

The Integration of Biodiversity into National Environmental Assessment Procedures

National Case Studies

Yemen

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15 YEMEN

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15.1 Introduction

1.1 Location and Area

The Republic of Yemen lies in the south-western part of the Arabian Peninsula between latitude 12° 40' and 19° 00' North, and 42° 30' to 53° 05' East longitude. The country covers an area of some 555,000 sq km excluding Rub-Al-Khali, with about 2000 km of coastline along the Red Sea and the Gulf of Aden. Its altitudinal range extends from sea level up to 3760m at Jabel Al-Nabi Shauib, the highest point in the Arabian Peninsula. Yemen is bordered by Saudi Arabia to the north, the Arabian Sea and the Gulf of Aden to the south, Oman in the east, and the Red Sea in the west. Lying in the South-west of the country is the Bab-Al-Mandab Strait which is divided by Mayoon Island into two parts that also controls the passway to the strait. Socotra Island in the Arabian Sea is the largest Yemeni Island (3650 km²) and lies some 510 km from the mainland coast. Besides Socotra more than 112 Yemeni islands are scattered in the Red Sea, the largest of which are: Kamaran, Great Hunish, Little Hunish, Zakar, Al-Zobair, Al-Tair, and other smaller islands.

□ *Socotra Island*

Socotra Island lies at about 3625 km off the northeast corner of Africa (between latitude. 12° 19' to 12° 42', and longitude 53° 20' to 54° 30') which is part of Hadhramot governorate. It can be divided into three main topographical zones: (1) coastal plains, (2) a limestone plateau, and (3) mountains. The elevation ranges from sea level to 1519m. The coastal plains and low inland mountains are covered by open shrubland dominated by *Croton socotranus*, *Cissus subaphylla*, *Jatropha unicastata*, *Pulicaria stephanocarpa*, *Dendrosicypos socotrana*, and *Adenium obesum subsp. sokotranum*. Some 828 plant species have been recorded so far from the island, and of these about 270 are endemic. The following vegetation associations can be found in the island:

Limonium axillare - *Atriplex griffithii*
Croton socotranus - *Cissus subaphylla*
Aizon canatiensis - *Salsola sp.*
Salvadora persica - *Cissus subaphylla*
Indigofera nephrocarpoides - *Panicum rigidum*

At low and middle elevations (500-600m) we find a shrubland or woodland dominated by the following species: *Dracaena cinnabari*, *Buxus hildebrandtii*, *Croton socotranus*, *Heliotropium nigricans*, *Corchorus erodiodes*, *Trichocalyx obovatus*, *Rhus thyrsiflora*. At middle elevations on the plateau (about 650m) a dwarf shrubland dominated by *Aloe perry*, and *Corchorus erodiodes* can be found.

At higher elevation woodland dominated by *Dracaena cinnabari*, *Buxus hildebrandtii*, *Croton sp.* and *Rhus sp.* can be found. In the valleys a thicket trees and shrubs are found, with the characteristic species being *Tamarix sp.*, *Ormocarpum caeruleum*, *Mussoenda capsulifera*, *Jasminum grandiflorum*, *Porana obtusa* and others. Many plants are used for the purposes of dyeing such as *Gaillonia tinctoria*, *Indigofera*, and *Roccella tinctoria*. Among important and valuable species are the Dragon's Blood Tree *Dracaena cinnabari*, which is found on the high altitude plateau and mountain grasslands (gum-resin exudes in tears from the stem of the Dragon's Blood Tree). Other gum-resin producing trees are *Boswellia spp.* and *Aloe perry*.

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15.2 Biodiversity status

15.2.1 Wetlands

Yemen's wetlands can be divided into natural and man-managed systems. The former include four subdivisions:

- Marshes and lagoons, around Aden, which form a suitable refuge for several species of birds.
- Mangrove sites in the Tehama "west coast of Yemen" and Bir Ali mangrove site on the southern coast.
- Valleys and permanent streams all over the country which support all kinds of freshwater biodiversity, including microorganisms, various invertebrates, fish, amphibians, birds, and many plant species.
- The swamps of Taiz, the only known site in Yemen for the globally threatened Bald Ibis *Geronticus eremicus*.

The man-managed systems, on the other hand include the lake of Marib Dam which is the largest freshwater body within the Arabian Peninsula. This lake can play an important role in the conservation of large numbers of freshwater species.

15.2.2 Vegetation

The flora of Yemen is very rich and heterogeneous. Species diversity is a result of considerable climatic changes in former periods, which enabled different species to survive in the different ecological habitats. Over 3000 plant species are possibly found in the mainland, and about 10% of them are endemic. One checklist comprised 467 plant species belonging to 244 genera from 71 families (Gabali and Gifri, 1990). Socotra Island is unique in its flora and like many oceanic islands, has a high level of endemism. The latest study reported that Socotra contains approximately 850 plant species, 254 (about 30%) of which are endemic. Out of the eighteen plant genera endemic to the Arabian Peninsula, ten genera are restricted to the Socotra archipelago (Miller, pers.comm).

The majority of endemic taxa in Yemen are associated with mountainous areas which provide a rich variety of ecological niches and offer a degree of environmental stability during periods of climatic changes. Endemism is generally very high among the succulent plants. The largest numbers of endemic species are found within the *Asclepediaceae* taking into account the *Stapeliad* genera (*Carraluma*, *Duvalia*, *Huernia*, and *Rhytidocaulon*). *Euphorbiaceae* and *Aloeaceae* also have high percentage of endemism as they include the succulent *Euphorbia* and *Aloe* species respectively. Socotra Island contains about 30% of endemic species.

Precise data on the status and number of rare and endangered plants are not available. Some eight species (seven of these from Socotra) are included in the IUCN Red Data Book as being endangered or rare, and an additional 19 species are considered to be endangered or rare at the national level in Yemen.

The medicinal flora in Yemen is not yet well documented, as research on this subject is still limited. However, medicinal and aromatic plants are of great interest and use to Yemenis. There are accumulated experiences in using these plants as traditional remedies to cure an endless list of diseases in different areas of the country while others are used as cosmetics, condiments, coloring matters and flavoring agents. A list of 224 medicinal and aromatic plants species along with their scientific names, families, vernacular names, distribution, active substances, medicinal

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part and medicinal use has been compiled (Al-Dubiae and Al Khulaidi, 1995). A similar study concentrated on the use of medicinal plants endemic to Yemen (Al-Dubiae, 1993).

Other uses include 19 species of common trees and shrubs used for fuel wood, seven species used as timber for construction, another 19 species for dune stabilization and a great number of plants (weeds, trees, shrubs, grasses and some succulents) are used by grazing ungulates.

15.2.3 Terrestrial Fauna

Yemen has a rich and diverse terrestrial fauna is primarily due to two factors:

- The wide range of habitats in the country that vary from the highest mountains, to the plains, dry sand-deserts, marshes, coastal habitats and volcanic ocean islands; and
- The country's position at the juncture of three major biogeographic regions, the Palaearctic, Afrotropical and Oriental regions.

Mammals

Yemen has a population of 71 recorded land mammal species represented by eight orders including the bats (Table 1). About one third of the mammals are relatively large-sized species some of which are rare in other parts of Arabia. Five species of gazelle have been recorded in Yemen (Al-Jumaily, 1998) the most common being the "Idmi" or Arabian Mountain Gazelle (*Gazella gazella*) which is typically found in Acacia and Savanna-like habitats, but close to barren rocky hills with wadis and depressions that support a scarce vegetation of mainly *Acacia tortoils*, *Leptadenia pyrotechnica* and *Panicum turgidum*. The remaining four species are rare, and are believed to be almost extinct in the country (Groves, 1997). The Rhim or the Goitered Gazelle (*Gazella subguturosa*) is the typical desert gazelle being larger and stouter than the other four species. It is possible that Rhim may still occur in the most remote areas close to the hot desert area of Al-Rub, Al-Kahli near the border with Oman. The Dorcas Gazelle (*Gazella saudiya*), the smaller and lighter species with relatively longer horns, formerly inhabited the plains of the interior but has not been reported in recent times, and is believed to be almost certainly extinct in the country. The Queen of Sheba's Gazelle (*Gazella arabica bilkisi*) is known only from Yemen. Four specimens collected in the past few years were believed to be held in a private collection in the State of Qatar (Stauart and Stauart, 1997). Two specimens from Ma'bar were currently held in the Field Museum of Natural History, Chicago (Greth *et al.*, 1993).

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Table 1 Preliminary record of orders, families, genera and species of mammal in Yemen

Order	Family	Genus	Species
Insectivora	2	3	6
Carnivora	6	11	16
Primates	1	1	1
Hyracoidea	1	1	1
Lagomorpha	1	1	1
Artiodactyla	1	4	8
Rodentia	4	9	15
Chiroptera	8	18	23
Total	24	28	71

The Ibex (*Capra ibex nubiana*) still occurs in the eastern part of Yemen, inhabiting the difficult rocky slopes in mountainous areas which have served to protect the animals from hunters in vehicles. The Arabian Oryx (*Oryx leucoryx*) is almost certainly extinct in the wild, and there is no evidence that it exists within the accessible terrain in the deserts of north-eastern part of Yemen. The Baboon (*Papio hamadryas*) is still found in hilly terrain, preferring rocky slopes usually in the vicinity of permanent water. There has been a serious decline in the Baboon population with the occupation of nearly all water sources and fertile wadis by man.

The Arabian Red Fox (*Vulpes vulpes arabicus*) and the Striped Hyaena (*Hyaena hyaena*) are probably the most abundant mammals in Yemen and inhabit adequately vegetated areas throughout different parts of the country. Although the Striped Hyaena is primarily known as a scavenger feeding on carcasses of dead animals, people in many parts of the country have complained about Hyaenas attacking their domestic animals and raiding watermelon crops in the field. Two other species of foxes found in Yemen are Sand Fox (*Vulpus ruppelli*) a paler and smaller species with larger ears that inhabits the desert, and Blanford's Fox (*Vulpes cana*), similar to the Sand Fox in general appearance but inhabits rocky slopes. Its occurrence in Yemen is not certain. The Arabian Wolf (*Canis lupus arabs*) is found in many areas, especially in the eastern part of the country. The Jackal (*Canis aureus*) can be found near human settlements.

The Family Felidae has the largest number of members and is represented by 5 genera and 6 species, all of which are considered endangered or extinct. Among the most notable are the Arabian Leopard (*Panthera pardus nimr*), a very rare, if not an extinct mammal in Yemen which was known to inhabit the rocky slopes of mountainous and hilly terrain. Recent reports indicate that a leopard was captured near the area of Wadeah, and was sent to the United Arab Emirates for a captive breeding program (Nabil A. Obadi, pers. comm). The Cheetah (*Acinonyx jubatus*) has not been observed in the wild in many years. The last individual was seen by Ducker in March 1963 in Wadi Mitani. However, there is some evidence that cheetah may still survive in remote areas of the southern part of the country. A stuffed skin of cheetah was seen hanging on a building in Ataq in 1985, and was said to have been killed in the area.

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Table 2 Extinct and endangered mammal species (a preliminary estimate)

Endangered		Extinct	
Scientific name	English name	Scientific name	English name
<i>Gazella gazella</i>	Arabian mountain gazelle	<i>Gazella arabica bilkis</i>	Queen of Sheba's gazelle
<i>Gazella subgutturosa</i>	Goitered Gazelle	<i>Oryx leocoryx</i>	Arabian Oryx
<i>Gazella saudiya</i>	Dorcas Gazelle	<i>Acinonyx jubatus</i>	Cheetah
<i>Capra ibex nubiana</i>	Ibex		
<i>Canis lupus arabs</i>	Arabian Wolf		
<i>Canis aureus</i>	Jakal -		
<i>Panthera pardus nimr</i>	Arabian Leopard		

Birds

Yemen has a very rich bird fauna with more than 363 species thus far recorded representing 18 orders, 61 families and 177 genera. The main reasons for this richness are:

- i) Presence of a wide array of habitats (mountains, Tihama plains, wetlands and marshes, coastal areas, Gulf of Aden and Red Sea, and agricultural landscapes of many varieties) largely the result of the broad range of elevations and climate;
- ii) Geographic isolation by the sea and deserts, resulting in 13 endemic or near-endemic species;
- iii) Yemen's position at the transition zone of three biogeographic regions: Afrotropical, Oriental and Palaearctic, resulting in a mixture of species from all three; and
- iv) The country's strategic position at the foot of the Arabian Peninsula, thus acting as an important stop-over in the path of flyways for migrant birds, notably birds of prey and waders.

From the 363 bird species recorded in Yemen, seven groups are of particular importance:

□ ***Globally Threatened Species***

- -Bald Ibis (*Geronticus eremita*): Yemen is probably a vital wintering area for a small population of this species and may possibly even be their breeding ground. The retention of grazing marshes, especially in the Taiz area is critically important.
- White-eyed Gull (*Larus leucophthalmus*): Occurs throughout the year on the coast and may well breed on Yemen's off-shore islands. The main threats are oil pollution and destruction of nesting colonies through man's activities. Other important species are shown in Table 3.

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Table 3 Globally threatened species found in Yemen

Scientific name	English name	Endemic in Yemen	Restricted distribution including Yemen
<i>Aquila clanga</i>	Greater Spotted Eagle		
<i>Aquila heliaca</i>	Imperial Eagle		
<i>Aythya nyroca</i>	Ferruginous Duck		
<i>Crex crex</i>	Corncrake		
<i>Emberiza socotra</i>	Socotra Bunting	*	
<i>Falco naumanni</i>	Lesser Kestrel		
<i>Geronticus eremic</i>	Northern Bald Ibis		
<i>Larus leucophthalmus</i>	White-eyed Gull		*
<i>Onychognathus futer</i>	Socotra starling	*	
<i>Parisoma buryi</i>	Yemen warbler	*	
<i>Turdus menachesis</i>	Yemen thrush	*	

□ **Species Endemic to Southwest Arabia**

Yemen holds significant, and in most cases the major populations of 13 species unique to southwest Arabia. For a small country to be so richly endowed with endemic birds adds greatly to its international significance. With the exception of the Arabian Golden Sparrow (*Passer euchlorus*), all endemic species occur in the highlands. The Arabian Accentor (*Prunella fagani*) is known only from the highlands of Yemen mainland. The demise of the terracing systems could adversely affect several of the endemics as the resultant soil erosion will cause loss of trees. Acacias in the highlands, even isolated trees or clumps, are important for the Arabian Woodpecker (*Dendrocopos dora*), Yemen Thrush (*Turdus menachensis*), Yemen Warbler (*Parisoma buryi*), Arabian Serin, (*Serinus rothschildi*), Golden-winged Grosbeak (*Rhynchostruthus socotranus*), and Yemen Linnet (*Carduelis yemenensis*). The distribution of endemic and semi endemic birds in mainland Yemen, Socotra, and two neighboring areas is shown in Table 4.

Table 4 Endemic and semi-endemic bird species in Yemen

Species	Endemic to Yemen		Semi Endemic		
	Mainland	Socotra	Yemen	Asir	Dhofar
<i>Alectris melanocephala</i> (Red-legged partridge)			*	*	*
<i>Alectoris philbyi</i> (Philby's rock partridge)			*	*	
<i>Apus berliozi berliozi</i>		*			
<i>Carduelis yemenensis</i> (Yemen linnet)			*	*	
<i>Cisticola haesitata</i>		*			
<i>Denrocopos dora</i> (Arabian woodpecker)			*	*	
<i>Emberiza socotrane</i> (Socotra bunting)		*			
<i>Estrilda rufibarba</i> (Arabian waxbill)			*	*	
<i>Incana incana</i>		*			
<i>Nectarinia Balfouri</i> (Balfour sunbird)		*			

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<i>Oenanthe lugens bosaweni</i> (Mourning wheatear)				*	*
<i>Oenanthe lugens lugentoides</i>			*	*	
<i>Onychognathus frater</i>		*			
<i>Otus senegalensis pamela</i> (Senegal scops owl)			*	*	*
<i>Otus senegalensis socotranus</i>		*			
<i>Parisoma buryi</i> (Yemen warbler)			*	*	
<i>Passer euchlorus</i> (Golden sparrow)			*	*	
<i>Passer insularis</i> (Socotra sparrow)		*			
<i>Prunella fagani</i> (Arabian accentor)	*				
<i>Rhynchostruthus socotranus percivali</i>			*	*	*
<i>Rhynchostruthus s. socotranus</i> (Golden-winged grosbeak)		*			
<i>Serinus menachensis</i> (Yemen serin)			*	*	
<i>Serinus rothschildi</i> (Olive-rumped serin)			*	*	
<i>Turdus menachensis</i> (Yemen thrush)			*	*	
<i>Zosterops socotrana</i> (Soqotra white-eye)		*			

□ **Seabirds**

The biological richness of the Red Sea and offshore islands of Yemen combine to make an ideal feeding and breeding area for seabirds, notably Red-billed Tropicbird (*Phaethon aethereus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Sooty Gull (*Larus hemprichii*) and possibly White-cheeked Tern (*Sterna repressa*). The globally threatened White-eyed Gull (*Larus leucophthalmus*) may also breed there. All these species plus many others feed in the relatively shallow inshore waters along the coast of Yemen. Oil pollution, disturbance from military activities, port developments and planned tourist facilities may all have an adverse effect on the seabirds. The lack of recent information on the status of these birds in Yemen makes specific recommendations impossible. However, priority should be given to an ornithological survey of the offshore islands.

□ **Waterbirds**

Freshwater habitats are rare in Yemen. Concentrations of ducks and grebes occur in just two areas (both recently created sewage lagoons) but rarely exceed 1000 birds. These, together with the new dam at Ma'rib, may result in a notable increase in the numbers of waterbirds in winter; they have already led to some species breeding for the first time in Yemen.

For wading birds, coastal areas are important, particularly where wadis reach the sea. While comprehensive counts have not been undertaken it would appear that the biologically rich mudflats are particularly important for the following species: Carb Plover (*Dromas ardeola*), Greater Sand Plover (*Charadrius leschenaultii*), Lesser Sand Plover (*Charadrius mongolus*), Sanderling (*Calidris alba*), Little Stint (*Calidris minuta*), Curlew Sandpiper (*Calidris ferruginea*), Bar-tailed Godwit (*Limosa lapponica*), Grey Plover (*Pluvialis squatarola*), and

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Redshank (*Tringa totanus*). Storks, herons and egrets also occur on passage in small to moderate numbers but no important concentrations have been discovered. White Storks (*Ciconia ciconia*) winter in small numbers at freshwater sites and breeding species include Abdim's Stork (*Ciconia abdimii*) (on Tihama rooftops), Reef Heron (*Egretta gularis*) (coast), Cattle Egret (*Bubulcus ibis*) (trees on Tihama and foothills), Green-backed Heron (*Butorides striatus*) (mangroves), and Pink-backed Pelican (*Pelicanus rufescens*) (mangroves); though none have been censused. Despite the close proximity of many breeding colonies to villages and human activities, there is no evidence of interference or persecution. The highest conservation priority concerning waterbirds is of course the Bald Ibis, mentioned under 'Globally Threatened Species'.

□ **Raptors**

Raptors frequently suffer more than other species in terms of both indirect (e.g. pesticide pollution) and direct persecution. However neither is common in Yemen. As a consequence there appears to be a healthy raptor population with some 17 resident species and a further 15 occurring regularly on passage or in winter. The limited information suggests that the country is in the path of an important flyway, at least in autumn, for migrant Steppe Eagles (*Aquila rapax*), Buzzards (*Botu spp.*) and Black Kites (*Milvus migrans*) passing from their Palearctic breeding grounds to their main wintering area in East Africa. Clearly there is an international responsibility to ensure that these birds are unmolested.

□ **Migrant and Wintering birds**

Over 220 species have been recorded on migration in Yemen; mention has been made already of the waders, white storks and raptors. A number of passerines or near-passerines also occur on migration and/or in winter in what appear to be significant numbers. These are Golden Oriole (*Oriolus oriolus*), Bee-eaters (*Merops spp.*), Short-toed Lark (*Calandrella brachydactyla*), Swift (*Apus spp.*), Swallow (*Hirundo rustica*), Tawny Pipit (*Anthus campestris*), Yellow Wagtail (*Motacilla flava*), White Wagtail (*Motacilla alba*), White throated Robin (*Irania gutturalis*), Black Redstart (*Phoenicurus ochrurus*), Redstart (*Phoenicurus phoenicurus*), Stonechat (*Saxicola torquata*), Isabelline Wheater (*Oenanthe isabellina*), Pied Wheater (*Oenanthe pleschanka*), Olivaceous Warbler (*Hypolais pallida*), Menetries' Warbler (*Sylvia mystacea*), Desert Lesser Whitethroat (*Sylvia curruca minuta*), Chiffchaff (*Phylloscopus collybita*), Isabelline Shrike (*Lanius isabellinus*), and Great Gray Shrike (*Lanius excubitor*).

□ **The Arabian Bustard (*Ardeotis arabs*)**

Within the Arabian Peninsula, Yemen is probably now the only country with a self-sustaining population of Arabian Bustards. This may in fact be partly supplemented by migrants crossing the Red Sea. The species may be threatened from hunting on the Tihama, the only place where this bird occurs in the country.

15.3 Threats to biodiversity

15.3.1 Threats to Vegetation

The country's vegetation is being drastically reduced by rapid degradation of the environment, a direct result of desertification and droughts, among the oldest global environmental phenomena. These phenomena have increased drastically in Yemen and threaten about 90% of the land and can be attributed to the following:

- Cultivation and poor agricultural practices;
- Wood cutting for firewood, timber and charcoal;
- Over grazing;
- Soil Salination;

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- Wind erosion and Sand dune encroachment; and
- Construction expansion in cities and villages.

15.3.2 Threats to Terrestrial Fauna

Threats to terrestrial fauna in Yemen are common to many countries in the regions and are mainly:

- Destruction, degradation and loss of habitats;
- Over-hunting and proliferation of firearms; and
- Road construction opening up avenues into the hinterland.

15.3.3 Threats to Freshwater Biodiversity

Threats to freshwater biodiversity in ranking order of importance include:

- Overuse and depletion of water;
- Degradation of wetland ecosystems;
- Improper application of pesticides;
- Use of chemical fertilizers;
- Contamination of ecosystems with sewage; and
- Contamination by industrial waste.

15.4 The NBSAP Process

The formulation of the NBSAP involved a wide range of consultations and interactions among the project coordinators, the technical working groups, EPC staff and its steering committee, national and international experts and the civil society including NGOs, universities and local communities. The diagram below provides a graphic representation of the BDSAPY process and outputs. The process is iterative and has proceeded towards completion in a participatory fashion.

1st Phase (Stocktaking)

- Data collection
- Biological resources inventory
- Value of biological resources and their diversity
- Identify gaps in data
- Identify major threats and opportunities

2nd Phase (prioritisation)

- Identify goals
- Analyse impacts and benefits
- Estimate resource-needs
- Set priorities

3rd Phase (Action planning)

Activities that achieve conservation and sustainable use

Throughout process

Evaluating effectiveness of action

15.4.1 Progress with implementation of NBSAP .

Current efforts to conserve & implement the NATIONAL BIODIVERSITY STRATEGY & action plan are restricted by lack of legislation (by-laws) & institutional weakness. The main objective can be only attained through an integrated programme of institutional, legal & policy reforms coupled with increased investment. Lack of knowledge on the importance of

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biodiversity from the public as well as the decision-makers is also one of the major constraints of the implementation.

This is partly one to lack of public awareness in the issue. In spite of the above-mentioned problem, Yemen is developing National Integrated Protected Area System. Two sites are being implemented. A unit for BD is being established at the EPC.

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Table 5 NBSAP Objectives

NBSAP Objective	Selected Agenda Action
1. Conservation of Yemen's biodiversity	<ul style="list-style-type: none"> <input type="checkbox"/> Develop a sustainable water management system. – <input type="checkbox"/> Establish in situ conservation program, in particular for endangered and rare animals and plant species and always in -Collaborative community management and other relevant social actors. – <input type="checkbox"/> Rehabilitate habitats (especially for large animals. – <input type="checkbox"/> Promote policy development for biodiversity conservation. <input type="checkbox"/> Identify and legally establish a representative system of protected areas / habitats (including wetlands) for animals and plant species. <input type="checkbox"/> Ensure community involvement in establishing these protected areas and in managing them.
2. Sustainable use of Yemen's biodiversity and related natural resources	<ul style="list-style-type: none"> <input type="checkbox"/> Establish co-management agreements and institutions for protected areas, fisheries, rangelands, water resources, integrated pest management, and lands and forests – <input type="checkbox"/> Carry out participatory rehabilitation. <input type="checkbox"/> Active research on the recovery capacity of range land and range land management systems
3. Developing and implementing specific policies, legislation and regulations concerned with biodiversity	<ul style="list-style-type: none"> <input type="checkbox"/> Adoption of executive By-laws for the EPL (26) for 1995. <input type="checkbox"/> Guideline for application of EPL -National Policy in in-situ conservation addressing wild and domesticated (cultivated) biological resources (plants and animals) <input type="checkbox"/> Policy on import-export of biological materials <input type="checkbox"/> Urban planning and land registration related to land tenure enforced in all governorates -Community participation embodied in legislation <input type="checkbox"/> Adoption of biological resource by-laws
4. Community participation in reviving traditional and indigenous knowledge and skills in natural resource management	<ul style="list-style-type: none"> <input type="checkbox"/> Survey, collect, understand and strengthen indigenous traditional resource management systems and institutions <input type="checkbox"/> Promulgate the collected information on indigenous natural resource management systems <input type="checkbox"/> Carry out social communication campaigns on the value of biodiversity, in listing local artists, elders, religious leaders and team leaders <input type="checkbox"/> Promote school clubs for the protection of nature
5. Equitable sharing of biodiversity benefits within Yemen	<ul style="list-style-type: none"> <input type="checkbox"/> Promote participatory action research on benefits and costs of conservation of biodiversity <input type="checkbox"/> Enforce equitable sharing/use arrangements for marine fishing, grazing and other uses of common Biodiversity resources balancing commercial and sustainable use <input type="checkbox"/> Strengthen local capacity for maintaining and benefiting from crops variety and diversity <input type="checkbox"/> Enforce equitable licensing system of resource management to obtain a larger market share for domesticated products harvested sustainably
6 Institutional Development and Human Capacity Building in the Field of Biodiversity	<ul style="list-style-type: none"> <input type="checkbox"/> Offer training courses on natural resource and protected areas management <input type="checkbox"/> Intensify participatory action research and collaborative management methods on protected

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	<p>areas management and methods in problem solving</p> <ul style="list-style-type: none">❑ Endorse responsibility for co-ordinating Biodiversity issues to a single government agency❑ Delegate certain responsibilities to local administrations❑ Strengthen the role of local communities and NGOs in natural resource management❑ By-laws to the existing EPL should be produced
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15.5 The EIA System

In 1995 EIA was introduced in Yemen. The legal basis for EIA is the Environmental protection Law (EPL) chapter 3, especially articles 35-43. These articles are dealing with the application of EIA on the new development projects & on existing projects including industries. Twenty-four other laws & decrees are related to EIA. All approved in the period 1990-1996. EIA has certain major benefits:

- ❑ It enables government authorities to assess the environmental effects of the proposed activities & to verify compliance with environmental laws & standards.
- ❑ It forces the investor or any one who develops an activity to take into consideration the environmental aspects to the designed & selected location.
- ❑ It offers a clear picture to the public in general of what developments will take place, their rights in the process & what authorities they have to turn for comments.
- ❑ It serves as a means of public awareness to the question of environment.
- ❑ It prevents activity from being implemented if unacceptable environmental
- ❑ Impacts are revealed.

An EIA Law was prepared in 1996 and draft by-laws were submitted by the EPC (Environmental Protection Council) and approved in late December 2000. The executive regulations, guidelines & standards provide the necessary framework for a coherent & consistent approach. The EPC acts as lead agency in the EIA procedure. This does not only apply for donor funded projects or private projects, but also for governmental projects involving one or more other government agencies, authorities or ministries. The other agencies Investment Authority will be involved as co-operating agencies. It has to be stressed that this only relates to the project component and not to responsibility for the project as a whole.

EIA is primarily project-based. EIA is mandatory for those projects that do not meet the environmental quality standards as developed by the different authorities under responsibility of the EPC & established by the cabinet resolution (art 37.1). The EPC administers the EIA process and procedures included in the EIA legislation & regulation. The EPC plays a central position in the implementation of the EIA process. The other agencies are involved as co-operating agencies.

15.5.1 Screening system

- ❑ Screening is done under the authority of the EPC. Projects are classified in the three categories: Compulsory EIA
- ❑ Exempted from EIA
- ❑ Additional data needed; a preliminary assessment may be required.

Type of activities for which EIA is mandatory

EIA is primarily project based. EIA is mandatory for those projects that do not meet the environmental quality standards as developed by the different authorities under responsibility of

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the EPC and established by the cabinet resolution (Art 37,1). It is not permissible for any competent body to give permission or issue a license to establish, operate, amend projects that affect and damage the environment, contribute to its deterioration, cause its pollution, or harm human health and other living organisms. Only in accordance with the standards, criteria, specifications and conditions that are determined and specified by the council.

15.5.2 Scoping

Scoping guidelines will be formulated by the EPA, in collaboration with the responsible authority. Public Participation Plays a role to identify : construction , operation and completion in principle the monitoring should be integrated in regular monitoring programmes of the sector ministries.

15.5.3 Reviewing

Reviewing will be according to the TOR of the EIA report, taking into account the scoping guidelines as well. The EPC has the main role in the quality of the report but can also advise on the environmental acceptability of different project alternatives

15.5.4 Monitoring

When a need for monitoring is identified during the EIA , the actual data collection should start before the project is initiated . Three main phases can be identified: construction, operation and completion. In Principle the monitoring should be integrated in regular monitoring programmes of the sector ministries .

15.5.5 Environmental Authority Responsible for EIA

The EPC has overall responsibility for the EIA. Information and advice has to be given to other parties involved in the EIA process, and the EPC maintains registers of relevant legislation.

The responsible/ competent authority (sector ministry/authority) gives a license for development to proceed. Draft and final reports are reviewed by the EPC , which safeguards against biased EIA statements.

15.5.6 Legal basis for EIA

The Environmental Protection Law (EPC), 1995; Chapter 3 especially art.35- 43. These articles are dealing With the application of EIA on the new development projects and the existing projects including industries . Twenty four other laws and decrees are related to EIA, all approved in the period 1990-1995 (see EIA Policy).

[Refer to Environmental protection law, NO(26)of 1995 (English translation),1995, Republic of Yemen and: Environmental impact assessment Policy of the Republic of Yemen 1996, Environmental protection council].

Regulations for implementation and sectoral guidelines (An EIA policy was prepared in 1996 and a draft by-law submitted to the EPC and is expected to be approved in 1997). The executive regulations, guidelines and standards will provide the necessary framework for a coherent and consistent EIA approach. The EPC will act as lead agency in the EIA procedure. This does not only apply for donor funded projects involving one or more other government agencies (...) will be involved as co-operating agencies .It has to be stressed that this only relates to the EIA project component and not to the responsibility for the project as a whole.

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15.5.7 EA implementation.

Institutional Framework for the implementation of EIA

The EPC administers the EIA process and any other requirements & procedures included in the EIA legislation and regulations. This does not only involve the responsibility for the drafting of regulations, guidelines and standards but also a central position in the implementation of the EIA process. The other agencies will be involved as co-operating agencies. There are different flow charts for three category 2 requires a full EIA, as is showed below:

The EPL established the EIA requirement in Yemen. Chapter Three of Part Three of the law requires prior EIA for projects with potential environmental impact, set out potential baseline components of the study to be carried out, establishes minimum procedural elements and provides considerations to be taken into account in reviewing the environmental impact study, after the EPL was enacted, the EPC adopted a policy which has been used as a guideline for implementing EIA in practice. This policy is incorporated in the draft general by-law to the EPL. The system of implementation so far is not effective, since the EIA is only recently introduced & certain donor-financed projects or Yemeni investment corporations bring known companies to do the EIA study. Then they bring it to EPC for approval. After reviewing EPC approves or requires certain adjustments.

15.5.8 Value of EIA

Overall, EIA resulted in "better" decisions more in broader environmental & socio-economic view points. It has resulted a little better decision from a biodiversity perspective, taking into account natural resources (flora, fauna, water --etc.).

The current system takes into account the impact of BD but this is not well-documented. In Yemen there is not sufficient capacity for review in all fields of BD. The follow-up is also not sufficiently carried out, and in certain cases it is not carried out as it should be done. EIA does not take into account the impact on BD per se, it takes into account impacts from natural resources point of view.

15.6 Biodiversity and EIA.

In Yemen, the top priority is the establishment and development of a NIPASY (National Integrated Protected Area System for Yemen). The overall objective of NIPASY is to contribute to the conservation and sustainable development of Yemen biodiversity-related natural resources by producing an integrated national protected area system plan for the country that will be adopted and approved by all sectors with activities related to land use and marine and coastal zone planning and development and to chart a course for strengthening management effectiveness in those protected sites.

The following goals are the output of the NIPASY:

- ❑ Increase the effectiveness biodiversity conservation through the systematic identification and establishment of an integrated protected area system in Yemen to include coverage of ecosystems in the terrestrial, wetland and marine environments of the country.
- ❑ By consensus identify which of these reserves are considered to be of critical importance and are requiring priority management action to assure their integrity and role in preserving the representativeness of bio-units, species and habitats in the country and provide appropriate development budgets for each.
- ❑ Develop a sound system of protected area management categories and internal zoning systems which offer potential and options managing the interaction of the RAS and communities in an environmental context that produces different benefits for the country.

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- Develop and assist in implementing management plans for selected priority protected areas; tentatively one terrestrial, one wetland and one marine reserve.
- Address institutional and management issues to promote more effective management of NIPSY to be incorporated into strategies of national and regional action.

15.6.1 The integration of Biodiversity & EA

□ **Screening.**

- Screening is carried out under the authority of EPC. The EPC has created a unit for Biodiversity with certain ideas and data about protected areas. This helps to some extent but is not sufficient. In Yemen, projects are classified in three categories:
- Compulsory EIA
- Exempted from EIA
- Additional data needed, (a preliminary assessment may be requested).

There are certain data available on biodiversity, for example the location of protected areas and distributions of endangered species which the EIA will take into account depending on its location.

□ **Scoping**

The scoping guide lines. The EPC plays an important role in the quality of the report, but can also advise on the environmental acceptability of different project activities.

The EIA does not include assessment of impacts on BFD.

Ecosystems are the components or levels of BD that are considered..

□ **Impact prediction.**

No field studies are carried out to collect BD data during the EA procedure. Generally this topic is included under natural resource topics.

If BD impacts are identified it is at the level of ecosystem.

Impacts on internationally protected and locally important ecosystems are likely to be considered.

□ **Mitigation.**

No mitigation measures are specified for impacts on BD.

There are no any legal requirements to implement mitigation proposals.

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□ **Impact evaluation.**

BD values are taken into account in decision making.
Impacts on BD are not explained in EIS.
BD issues are overridden by economic consideration.

□ **Review.**

- The review system is according to the TOR of the EIA report, taking into account the available data.
- There are no review criteria available for impacts on BD.
- No EIS is reviewed to assess their coverage of BD.
- The competent responsible authority gives a license. The evaluation & approval is done by the EPC. For the draft & final report this is intended as a safeguard against biased EIA statements.
- Since the BD strategies are completed, there are certain data that can be used, though the NBSAP are targeted that can be used to evaluate impacts or set mitigation requirements.
- The BD data are not suitable for meaningful assessment & mitigation. They need upgrading depending on the area or site of the study.
- I do not know any example where an EA provided Biodiversity data.

15.7 Case studies or illustrative examples

Location.

Aden Yemen(Aden free zone development project.

Proponent.

Yemen Investment & development International Ltd. (Yeminvest).

Proposal:

The proposal is to build a certain terminal on CALtex Island in the harbor of Aden & to develop an industrial estate north of the terminal. The EIA serves two primary purposes:

- First the EA provides YEMINVEST with an understanding of potentially adverse environmental impacts to allow for the incorporation of measures that can mitigate such impacts during the project design phase.
- Secondly The EIA provides the government of Yemen, The Aden Free Zone Authority & financial institutions such as The World Bank with a report that can be used to assess the environmental acceptability of project activities within prescribed guidelines.

In this case, The World Bank guidelines provided the framework for the EIA. An international company was contracted by Yemen invest to do the EIA. A multidisciplinary team of scientists completed the fieldwork. The baseline for the EIA was established using a combination of environmental studies previously conducted in the project area and additional data collected in the field together with information collected through meetings and interviews in Yemen. A detailed biological, soil, sediment & water quality analysis was conducted. Inventories of the maritime & intertidal environments of the inner harbor and the industrial estate & in the surrounding area were conducted.

Project Description.

The Aden Free Zone Development Project is developed in three separate phases. Phase 1 involved the dredging of approximately 2.5 million³ of material from the inner harbor to reclaim the area to the east & south of Caltex Island for the new container terminal.

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Environmental Impacts of the proposed project.

The potential environmental impacts of the Aden Free Zone project include construction impacts associated with the expansion of Caltex Island, the widening of the causeway to Caltex Island and the landfilling associated with the industrial estate. Operational impacts include impacts associated with the operation of the industrial estate and container terminal and the construction and operation of up to a 35-MW power plant on Caltex Island.

There are number of positive impacts associated with the project including;

1. Improved port infrastructure.
2. Increased container and other vessel traffic to the Port of Aden.
3. Creation of new jobs.
4. Attraction of light industry to the industrial estate.
5. Creation of small business opportunities for the local population.
6. Increased tax revenues, and
7. Increased availability and lower prices to consumer and industrial products.

Alternatives.

No alternative analysis of project alternatives were done in detail. It was done in terms of natural resources.

Availability of biodiversity information

No Biodiversity data were available. Only the data collected during the field study & the interviews made to different stakeholder.

Impact assessment

The potential impacts of biodiversity were taken into consideration from screening to review & follow up as a part of natural resources.

The values of biodiversity were taken as a part of natural resources. No biodiversity values were elicited.

Survey techniques

The survey done took into account the air resource, land resources, water resources and biological resources. It was acceptable in terms of timing & the staffs were professional with good qualifications.

Outcome for biodiversity

The actual outcome was positive in the long run for biodiversity impacts.

15.8 Future Actions to improve effectiveness of biodiversity conservation & sustainable use.

There are no laws in Yemen in force which deal specifically with conservation & only a small number have provisions related to certain aspects of biodiversity conservation. The BD-related provisions in the ENVIRONMENTAL PROTECTION LAW (EPL)(no.26.1995) are very general & will require detailed by-laws in order to implement. BD-related provisions in sectoral laws require comprehensive review & precise redrafting in order to harmonize them with CBD & the EPL institutional jurisdictions over biological resources require particular attention & harmonization. The national legal regime for BD & the institutional structure which implements it are the most the most fundamental elements of Yemen BD strategy without these two components, there is context for BD conservation & no mechanism for putting the related scientific concepts into practice.

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Any improvements that can be made to the EA system to enhance consideration of biodiversity is to treat biodiversity as an important topic by itself and not to put it under natural resources. . Although the term "Biodiversity "is not used in the EPL, its provision can be considered as a framework for implementing many of the obligations assured by Yemen in ratifying the CBD.

The draft by-law to the EPL established environmental standards & EIA procedures, & thus proposes a regulatory scheme governing certain aspects of biodiversity consideration. EPL Art.56 (1) require that environmental protection, pollution control & rational use of natural resources be taken into consideration be taken into taken into account by all authorities responsible for development & economic planning. The EPC legally established the EIA requirement in Yemen. Chapter three of of part three of the law requires prior to EIA for projects with potential environmental impacts, sets out baseline components of the studies to be carried out, establishes minimal procedural elements & provides consideration to be taken into account in reviewing the environmental impact study. After the EPC enacted was enacted, the EPC adopted a policy, which has been used as a guideline for implementing EIA in practice. This policy is incorporated in the daft by-law to the EPL. The EPC is the public agency with overall responsibility for EIA. It coordinates with sectoral ministries for the purposes of implementing & supervising EIA. This linkage should be strengthened.

A comprehensive national legal regime which supports all technical efforts of biodiversity conservation, plus coherence & integrity in the institution which implementing that regime are indispensable for the success of every aspect of conservation & sustainable use. In the draft by-law its absolutely important to establish criteria review which include in particular analysis of the impacts of a proposed project on BD, including cumulative impacts, analysis for carrying out the project, provision for public participation in the EIA process.

15.9 Final conclusions

The relative impacts of the EIA system would have a positive role on the biodiversity conservation & sustainable use provided, there are basic data, institution which implement the conservation, protected area & at the same time are able to provide data on the environmental situation in the selected area for the project. Since the Biodiversity Strategy is developed, it has enhanced the role EIA has to play. Because of the Strategy development, certain data are collected in certain areas.

BD concerns are not managed effectively through EIA partly because the EIA touches the biological concerns under general natural resources. EIA does not address impacts on BD in an open & informative manner and it does not encompass relevant BD values for all stakeholders.

15.9.1 Recommendations

Promote development of appropriate legal instruments and institutions, which adequately reflect both the scientific and socio-economic reality of biodiversity conservation in Yemen. A strong legal and institutional foundation will in turn help to ensure that the results of the activities identified in the Strategy and Action Plan can be maintained and even improved on over time. The following recommendations include:

- 1) Revise the existing draft of the new law on local administration to:
 - ❑ Include provisions which enable local authorities to enter into agreements with local communities to manage biological resources and share in the benefits deriving from their use, and
 - ❑ Ensure that it does not create conflicts of jurisdiction between district and local authorities and the EPC over biodiversity conservation and sustainable use of biological resources.

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2) Prepare a by-law to the EPL on protected areas system.

This activity has been started by the EPC with support from IUCN

3) Prepare a by-law to the EPL on access to genetic resources (bioprospecting).

This activity has been started by the EPC with support from the IUCN-ELP.

4) Prepare a by-law to the EPL on species conservation, which includes provisions implementing CITES.

5) To consolidate the jurisdiction of the institution with primary responsibility for biodiversity conservation, it is recommended that one of two options be adopted: either

- Create a ministry for environment and biological diversity, with a clearly defined jurisdiction in the field of biological diversity conservation and sustainable use; or
- Provide the EPC with executive powers and clearly defined jurisdiction with respect to other governmental institutions, which have sectoral responsibility for particular components of biodiversity.

Either option would require amending the EPL.

6) In sectors which have no general laws and whose activities impact biodiversity (for example, agriculture, industry and water) develop general sectoral laws which incorporate consideration of conservation of biodiversity and sustainable use of its components.

7) Prepare a national policy on ex-situ conservation addressing wild and domesticated or cultivated biological resources (plants, animals and microorganisms). Among other issues the policy should address collecting and curating biological materials, research, importation and exportation of biological materials, property rights over the collected specimens. The policy should also address issues related to the management of ex-situ conservation facilities, particularly to building human and physical capacity for establishing and maintaining ex-situ collections. The environmental impacts of reintroducing or re-establishing species conserved ex-situ should also be addressed. This policy should be harmonized with the draft by-law on access to genetic resources. After the policy is adopted, prepare a supporting by-law.

8) Prepare a national policy on research which specifically includes and promotes research on biodiversity and its components and which allocates public funding for that purpose. After the policy is adopted, either prepare a new supporting by-law or amend the existing law on universities to reflect the policy. It may be necessary to take both of these actions.

9) Prepare a national policy on public awareness which addresses the issue at all levels, including central and local governmental authorities as well as the general public. The policy should include provisions for developing a strategy to communicate information concerning conservation of biodiversity and sustainable use of its components. After the policy is adopted, prepare a supporting by-law.