health and education) (MIA, 2015). Coastal and marine environments in the Arabian Gulf are the prime target for most of the major housing, recreational, and economic developments (Naser et al., 2008). According to Madany (1991), a number of sites along the coast of Bahrain down to the coast of Sitra Island have been either dredged or reclaimed since 1930s. These activities increased significantly in the 1970s, serving both industrial and residential purposes, and lead to clear changes in the area of Bahrain (SCE, 2012).

Land reclamation and dredging

Using 2010 as a base year, mining and quarrying (primarily oil and gas) accounted for 44% of real GDP and decreased to 20% in 2012, while nominal GDP remained at 25% of GDP in both years. With the exception of real estate and mining and quarrying, the GDP share of all major sectors increased between 2000 and 2012. The three fastest growing sectors over this period were social and personal services, construction, and transportation and communications (MIA, 2015). Given its limited land area (762 km^2), Bahrain has markedly been affected by coastal development. Nowadays, reclamation activities in Bahrain resulted in the addition of around 95 km^2 representing an increase of 12% of the total land area (Naser, 2011). Additionally, more than 80% of Bahrain's coastline has extensively been modified due to reclamation activities (Fuller, 2005). These activities constitute a major threat to the marine environment (i.e. mangroves, intertidal and seagrass beds). They have resulted in the loss of many productive intertidal habitats and have greatly increased the turbidity in the waters surrounding both reclaimed and dredged sites as well as the large-scale disappearance of seagrass beds (Hodgson, 2006). Land reclamation affects suspended sediments, turbidity, ocean currents and water movements as well as salinity. The disappearance of both intertidal habitat and seagrass beds affects respectively the marine mammals, the dolphins especially humpback dolphins and the dugong populations (Hodgson, 2006).

Domestic and international tourism

As a result of greater wealth, domestic and international tourism from all types have increased in the last decade, leading to a huge impact on the marine environment in the Kingdom. Those activities rely on land reclamation in coastal and marine areas where artificial islands, beaches and jetties are developed. Litter and sewage discharge resulting from touristic activities are either left on the beaches or thrown from vessels. They alter the habitats and strangle marine turtles among other marine mammals. Meanwhile, debris that blow away from waste disposal sites accumulate underwater and alter the substrate making the areas unsuitable for marine organisms (Miller and Abdulqader, 2006).

Alien species

Following the increase in the maritime transport especially import operations, grey data shows a steady increase in imported goods, especially in new crop varieties and ornamental plants. It is likely expected that the import will keep the same pace among agricultural plant species and crop varieties resulting in a decrease in native plants' distribution, especially in northern Bahrain. On the other hand, two well known invasive species of birds the *Corvus splendens* and *Acridotheres tristis*, predate on eggs and chicks of local bird species decreasing their populations' growth (SCE, 2015). It is worth noting that a quick appraisal with Bahraini's growers revealed that farmers only care about crop yield. Consequently, imported varieties in the market will increase with time. There is a lack of governmental control on that issue especially for seed grown plants.

Overexploitation of marine resources

National records reveal that a decline was observed in both bycatch fish size and abundance index. Overfishing was speculated to be the major cause of fish stock depletion between 2004-2014, leading to a rise in prices. During the same period, a decline in the catchment size of finfish (around 70-74) indicated that the status of fish stocks are outside the safe biological limits (DOF, 2013).

Oil spills and pollution

The marine environment in Bahrain is under constant threat form oil spills resulting from tanker accidents, oil explorations, oil shipping and loading

operations. In 1991, dugong deaths were witnessed as a result of a large oil spill (Hodgson, 2006). Other sources of oil pollution are ballast water discharged by oil tankers, oil water discharge from garages and machine shops as well as discharges to the sea from land-based industry and urban sources (i.e. loading terminals, oil leaks from loading and off-loading facilities in operation terminals, sewage effluent) (SCE, 2015).

Climate change

Bahrain's marine ecosystem has been affected by the changes in climate conditions for more than two decades. Potential detrimental effects of global warming have been observed on the plant communities in seagrass beds; increase in water depth and changes in tidal regimes and salinity; increased UV radiation, turbidity and growth of epiphytes. Additionally, climate change has seriously affected coral reefs communities in the Kingdom through bleaching and killing over 90% in 1998 (Hodgson, 2006).

3.2. National priorities

Setting up national priorities was based on defining the conservation status of the existing ecosystems and their habitats in the KoB. The threat values were defined based on the distribution of the ecosystems and the pressures stemming from anthropogenic activities. Conservation status of the habitats revealed that coral reefs and intertidal mudflats habitats and agriculture ecosystems are facing high threats. On the other hand, highest threat values are recorded for the mangroves, seagrass beds, hadrah and freshwater spring and remnants of streams (SCE, 2015; Loughland, 2006) (table 5).

Table 5. Conservation status of biodiversity in Bahrain.

High Pressures	**Very high threat value** Seagrass beds Freshwater springs and streams Mangroves	**High threat value** Coral Reefs Intertidal mudflats Oyster beds Agriculture land systems Hadrah of Umm Sultan, Hamba, Pedat.
Medium Pressures	**Medium Threat value** Algal beds Salt Marsh and Coastal Sabkhas Sand dunes	**Low threat value** Desert
	Low distribution	High distribution

The analysis revealed that the marine and coastal ecosystems are of high conservation priority (tables 5 and 6), needless to say that the oceans and seas are at the heart of the cultural heritage of the Kingdom. Definition of national priorities was based on stakeholders' engagement and participation and on baseline biodiversity assessment (Alkhuzai, 2015a).

Table 6. National priorities actions defined for the biodiversity conservation .

Ecosystem	National Priorities actions
Marine and Coastal	i. Survey all marine species and map ecosystems services ii. Cease dredging and landfill in significant areas iii. Enforce existing laws and develop necessary legal and administrative measures to curb activities that contribute towards marine and coastal ecosystem degradation iv. Ensure the accession to relevant international treaties
Coral reefs	i. Apply emergency measures for the protection of remaining live corals ii. Develop management plans for the coral reefs iii. Develop a communication strategy to raise awareness and initiate science-policy interface
Mangroves	i. Take necessary measures to stop illegal activities and violations ii. Reinforce the management program for the restoration and plantations iii. Develop a communication strategy to raise awareness on the importance of mangroves.

Agriculture	i. Take necessary measures to cease agricultural land conversion through the land use and management plan ii. Promote sustainable farming systems while maintaining the balance in ecological functioning emphasizing on the cultural and historical value of Palm groves iii. Develop value chain for the goods and services provided by Palm grove to increase local communities livelihood
Freshwater Springs	i. Identify and map freshwater springs and their water flow ii. Take necessary administrative, legal and financial measures to protect freshwater springs, improve their water flow, and control development activities in Spring Important Areas (SIAs); iii. Integrate 'SIAs' within the eco-tourism strategy.
Desert	i. Assess biodiversity including genetic resources and traditional knowledge and map ecosystem services ii. Develop an ecotourism strategy for domestic and international tourism including marketing plans and value chain, voluntary standards and guidelines for investors and visitors iii. Develop an awareness program on desert ecosystems, its richness and services

Section 4: Guiding principles, strategic goals and targets

4.1. Long-term vision and mission

Vision: *'Strive towards improving resilience of all four ecosystems in the Kingdom and managing sustainably ecosystems services to ensure good quality of life for the Bahraini citizens by 2030.'*

Mission: *'Biodiversity in the kingdom is assessed, mapped and valued and its conservation is integrated into all national policies and accounted for in national budgeting by 2021.'*

4.2. Guiding principles

The guiding principles of Bahrain's NBSAP integrate all aspects of good practices of biodiversity protection at the governance, social and economic levels.

National Sovereignty

National sovereignty means that Bahrain has complete and acknowledged rights to manage and use biodiversity in accordance with its own policies. Nevertheless, Bahrain has made an international commitment to conserve biodiversity and manage its resources without harming other States or jeopardizing the common heritage of humankind or the development options of future generations. National sovereignty is closely related to Bahrain's leadership and political will to assume full responsibility for the design, development and implementation of the NBSAP.

Good governance

Good governance embraces the traditions and institutions by which authority in a country is exercised for the common good. This includes first the process by which those in authority are selected, monitored and replaced; second the capacity of the government to effectively manage its biodiversity and implement sound policies; and third the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Consistency within and integration beyond the biodiversity conservation sector

Consistency within the biodiversity conservation sector involves fostering synergies and minimizing contradictions in policies and their corresponding national instruments. Integration beyond the biodiversity conservation sector provides incentives to the private enterprises. Consistency within the sector also involves the recognition of customary laws, traditional rights and traditional biodiversity-related knowledge. It is necessary to seek coherence in the policies of different sectors and in their implementation to avoid negative impacts on biodiversity and all four types of ecosystems in Bahrain. On the other hand, integration ensures that biodiversity-related measures in the various national strategy and action plan contribute to fulfilling the objectives of multilateral environmental agreements (MEAs).

Sustainable management

The stewardship and use of biodiversity resources in a way, and at a rate, that conserves species diversity and ecological integrity and that maintains the carrying capacity of the four major ecosystems in Bahrain in terms of productivity, regeneration, and vitality. It also draws on their potential to fulfill relevant provisional, supporting, regulating and cultural ecosystem services for the present and future generations to come. It ensures balanced ecological functioning in line with socio-economic development, at local, national, and global levels.

Ecosystem approach

The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

Ecosystem-based management

Ecosystem-based management (EBM) is a place-based approach to natural resource use that aims to restore and protect the health, function and resilience of entire ecosystems for the benefit of all organisms. Having its foundation in the interdependence between ecosystem health and human well-being, EBM is based on ecosystems protection and community participation. Community participation requires a certain degree of organization and capacity and is therefore mostly in the hands of organized interest groups. It aims among many other things to mobilize citizen-science programmes and the empowerment of women.

Stakeholders' participation

Stakeholders in biodiversity conservation are all those who depend on or benefit from the ecosystem services and goods, or who decide on the control of or regulate access to biodiversity resources. They participated in the development

of the NBSAP in various ways: directly or indirectly, actively or passively, in supporting or opposing roles.

Precautionary principle

The precautionary principle or precautionary approach to risk management states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is not harmful falls on those taking an action. The principle implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found a plausible risk. These protections can be relaxed only if further scientific findings emerge that provide sound evidence that no harm will result.

Science –policy interface

Science–policy interfaces are defined as social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making. They are implemented to manage the intersection between science and policy. They involve exchange of information and knowledge leading to learning, and ultimately to changed behaviors.

Evidence-based science

Evidence-based science is the conscientious, explicit, and judicious use of current best evidence in making decisions to enhance provision of products and services from biodiversity resources. It recognizes that biodiversity management is context specific, ever-changing, and involves uncertainties, and that the best evidence is derived from a systematic process which aims to minimize bias".

Human well-being

Political, economic and civil societal support for biodiversity conservation can be considerably improved if the biodiversity worth to humans and societies at the local scale are quantified and economically valued. This could also bring in an incentive for better governance of socio-ecological systems to ensure the sustainable management of biodiversity. Human well-being coupled with

ecosystem services programme strives to bridge this gap in knowledge by exposing ecosystem services into on-going and new societal and policy discussions.

4.3. Strategic goals and objectives

The strategic goals (SGs) and their general objectives draw on a synthesis of the results of the biodiversity baseline assessment, the stakeholders mapping exercises executed during the course of the NBSAP project and the results of the stakeholders participation exercises. The SGs target all aspects of biodiversity conservation including governance; systemic, institutional and individual capacities; ecological functioning and services and communication and outreach. The strategic goals values are aligned with the NBSAP guiding principles and long-term vision.

SG I: Strengthen the governance of biodiversity conservation in national development strategies

1. Mainstream biodiversity conservation into national development strategies;
2. Revise and update the existing laws and put in place effective mechanisms and tools for their implementation;
3. Strengthen systemic, institutional and individual capacities on biodiversity governance.

SG II: Infuse biodiversity conservation in schools, universities curricula and develop outreach programs addressed to the general public.

4. Upgrade schools and universities curricula and teaching programs to integrate biodiversity of Bahrain in educational material and courses;
5. Develop communication strategy [10] on all aspects of biodiversity conservation addressed to decision-makers, investors and the general public;
6. Develop a framework to strengthen capacities and increase awareness[11] on the value of biodiversity and its role in ensuring human well-being.

[10] Actions under the SG need to address inducing changes in consumer behaviors and lifestyle and practices (seasonal catches, respect of carrying capacity, etc.).
[11] Embedded actions need to enhance the access to biodiversity sites and sustainable ecotourism activities.

SG III: Bridge the gaps between scientists, citizens and decision-makers by fostering innovation and research

7. Design and develop a national research policy and program in partnership with universities, civil society and politicians, industries and NGOs;
8. Establish a national research council/center with necessary budget responsible of monitoring the implementation and progress of the national research program with its appropriate guidance;
9. Put in place a science-policy interface system.

SG IV: Strengthen existing ecological functioning systems and improve resilience of all ecosystems

10. Work towards increasing the abundance of all organisms;
11. Establish a network of protected areas;
12. Ensure sustainable management of marine stock/natural resources;
13. Restore coral reefs and increase artificial reefs.

SG V: Foster international and regional cooperation

14. Increase the visibility of the Kingdom in biodiversity conservation at international and regional level;
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.

4.4. National targets

The twelve national targets were set following the SBP 2011-2020 guidance and they were aligned with the twenty Aichi Biodiversity Targets. They draw on emerging national needs, national priorities identified and the conservation status of the ecosystems and their habitats.

Marine and coastal ecosystems

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

- Update marine and coastal ecosystems assessment and value their services including invasive species.
- Map the ecosystem services and conservation status of marine and coastal habitats and identify Important Areas[12].
- Issue decision(s) and develop integrated management plans (IMPs) for the protection of the identified sites.
- Develop and implement a 5-year eradication plan for invasive marine and coastal species.
- Accession of the Ballast Water Management Convention – International Marine Organization.

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

- Design a long-term action plan for the application of regulatory measures to reduce the bycatch from fishing.
- Mobilize the National Competent Authorities (NCAs) to gather all records to monitor the fishermen and their bycatch value.

Target 3: Improve seawater quality by 50% from wastewater and sewage discharge resulting from municipal treatment plants

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

Coral Reefs

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

- Map ecosystem services of all coral reefs which are not protected, their values and their socio-ecological systems.
- Issue decisions for the protection of the remaining unprotected coral reef areas and put in place mechanisms for their conservation.
- Develop and implement an IMP based on the existing restoration program.

[12] Zero Extinction Areas (ZEAs) if available.

- Design and implement a monitoring program (MP) and strengthen existing national capacities.

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

- Design and implement mechanisms for key stakeholders engagement.
- Develop and implement a communication strategy on the values and services of coral reefs and all marine and costal habitats to induce behavioral changes.

Mangroves

Target 6: Rehabilitate mangroves by 25% and increase the populations of migratory bird species

- Update the ecological and socio-economic assessment of the existing mangroves and develop a 'bookkeeping' for bird species populations.
- Develop an adaptive IMP for mangroves.
- Take immediate measures to reduce polluted effluents from the government sewage treatment plants and wastewater discharged by the industrial sector.

Desert ecosystem

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

- Assess, map, collect and store information to develop a comprehensive database including desert plants and animals, plant genetic resources and traditional knowledge.
- Develop regulatory measures to protect identified sites which would be exempt from any urban development.
- Establish a gene bank for desert plants and wildlife[13].

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

- Develop an eco-tourism strategy to revive traditions and reconnect Bahraini with nature.
- Develop an IMP in line with the eco-tourism strategy.

[13] Gene bank will also host accession of agricultural crops varieties and all other types of plants.

- Develop and implement a communication strategy including outreach materials for potential cultural services.

Agriculture ecosystem and freshwater springs

Target 9: Revive agricultural land systems including Palm groves by 25%

- Assess the status of agricultural land systems and map their potential services.
- Develop an IMP for the existing agricultural land systems in partnership with farmers, shareholders and stakeholders.

Target 10: Decrease pest infestations in Palm grove by 100% and reduce other infestation

- Develop and implement an Integrated Pest Management (IPM) program to reduce red weevil among others pest.
- Eradicate the introduced palm varieties.

Target 11: Protect no less than 100% of healthy freshwater spring

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

Target 12: Increase green area in the governorates by 50%

- Develop an action plan and management strategy for streetscapes, pockets gardens and public spaces.
- Rehabilitate the green corridor and establish 'ecotones' within the various landscape structures.
- Develop a communication strategy and action plan to enhance the value of the green corridors and urban biodiversity to induce behavioral changes among the general public.

5.1. Priority actions and timeframes

The twelve national targets set require the prioritization of the various actions involved in their implementation (table 7). For instance, emergency actions are required for the eradication of red weevil on date palm and introduced palm varieties. The application of existing regulatory measures is also a priority; though there is a need to develop mechanisms of implementation and tools as well as to mobilize the corresponding NCAs or leading bodies. The development of IMPs and MPs requires baseline assessments on all species, ecosystem services and socio-ecological systems. Therefore, it is necessary to establish an enabling environment for the launching of these assessments in 2016.

Table 7. Milestones and timeframe of the NBSAP (2016-2021).

Timeframe	Milestones
2016	National species and ecosystems assessments launched[14] Accession of the Ballast Water Management Convention-IMO IPM program to reduce red weevil and pest developed/implemented Introduced palm varieties fully eradicated Biodiversity National Self capacity assessed (2016-2017) State of Biosafety assessed
2017	Laws for the protection of important/vulnerable identified sites issued Mechanisms for laws implementation put in place and regulatory measures well applied Mechanisms for gathering records on exploited resources put in place Communications strategies developed with implementation action plans
2018	All IMPs and MPs developed Gene bank established and operate
2019	**Mid-term evaluation of the progress of NBSAP implementation** All databases on all biodiversity related resources hosted at IEGA
2020	Network of PAs put in place, PAs teams operational and effective IMP implemented Roadmap for the implementation of the PAs strategy designed and PAs National Representative System established
2021	Measurement of behavioral changes among Bahraini citizens

[14] Assessments are expected to last between 2 to 5 years.

	done Systemic, institutional and individual capacities strengthened Eradication plan of invasive marine species successfully implemented Analysis of defined indicators and setting the scenes for the 2022-2027 NBSAP

5.2. Actions, outputs and cost of the national targets

For each target, actions, outputs, timeframes, cost and responsibility are presented in the matrices below (pp. 50 to 71). It is worth noting that even the responsibilities were defined under each of the twelve targets, leading agencies and partners have to be approved formally by relevant bodies.

TARGET 1: PROTECT AN ADDITIONAL 10% OF BAHRAIN'S TERRITORIAL MARINE AND COASTAL AREA PROTECTED

Ecosystem	**Marine and Coastal Ecosystems**	
1.Protect an additional 10% of Bahrain's territorial marine and coastal area protected	1.1.Update Marine assessment inter alia invasive species and identify zero extinction areas 1.2. Issue decision(s) and develop management plans for the protection of newly identified sites 1.3. Develop and implement 5-year eradication plan for invasive species 1.4. Accession of the Ballast Water Management Convention	1.1.Marine Atlas Management plans 1.2.Decisions approved and issued 1.3. 80% of invasive species eradicated 1.4. KoB becomes party
Target 1	**Actions**	**Outputs**

T4: Sustainable production T5: Halve rate loss T8: Reduce pollution T9: Reduce invasive species T11: Protected Areas T12: Prevent extinctions T19: Improve knowledge	1.1. List of Invasive spp., lists 1.2. Number of decisions signed Number of Management plans Number of Managers and assistants hired 1.4. Official paper signed	BDH 364,920
Aichi targets	**Indicators**	**COST**

SCE - DOF	IEGA (CIO)	1.1. 2021

	DOF DOCG UOB NGOs	1.2. 2018 1.3. 2017-2021 1.4. End of 2016
Leading agency	**Partners**	**Timeline**

TARGET 2: TO REDUCE THE NUMBER OF BYCATCH FROM FISHING BY 10%

Ecosystem	**Marine and Coastal Ecosystems**	
2. To reduce the number of bycatch from fishing by 10%	2.1. Design a long-term action plan for the implementation of regulatory measures to reduce the bycatch from fishing 2.2.Mobilize the competent authorities to gather all records to monitor the fishermen and their bycatch quantity	2.1. Fish bycatch reduced 2.2. Register of bycatch quantity 2.3. Awareness raising
Target 2	**Actions**	**Outputs**

T4: Sustainable production T6: Sustainable fisheries T19: Improve knowledge	1.1. Quantity of by catch/month| Nb of fines 1.2. Nb of technician hired 1.2.Nb of records provided to IEGA (CIO)	BHD 52,000
Aichi targets	**Indicators**	**COST**

DOF – IEGA (CIO)	IEGA (CIO) DCG	1.1. 2017 1.2. 2016-2021
Leading agency	**Partners**	**Timeline**

TARGET 3: IMPROVE SEAWATER QUALITY BY 50% FROM WASTEWATER AND SEWAGE DISCHARGE FROM MUNICIPAL TREATMENT PLANTS

Ecosystem	**Marine and Coastal Ecosystems**	
3. Improve seawater quality by 50% from wastewater and sewage discharge from municipal treatment plants	1.1. Design a monitoring program for sewage treatment plants 1.2. Implement regulatory measures and treatment plan to control sewage discharge	1.1. Monitoring program (2016-2021) 1.1. Manual for awareness and building capacities 1.2.Implementation Mechanism with tools
Target 3	**Actions**	**Outputs**

T8: Reduce pollution	1.1.Records registered 1.2. Monitoring plan Nb of fines	BHD 64,000
Aichi targets	**Indicators**	**COST**

MWMUP	IEGA CITO SEPPD SEOMD MWMUP	2018 2018
Leading agency	**Partners**	**Timeline**

TARGET 4: PROTECT NO LESS THAN 25% OF REMAINING UNPROTECTED CORAL REEFS

Ecosystem	**Coral Reefs**	
4. Protect no less than 25% of remaining unprotected coral reefs	4.1. Map ecosystem services, their values and the socio-economic dynamics of stakeholders 4.2. Issue laws for the protection of the remaining coral reef areas and	4.1.ES valued GDP contribution estimated 4.2.Laws issued 4.3.Management

	put in place mechanisms for their conservation 4.3. Develop and implement an IMP based on the existing restoration program 4.4. Design and implement a MP including strengthening existing capacities	plans developed 4.4.MP and Training manual developed
Target 4	**Actions**	**Outputs**

T2: Mainstream biodiversity T4: Sustainable production T10: Minimize reef loss T15: Enhance resilience T19: Improve knowledge	4.1. Nb and monetary values of ES, 4.2. Laws issues and approved by Council of Ministers, Nb of persons hired for the protection 4.3. Age distribution of Mangroves, Nb of mangrove trees planted, 4.4. Monitoring program, Nb of training and Nb of participants in the training	BHD 758,720
Aichi targets	**Indicators**	**COST**

SCE	IEGA DCG and DOF UOB AGU DERASAT NGOs	4.1. 2018 4.2. 2017 4.3. 2019 4.4. 2017-2018
Leading agency	**Partners**	**Timeline**

TARGET 5: RAISE AWARENESS AMONG 90% OF KEY STAKEHOLDERS AND 50% OF THE GENERAL PUBLIC

Ecosystem	**Coral Reefs**	
5. Raise awareness among 90% of key stakeholders and 50% of the general public	5.1. Design and implement mechanisms for engagement of key stakeholders 5.2. Develop and implement a communication strategy	5.1. Mechanism 5.2.Communication strategy and Plan 5.2. Awareness campaign and awareness material

	on the values and services of coral reefs to induce behavioral changes	
Target 5	**Actions**	**Outputs**

T1: Understand values	5.1. Nb of partnership and initiatives with PPP 5.2. Nb of visitors to Coral reefs	BHD 944,400
Aichi targets	**Indicators**	**COST**

MOE - SCE	UOB DOC NGOs Youth groups	2017-2021
Leading agency	**Partners**	**Timeline**

TARGET 6: REHABILITATE MANGROVES BY 25% AND INCREASE MIGRATORY BIRD SPECIES BY 10%

Ecosystem	**Mangroves**	
6.Rehabilitate mangroves by 25% and increase populations of migratory bird species	6.1. Update the ecological and socio-economic assessment of the existing mangroves and develop a 'bookkeeping' for bird species populations 6.2. Develop and implement adaptive IMPs for mangroves 6.3. Take immediate measures to reduce polluted effluents from the government treatment	6.1. Mangroves ES valued 6.1. Bookkeeping of Birds 6.2. IMP 2017-2022 6.3. Decision for Emergency measures issued

	plants and wastewater by the industrial sector	
Target 6	**Actions**	**Outputs**

T3: Address incentives T7: Manage within limits T8: Reduce pollution T10: Minimize Reef loss T12: Prevent extinctions T15: Enhance resilience T19: Improve knowledge	6.1. Number of bird species Number of mangrove seedlings planted/survival rate Database on Mangrove surface area Bookkeeping of bird species 6.2. Management Plan 6.3. Range of chemical concentration	BHD 178,100
Aichi targets	**Indicators**	**COST**

SCE	IEGA (CIO) MOF, IAA, MWMUP Coastal police UOB, AGU NGOs	2017-2018 2016-2021 2017-2018 2016
Leading agency	**Partners**	**Timeline**

TARGET 7: TO PROTECT AT LEAST 60% OF REMAINING DESERT ECOSYSTEMS AND WILDLIFE

Ecosystem	**Desert Ecosystems**	
7.To protect at least 60% of remaining desert ecosystems and wildlife	7.1. Assess, map, collect and store information to develop a comprehensive database including desert plants and animals, plant genetic resources and traditional knowledge 7.2.Develop regulatory measures to protect identified sites exempting any urban	7.1. Database completed 7.2. Law issued 7.3. Gene Bank established and functional

	development 7.3.Establish a gene bank for desert plants and wildlife	
Target 7	**Actions**	**Outputs**

T12: Prevent extinction T13: Conserve gene pool T16: Implement Nagoya Protocol T19: Improve knowledge	7.1.Population distribution of desert wildlife Database and Maps at IEGA (CIO) Traditional knowledge register 7.2. Number of laws issued 7.3.Number of accession of genetic resources	BHD 493,280
Aichi targets	**Indicators**	**COST**

7.1. AGU and UOB 7.2. SCE 7.3. UOB	SCE IEGA CITO NGOs	7.1. 2016-2021 7.2. 2016-2017 7.3. 2018
Leading agency	**Partners**	**Timeline**

TARGET 8: REHABILITATE DESERT ECOSYSTEMS FOR THE PROMOTION OF ECO-TOURISM BY 17%

Ecosystem	**Desert Ecosystems**	
8.Rehabilitate desert ecosystems for the promotion of eco-tourism by 17%	8.1.Develop an eco-tourism strategy to revive traditions and reconnect Bahrainis with nature Ecotourism strategy 8.2. Develop an IMP plan aligning with the eco-tourism strategy 8.3. Develop and implement a communication strategy including outreach materials for potential cultural services	8.1. Ecotourism strategy Ecotourism Plan 8.2. IMP (2018-2022) 8.3. Communication strategy Guidebooks, booklets 8.3. Awareness campaigns

Target 8	**Actions**	**Outputs**

T1: Understand values T4: Sustainable production T5: Halve rate loss T14: Restore ecosystem T15: Enhance resilience	8.1. Number of visitors, Eco-tourism package sold 8.2. Ecotourism strategy, Nb of visitors 8.3. Outreach material produced Nb of visitors, domestic and international tourists	BHD 937,850
Aichi targets	**Indicators**	**COST**

DOT	MOE, SCE ARCWH, BACA UOB, AGU NGOs	8.1. 2017 8.2. 2017 8.3. 2018
Leading agency	**Partners**	**Timeline**

TARGET 9: REVIVE AGRICULTURAL LAND SYSTEMS INCLUDING PALM GROVES BY 25%

Ecosystem	**Agriculture ecosystems**	
10. Revive agricultural land systems including Palm groves by 25%	10.1. Assess the status of agricultural land systems (ALS) and map their potential services 10.2. Develop IMP for the existing ALS in partnership with farmers, shareholders and stakeholders	10.1.ALS portfolio 10.2. IMP 2018-2023
Target 10	**Actions**	**Outputs**

T7: Manage within limits T9: Reduce invasive species T13: Conserve gene pool T15: Enhance resilience T16: Implement Nagoya Protocol T19:Improve knowledge	10.1. Map of Ecosystem services 10.2. IMP Nb of Private Public Partnerships (PPPs)	BHD 250,250
Aichi targets	**Indicators**	**COST**

DAA	MWMUP UOB/AGU NGOs	10.1. 2016-2017 10.2 2017
Leading agency	**Partners**	**Timeline**

TARGET 10: DECREASE PEST INFESTATIONS IN PALM GROVE BY 100% AND OTHER PEST INFESTATION

Ecosystem	**Agriculture Ecosystems**	
11.Decrease pest infestations in Palm grove by 100%	11.1. Develop and implement an Integrated Pest Management program to reduce red weevil among other agricultural pest 11.2. Eradicate the introduced palm varieties	11.1. IPM 11.2. Eradication Plan
Target 11	**Actions**	**Outputs**

T9: Reduce invasive species	11.1. Number of infested Palm grove 11.2. IPM plan developed Nb of introduced palm varieties eradicated	BHD 342,650
Aichi targets	**Indicators**	**COST**

DAA	AGU NGOs	2016…2020

	NIAD	
Leading agency	**Partners**	**Timeline**

TARGET 11: PROTECT NO LESS THAN 75% OF HEALTHY FRESHWATER SPRING

Ecosystem	**Agriculture Ecosystems**	
12. Protect no less than 100% of healthy freshwater spring	12.1 Map and assess the status of existing freshwater springs (FWS) 12.2. Develop regulatory measures and action plan to protect freshwater springs	12.1.FWS portfolio 12.2. Law issued
Target 12	**Actions**	**Outputs**

T11: PAs T14: Ecosystems restoration T15: Enhance resilience T19:Improve knowledge	12.1. Water quality of freshwater springs Freshwater springs maps Water composition 12.2. Laws issued, Nb of freshwater springs protected	BHD 63,800
Aichi targets	**Indicators**	**COST**

DAA	SCE IEGA, SLRB CITO AGU NGOs	2017
Leading agency	**Partners**	**Timeline**

TARGET 12: INCREASE GREEN AREA IN THE GOVERNORATES BY 30%

Ecosystem	**Desert Ecosystems**	
9. Increase green area in the governorates by 30%	9.1. Develop an action plan and management strategy for streetscapes, pocket gardens and public spaces 9.2. Rehabilitate the green corridor and establish ecotones within the various landscape structures 9.3. Develop a communication strategy and action plan to enhance the value of the green corridors and urban biodiversity to induce behavioral changes	9.1.Database on urban biodiversity 9.2.Management Plan 9.3.Green belt delineating urban area 9.4 Communication strategy
Target 9	**Actions**	**Outputs**

T1: Understand values T14: Restore Ecosystem T15: Enhance resilience	9.1. Surface area Action plan developed 9.2. Management plan developed Length of the corridor/surface areas 9.3. Communication strategy developed	BHD 995,600
Aichi targets	**Indicators**	**COST**

MWMUP	4 Governorates Municipal Council, SCE BACA MOE UOB, AGU NGOs, NIAD Media	9.1. 2017-2018 9.2. 2018-2020 9.3. 2019
Leading agency	**Partners**	**Timeline**

5.3. Actions towards improving protection of species

The establishment of protected areas and their effective management has 'long been a cornerstone of biodiversity conservation efforts and remains the most widely deployed and best-known strategy'. Nevertheless, biodiversity outside the boundaries of these areas are important and valuable (Redford et al., 2015). The guiding principles of the NBSAP in Bahrain set the ground towards the protection of ecosystems being protected or not. In that light, the actions defined to meet specific targets will have as basis the Ecosystem approach. The identification of important sites and/or AZE and the development of regulatory measures to ensure their long-term conservation will contribute not only to the protection of species but also to the protection of genetic resources through the establishment of a gene bank (Target 7) and to an increase of ecosystems resilience (Target 1).

On the other hand, the PAs network will ensure that 90% of the available plant and animal species are protected in the Kingdom. In the national PAs strategy, it is proposed that the existing PAs system needs to define specific management objectives and develop operational management plans. The proposed strategy shed the light on the declaration of new PAs of ecologically important and sensitive habitats. These are northern Hayrat, northwestern waters of the Hawar Islands, and area in the North of Bahrain / South of Fasht Al Jarim. In parallel, an expansion of the PA**s** network with the identification of new sites is essential to ensure representativeness of all ecosystems and habitats found in the Kingdom. Certain PAs such as Arad and Tubli Bay require immediate management intervention to prevent their degradation. Hawar Islands and Hayr Bul Thamah containing natural and cultural values of national and international importance, require an operational and functional management system. The Hawar Islands site with an important conservation values is currently on the tentative UNESCO-WHS (Abdulla, 2015).

5.4. Restoring and increasing resilience of critical ecosystem

Since late nineties, restoration initiatives of mangroves along the coast were launched. These ongoing projects are taking place in Ras Sanad Nature Reserve, Tubli Bay and Dohat Arad (SCE, 2015). In the 5-years plan, the new identified sites recognized for their high conservation value will set the path for safeguarding

critical habitats in the Kingdom. On one hand, the development of IMPs and MPs will strengthen ecological integrity and ensure resilience of the critical sites. These plans and programs are sought to be not only effective but also adaptive to manage any emerging changes. On another hand, the expansion of green corridors (belt) and the establishment of PAs network will also have a great impact on the resilience of existing critical ecosystems especially agriculture and urban ecosystems. Green corridors will be managed in a way to play the role of a transition zone (tension zone/ecotone) between the various terrestrial and costal habitats found in the Kingdom. Additionally, the restoration of mangroves will boost marine ecosystems and increase the resilience of coastal populations and communities, linking the existing meta-populations of either birds or marine organisms.

The PAs strategy proposes two fundamental concepts for long-term success of the PAs strategy while ensuring representativeness of the Kingdom ecosystems and habitats. The first one is related to the establishment of a legally mandated governing body for PAs and the second one involves the development of a program of work to operationalize hands-on management. The latter will contribute to strengthen the administration of PAs management schemes at the SCE (e.g. recruitment of PA managers, rangers) and strengthen technical capacity (e.g. training in surveillance, enforcement, promotion, monitoring, and business planning for the PA system) (Abdulla, 2015).

Strong commitment for biodiversity conservation in all sectors requires primarily ensuring political, social, technical and financial support for the NBSAP implementation. It necessitates a harmonized approach based on the integration of biodiversity conservation in both cross-sectoral and sector-specific plans. Cross-sectoral plans involve sustainable development, poverty reduction, climate change adaptation/mitigation, trade and international cooperation; while sector-specific plans target agriculture, fisheries, forestry, mining, energy, tourism, transport.

It is worth mentioning that at national level, synergizing of efforts is crucial. For instance, the Kingdom has several ongoing initiatives that could be related to the NBSAP. Although these initiatives are scattered and conducted by several institutions, they eventually participate in the NBSAP implementation. This is applicable to an initiative launched by the CITO to spatially map marine environment. Therefore, it is expected that some actions stipulated by the NBSAP will go ahead while waiting for the formal adaptation of the NBSAP.

6.1. Mainstreaming of biodiversity conservation

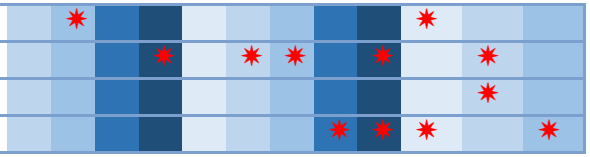
Mainstreaming of biodiversity conservation was developed as a mean of addressing the fact that biodiversity conservation goals are viewed as distinct from, and sometimes even contradictory to, the goals of development and economic growth. It has been referred to as "integrating" biodiversity into various development sectors. It implies changes in development models, strategies and paradigms (UNEP-WCMC, 2013). In the KoB, there is a big potential to integrate biodiversity conservation into recent national policies and strategies such as the Economic Vision 2030, Agriculture Affairs Strategy, Government Action Plan (GAP) 2015-2018 (table 8).

It is worth noting that other national policy instruments exist but are outdated such as National Environment Strategy (2006), National Planning Strategy (2007), and Bahrain Vision (2010-2015). Even if outdated, they are mentioned in here to shed the light on the core principles of the Kingdom's national policy instruments revolving around same principles as biodiversity conservation policies. The

National Environmental Strategy was endorsed with a set of guiding principles. Those are precautionary and polluters pay principles, partnership and improvement of the state of the environment.

Table 8. Mainstreaming potential of the NBSAP targets with national policies.

National policies instruments	NBSAP's Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
Economic Vision 2030												
Conserve natural areas for future generations to enjoy	✶	✶		✶	✶	✶	✶	✶		✶	✶	✶
Implement energy-efficient regulations												
Invest into technologies that reduce carbon emissions, minimize pollution and promote the use of more sustainable energy												
Encourage new generations of Bahrainis to gain experience and in-depth knowledge of their cultural heritage					✶		✶	✶	✶			
Government Action Plan 2015-2018												
Develop environmental awareness and education projects					✶			✶	✶			
Strengthen partnership with local community in all environmental fields	✶				✶			✶		✶	✶	
Increase the networks of PAs	✶											
Restore critical and vulnerable biodiversity areas	✶			✶		✶			✶			✶
Protect species in their natural range and regain number of threatened species with extinction (Animal breeding programs in captivity and plant nurseries)	✶	✶		✶			✶	✶				✶
Develop new regulations; strengthen monitoring, and frequency of inspection processes	✶		✶	✶		✶	✶					
Revise and update constitutional framework of environmental issues to be in line with rapid changes, guaranteeing the protection of natural habitats and plant and animal life in both desert and marine ecosystems	✶						✶					
Update monitoring systems of environmental violations		✶		✶		✶		✶				
Improve EIAs implementation mechanisms (industrial waste, untreated domestic waste, other dumps).			✶			✶		✶				
Protect coastal and marine protected areas	✶		✶	✶	✶	✶						
Support greenery and tree-planting projects									✶			
Developing means of protecting the environment, species, strains and varieties of ecological, economical, and cultural importance		✶	✶	✶		✶	✶	✶	✶			
Agriculture Affairs Strategy 2010-2015												

Achieve relative food security	
Conserve natural resources	
Combat animal and plant diseases and strengthen the abilities to deal with cross boundary diseases	
Support small-scale farming	

The National Planning Strategy (2007) whose aim is to transform Bahrain into a prosperous and innovative city-state of the 21st Century, addresses issues such as natural resources, lack of zoning, weak transport infrastructure, insufficient public open space and the need for improved education and comprehensive employment. It lays out ten key strategies that coordinate and focus on development, control land speculation, protect resources, preserve historic and ecologically important sites, integrate transport and ensure public access to open space and the waterfront. The Bahrain Economic Vision (2010-2015) objective is to achieve food security, sustainable income and economic prosperity through eco-tourism and local production via utilizing restored and conserved ecosystems.' Despite of the holistic vision in the previous strategies and plans, there is little progress in environmental protection portfolios and a shy progress in the implementation of sustainable development. Nevertheless, it is expected that the new biodiversity strategy will foster biodiversity mainstreaming process and synergizing efforts towards better practices in environmental protection and higher effectiveness in national plans implementation tackling biodiversity conservation and environmental protection such as the 2020 Vision and GAP2015-2018.

The 2030 vision foresees not only economic development but also leveraging the standard of life of Bahrainis and improving their well-being. It states that society and government in Bahrain '*will embrace the principles of sustainability, competitiveness and fairness to ensure that every Bahraini has the means to live a secure and fulfilling life and reach their full potential*'. It draws on law enforcement, cultural preservation and conservation of natural spaces for future generations to enjoy, education and research, strengthening national capacities, sustainable energy sources, and planning processes for a better quality of life with more attractive and open spaces.

Despite the potential of mainstreaming in the above-mentioned recent national policy instruments, the GAP reveals to be a more recent and fertile ground to ensure mainstreaming of biodiversity conservation while fostering resource mobilization at the same time at the national level. Though, this first step requires a close collaboration to be launched by the SCE to synchronize and synergize efforts towards meeting the targets set under the NBSAP. The GAP

2015-2018 targets development, poverty reduction, natural resources management and climate change. It integrates environmental protection, urban development and strengthening good governance among its six strategic priorities. Additionally, the GAP involves cross-sectoral cooperation (p. 9), improve citizenship through the education system (p. 21), establish infrastructure to institutionalize research and strengthen research capacities to respond to national priorities (p. 22). In its fifth chapter, the GAP focuses on sustainable use of water resources and electricity while promoting green technology (p. 41). The GAP 2015-2018 foresees food security (p. 44) while providing support to farmers and ensuring mechanisms for plant protection. Under this same chapter, the action plan targets activities similar to the NBSAP targets set (p. 47-48). It is evident that through the plan there is room for synergizing and harmonizing efforts on one hand. On the other hand, again it opens the door for resources mobilization from national budgets.

6.2. Synergies between international agreements

The institutional arrangements within a government determine how the international agreements are implemented at the national level. It is necessary to establish formal settings of cooperation among NCAs through their personnel and National Focal Points (NFPs) to ensure effective implementation while synchronizing efforts. In the context of the Kingdom NBSAP, NFPs were contacted and convened to participate in the workshops among other communication's activities related to the NBSAP updating process. The NFPs were those not only working on biodiversity-related conventions but also other Multilateral Environmental Agreements ratified by the Kingdom.

At present, Bahrain is signatory to fourteen international conventions related directly or indirectly to wildlife protection and biodiversity conservation. For most of the ratified conventions, the Kingdom has developed necessary national policy instruments and tools to ensure their implementation. The results of an attempt to present the existing policy instruments and cross-sectoral cooperation among government agencies are presented in table 9. Additionally, the NBSAP targets set for Bahrain matched most of the goals and objectives of

the biodiversity-related conventions (table 10). Nevertheless, there is a need to align the national targets sets within the NBSAP with the other biodiversity-related conventions through direct contact and the establishment of formal institutional arrangements settings to ensure regular follow up and avoid the duplication of efforts and for resource mobilization.

Table 9. Policy instruments and cross-sectoral cooperation under the ratified environmental agreements in the KoB.

Convention/Protocol	Year of ratification	NCA	Policy instruments	Cross-sectoral cooperation agencies
Kuwait Regional Organization for the Protection of the Marine Environment (ROPME) agreement	Law No. 17/ 1978	SCE	National Contingency Plan for Combating Pollution by Oil and other harmful substances. National Environmental Standards for Industrial Water Effluent. EIAs	MPA, DCG, DRM, NOGA, Royal Navy
Protocol on Marine Pollution	Law No. 9/ 1990	PME	N/A	
United Nations Framework Convention on Climate Change	Law No. 7/ 1994	SCE	Intended Nationally Determined Contribution (INDC)	
Convention on Biological Diversity	Law No. 18/ 1996	SCE	NBSAP	
Ramsar Convention	Law No. 3/ 1997	SCE		MMWUP
United Nations Convention to Combat Desertification	Law No. 9/ 1997	DAA	National Action Plan	
Environmental Impact Assessment	Law No. 1/ 1998	SCE	Law	
International *Convention* for the Prevention of Pollution from Ships	Law No. 32/ 2005	SCE	Riyadh MOU	MTT (MPA), DCG
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)	Law No. 4/ 2010		National Contingency Plan for Combating Pollution by Oil and other Harmful Substances. Oil Spill Contingency Plan for Coastal Facilities.	MTT (MPA),NOGA
Stockholm Convention on Persistent *Organic Pollutants*	Law No. 39/ 2005	DAA	N/A	
Cartagena Protocol on Biosafety	Law No. 2/ 2011	SCE	Interim-measure under the Protocol	N/A
UNESCO- World Heritage Convention	Decree No. 3 / 1991	BACA	Bahrain Action Plan for Marine World Heritage	
Convention on International Trade of Endangered Flora and Fauna Species	Law No. 27/2012	SCE	Suspension of trade in one or more species	SCE, CG, MTT

Table 10. Alignment of NBSAP targets with biodiversity-related conventions goals.

Biodiversity related Conventions	NBSAP Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
RAMSAR Convention on Wetlands												
Goal 1: Addressing the drivers of wetland loss and degradation	✶		✶			✶					✶	
Goal 2. Effective conservation and management of the RAMSAR Sites Network	✶			✶	✶	✶						
Goal 3. Wise use of all wetlands through partnerships	✶			✶	✶	✶						
Goal 4. Raised awareness and involvement in wetlands				✶	✶	✶						
Convention on International Trade of Endangered Fauna and Flora Species												
Goal 2: Secure the necessary financial resources and means Convention implementation	✶	✶	✶	✶	✶							
Goal 3: Contribute to significantly reducing the rate of biodiversity loss	✶											
Convention on Migratory Species												
Goal 1: Address the underlying causes of decline of migratory species (MS)	✶	✶		✶		✶						
Goal 2: Reduce the direct pressures on MS and their habitats	✶	✶	✶	✶		✶						
Goal 3: Improve the conservation status of MS and the ecological connectivity and resilience of their habitats	✶			✶								
Goal 4: Enhance the benefits to all from the favorable conservation status of MS												
Goal 5: Enhance implementation through participatory planning, knowledge management, capacity building												
The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)												
Goal 1: Conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, for sustainable agriculture and food security										✶	✶	✶
World Heritage Convention												
Goal 1: Continually improve World Heritage site management capacities	✶		✶			✶						
Goal 2: Counter threats to World Heritage in Danger sites	✶		✶			✶						
Goal 4: Apply the Ecosystem Approach	✶		✶			✶						
International Plant Protection Convention												
Objective: To protect world plant resources, including cultivated and wild plants by preventing the introduction and spread of plant pests and promoting the appropriate measures for their control.							✶	✶	✶	✶	✶	

6.3. Resource mobilization

The environmental trust fund proposed in 2007 as the main mechanism to ensure the availability of financial resources NBSAP implementation was not made operational. This was mainly due to a lack of follow up on NBSAP implementation in terms of endorsement and approval from parliament. Thus NBSAP was not given a priority and was not communicated properly with various government agencies in the Kingdom. This was among the many shortfalls that were faced by the stakeholders striving to establish an enabling environment for biodiversity conservation especially in terms of governance and policy instruments.

The updating process showed high motivation and potential strong engagement from the public and private institutions. It opened the ground for discussing potential partnerships (PPPs among others) for resource mobilization for the implementation of the various actions of the NBSAP (2016-2021). Different lines of financial resource were identified with the main categories of actions (table 11). Lines of financial resources fall under one of the followings:

- Government budget
- Public sector (TAMKEEN)
- Private sector (CSR, donations)
- Inter-governmental organization
- Local and regional Development Banks

Table 11. Categories actions and the corresponding funding sources.

Actions categories	Inter-Governmental	Regional	Local	Private Sector	HNWI
Policy instruments[15]	✶				
Assessments[16]	✶	✶	✶		
Communication[17]		✶	✶	✶	✶
Infrastructure[18]	✶			✶	✶

[15] IMPs, IPMs, MPs, Ecotourism strategies, Laws, tools for laws implementation
[16] Species assessment, ES mapping, FWS mapping, AZEs, etc.
[17] Communication strategy, outreach material, awareness campaign, schools activities
[18] Gene Bank, Botanical Garden, Guesthouses, etc.

It is proposed that the financial resources flow will *a priori* feed the environmental trust fund (fig. 9). High Net-Worth Individuals (HNWI) identified at national or regional and even global level will also feed into the NTF, this in addition to the development banks in the Gulf and Arab countries as well as the Asian development banks. Global Biodiversity Information Facility (GBIF) is another type of financial support, which provide funds for species assessment and developing and updating the checklist of plants and animals. Similar funding initiatives exist for the marine life. Capacity development at individual level can be resources that can be acquired from TAMKEEN and other domestic governmental budgets allocated for the institutional and systemic capacities of governmental agencies.

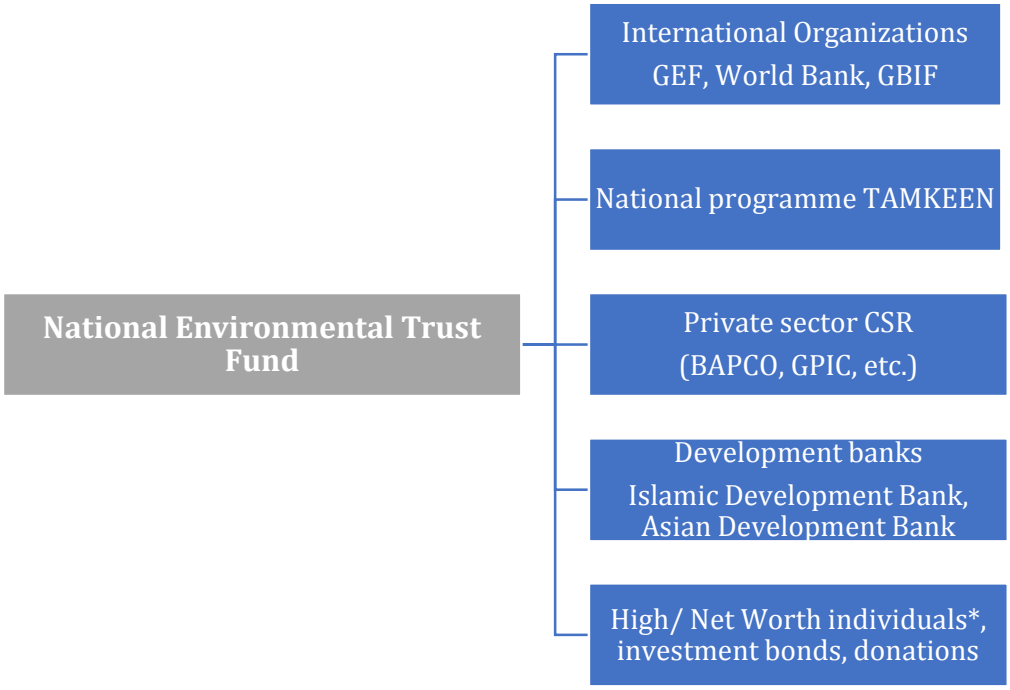


Figure 9. Potential funding sources for building up a National Environmental Trust Fund for NBSAP implementation.

6.4. Communication, education and public awareness plan

Communication strategies addressed to the various sectors and levels constitute an integral part of the national biodiversity targets in the Kingdom. Cross-cutting components of all NBSAP actions, it is part of SGII (Section 2). Biodiversity is already infused in science programs in schools in the Kingdom. It was proposed

that means of awareness include conventional Media tools such as TV, Radio, Social Media managed by the MOCT and MYS. Other means of direct communications proposed include seminars, workshops, round table discussions, educational courses, training addressed to government officials, and publication of relevant educational manuals.

6.5. Plan for capacity development

A plan for capacity development needs a priori assessing the national capacities on biodiversity conservation. The National Self Capacity Assessment (NCSA) woild involve the assessment of technical, administrative and financial capacities for biodiversity conservation through open-ended/close-ended questionnaires addressed to national stakeholders. Beside than defining national capacity, the NCSA analyses the root causes of biodiversity loss and ecosystems degradation while defining a plan of action for capacity development. The NCSA looks at three levels of capacities in countries. These are systemic, institutional and individual capacities.

• Systemic capacity: It aims at creating an "enabling environment" for biodiversity conservation. It addresses the overall policy, economic and regulatory frameworks within which institutions and individuals operate. Systemic capacity includes the framework for cooperation and communication processes as well as mandates between institutions.

• Institutional capacity: It aims at developing its own individuals and staff, as well as putting in place a path for collaboration with agency staff, national and regional bodies. This level includes the overall performance and functional capabilities of the institution, such as developing mandates, tools, guidelines and information management systems.

• Individual capacity: It aims to change attitudes and behaviours through communication, awareness raising, building knowledge and developing skills. It also involves hands on involvement, pro-active participation, and ownership of issues at hand. It includes enhancing performance through changes in management, administration, accountability and responsibility.

In the NBSAP, the NCSA is scheduled to start at the end of 2016. It is a necessary component of the NBSAP implementation in order to ensure effective management of all actions planned for the next 5 years to come.

Section 7: Institutional structure for NBSAP's implementation

7.1. National coordination structures

Apart from being the NCA for the implementation of the CBD and NBSAP, the SCE is the supervising agency and one among the leading agencies for the implementation of actions and follow up processes in a timely manner. The Directorates under the various Ministries will be the executing agencies responsible of the actions; each directorate will be responsible of the resources which fall under its mandate (fig. 10). The Directorate of Agricultural Affairs (DAA) is the Leading executing agency handling the Agricultural and FWS ecosystems. The Directorate of Fisheries is the leading executing agency on the Marine and Coastal Ecosystems in close partnership with the Directorate of Biodiversity at the SCE where appropriate (i.e. mangroves and coral reefs). Desert ecosystems will be handled by the SCE in close partnership with the various agencies depending on the ecosystem services managed and protected.

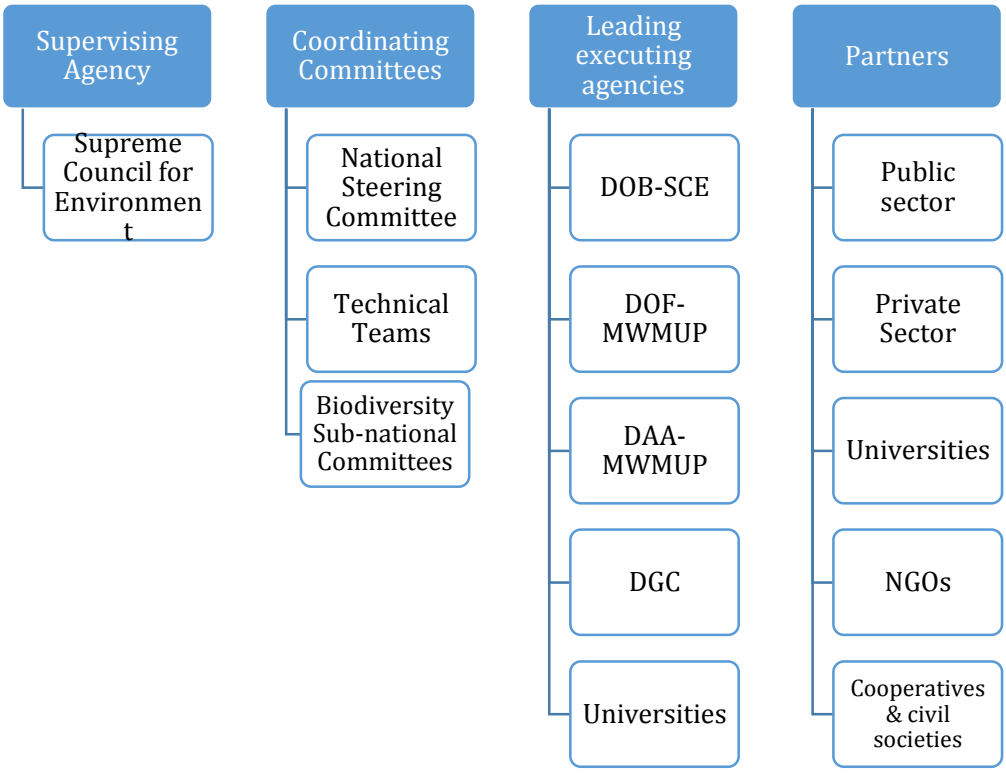


Figure 10. Leading agencies and partners' coordination structure for the NBSAP implementation.

7.2. National Biodiversity Steering Committee

In 2011, a National Biodiversity Steering Committee (NBSC) was established in the Kingdom (Decisions: No. 44/2011 and No. 81/2011). It gathers nine members designated by the SEC (3 members), MOC (1 member), MOE (1 member), MOIT (1 member), MWMUP (1 member), UOB (1 member) and CCIB (1 member). The NBSC[19] will bring on board additional members to support the three technical teams in their work on NBSAP's implementation. The main task of the NBSC is to supervise the processes of monitoring and evaluation of NBSAP's implementation (in 2009 and 2021) as well as ensuring the mainstreaming of biodiversity conservation in all sectors. Meanwhile, in order to ensure mainstreaming of biodiversity conservation in the various sectors and aligning MEAs targets and other targets of existing national action plans related directly or indirectly to biodiversity conservation, the NBSC will have on board additional representatives listed below from each of the agencies.

[19] It is proposed not to have more than 10-12 members on each of the committees or sub-committees.

1. Directorate of Fisheries (DOF)
2. Directorate of Agricultural Affairs (DAA)
3. National Oil and Gas Authority (NOGA)
4. Port and Maritime Affairs
5. The Informatics and e-government Authority (previously CIO)
6. Bahrain Authority for Culture and Antiquities (BACA)
7. Directorate of Budget (DOB)
8. Industries: ALBA, Bahrain Steel, etc.[20]
9. Academic sector and Research: UoB and AGU[21]
10. Bahrain Development Bank
11. TAMKEEN[22]
12. NGOs

On another hand, it is crucial to consider having the National Focal Points (NFPs) on board of the NBSC.

7.3. Technical Teams

The Technical Teams (TTs) aim is to ensure mainstreaming of biodiversity conservation in the various sectors and national policies and to provide the needed technical support for NBSAP implementation. Each technical team is assigned a set of Terms of Reference to ensure the effectiveness of biodiversity conservation governance starting with national assessment to issuance of law and their implementation. It was agreed by all stakeholders to establish three TTs on the following areas: Marine and Coastal biodiversity, Agriculture biodiversity and Urban biodiversity (fig. 11). The TT constitution involves experts and scholars as well as practitioners in the fields of Marine and Coastal biodiversity, Agriculture biodiversity and Urban biodiversity. The tasks of each of these teams target all technical and scientific issued related to NBSAP's implementation as well as requirement for capacity building at all levels. It is worth noting that TTs will

[20] Representative of one of the listed industry will be on board and the representative can alternate between the existing industries in the Kingdom
[21] Representatives of one university can serve three years and be replaced by representative of another university.
[22] It is proposed to address TAMKEEN and involve them on specific issues related to Building capacities or to get them on board of the technical teams.

assist in mainstreaming process to avoid duplication and overlap with any other national policy instruments. NIAD, as part of the TT will be a major partner on the projects/programs related to reforestation (green corridor/belt, ecotone, public gardens), Environmental Education at schools, Environmental awareness, as well as women empowerment in the agricultural sector. NGOs will be selected to join the technical teams based on their organization's missions and capacities.

7.4. Sub-national committees

Sub-national committee will be established to ensure mainstreaming of NBSAP and as part of stakeholders participation. There are four governorates in the Kingdom of Bahrain; the capital, northern, southern and Muharraq. Each governorate has its own municipality council. Four interdisciplinary sub-national committees[23] will be formed with an elected rapporteur whose main task is to report to the NBSC (fig. 12). The NBSC delegates a representative to join each of the technical teams whose main task is to update the committee on the needs, advances in the implementation processes or any emerging issues and needed support.

[23] The TORs of the sub-national committees could be merged with the municipal council (Article 19- Municipality law). If this can be applicable so there will be no need to create a 'new' committees (the sub-national ones).

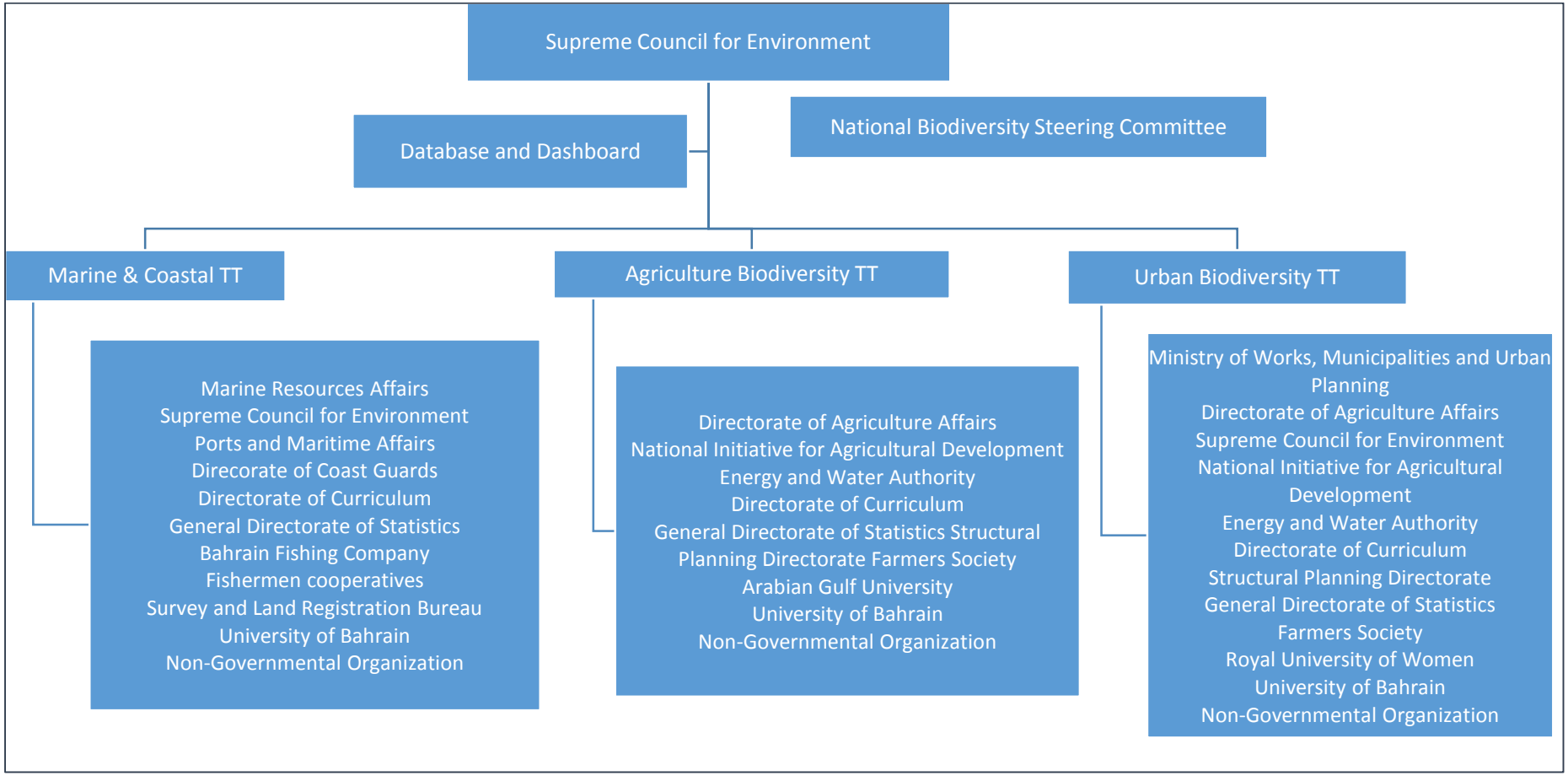


Figure 11. Structure and membership of the NBSC and technical teams responsible for all aspects of NBSAP's implementation[24,25]

[24] NIAD: Reforestation with native species, Environmental Education at schools, Environmental awareness, Women empowerment in agriculture.
[25] NGOs are selected to join the technical teams based on their missions and capacities.

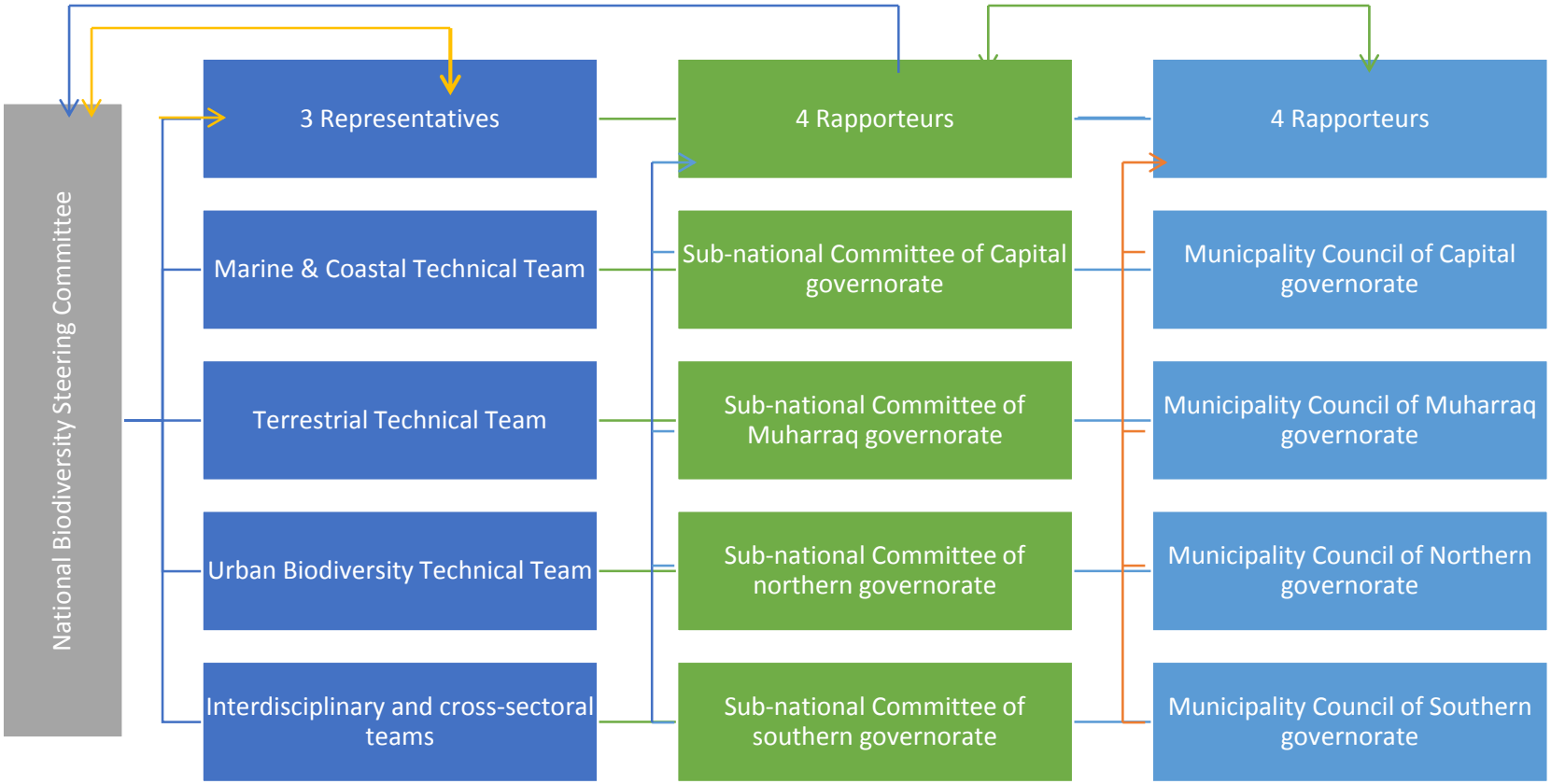


Figure 12. National and sub-national coordination structure for NBSAP's implementation[26].

[26] NB: The sub-national committees are linked to the technical teams through the designated 'Rapporteur'– the diagram presents the 3 layers of coordination.

8.1. Evaluation of NBSAP's implementation

The best scenario needs to bring together public and private agencies whereby their terms of reference under each activity would be aligned with their national mandates. The scenario draws on a decentralized system linked through an inter-operable platform (which could be hosted by the CHM). The inter-operable platform will bring together authorized users nominated by relevant authority, in addition to two or three validating-users designated from the concerned agencies.

The evaluation of the implementation of actions will be based on the measurement of the defined indicators by the relevant agencies. In terms of monitoring and reporting, each of the agencies, TTs and sub-national committees (fig. 12) will have a set of specific terms of references. The NBSC and TTs will follow up on the monitoring and evaluation of the mainstreaming of the NBSAP's implementation as well as the evaluation of the plan of work and aligning actions with biodiversity-related to biodiversity conservation and other MEAs.

8.2. Clearing-House Mechanism

The kingdom of Bahrain is the first country in the GCC region to establish its Clearing-House Mechanism (CHM) in support of the implementation of the Strategic Plan for Biodiversity (2011-2020). Bahrain CHM[27] is conceived as a virtual platform bringing together governmental entities, practitioners, scientists and experts to monitor the state of biodiversity in the KoB (fig. 13). It is set as an inter-operable system linking and directing the users to websites of all relevant organizations in Bahrain with the following aims:

- Providing easy access to biodiversity information in Bahrain;
- Ensuring transparency in the implementation processes of the CBD Strategic Plan for Biodiversity 2011-2020 and the advances towards meeting the Aichi Biodiversity Targets;

[27] http://bh.chm-cbd.net

- Showing the existing cooperation between government agencies and national partners across all sectors to implement the NBSAP;
- Assisting users in finding all biodiversity related information; from theory to practices;
- Forming a national and regional hub for practitioners and experts to encourage global scientific cooperation;
- Communicating grassroots initiatives, EBM projects and on-going activities on biodiversity conservation.

The CHM will be used for the coordination among the three levels of coordination involving the NBSC, TTs and sub-national committees. The rapporteurs and representative will be designated as authorized users to share updates on merging issues and needs. The CBD-NFP and CHM-NFP will be the responsible on the validation of all information shared through the CHM and related to the NBSAP implementation.

Figure 13. Bahrain CHM information system (SCE, 2015).

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