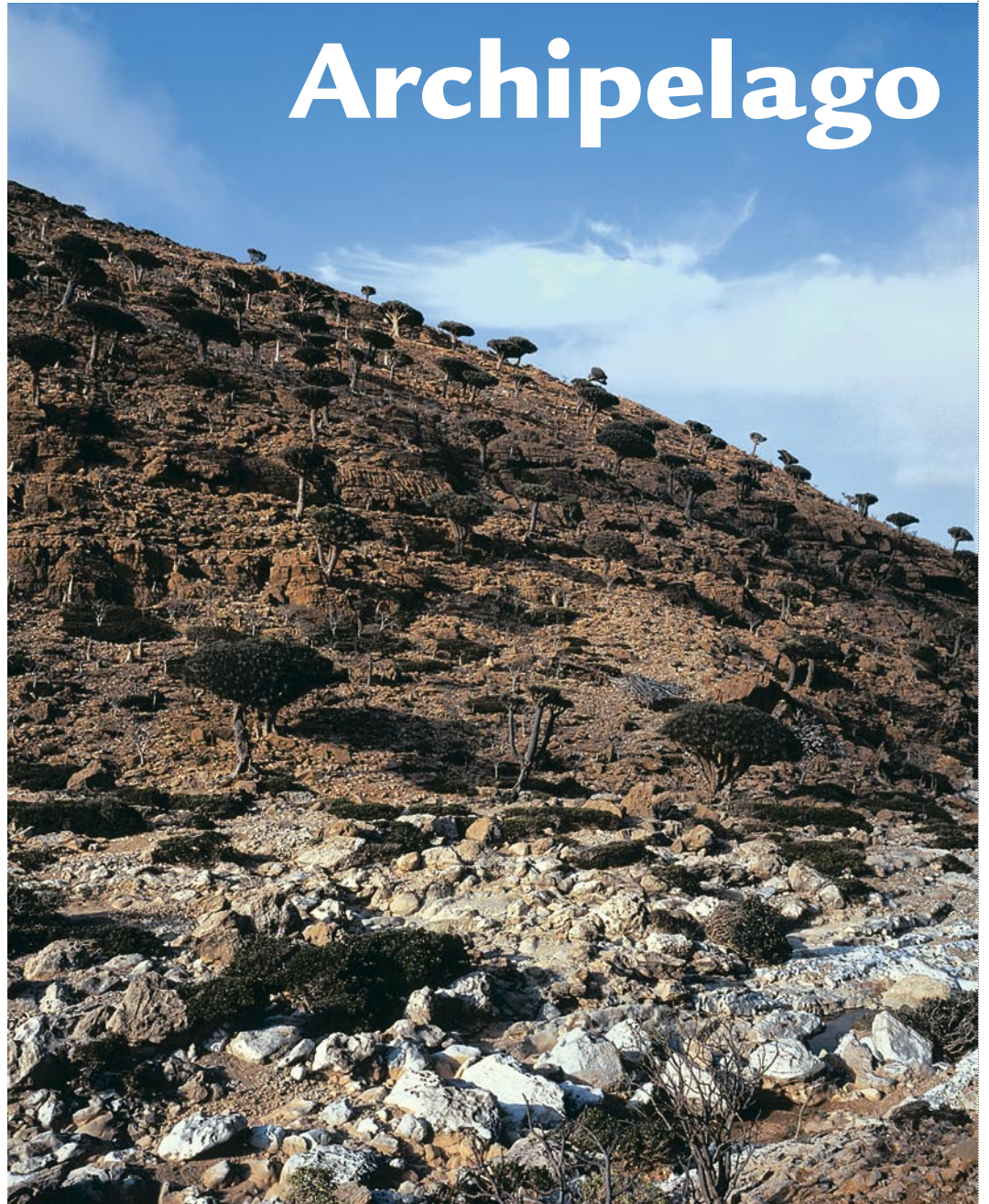


SOCOTRA

Archipelago



**Proposal for inclusion in the
World Heritage List | UNESCO**

January 2006

cover

Dracaena cinnibari

Photo by Mario Caruso

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0.

Executive
Summary

State Party

Yemen

State, Province and Region

Hadramawt

Name of Property

Socotra Archipelago

Geographical coordinates to the nearest second (*see maps at page 11*)

ID No.	Nome of the area	Discript	Corea Area (ha)		Buffer Zone (ha)		Coordinates
			Terrestrial	Marine	Terrestrial	Marine	
xxxx-001	Socotra	Hadramawt					N 12° 30' 00" - E 53° 50' 00"
			A: 242.903	a: 2.739	1: 64.845	840.325	
			B: 17.105	b: 7.157	2: 18.252		
				c: 578	3: 8.900		
				d: 1.106			
				e: 30.412			
				f: 764			
				g: 3.098			
				h: 14.187			
		sub-total	260.008	60.041	91.997	840.325	
xxxx-002	Abd Alkuri	Hadramawt					N 12° 11' 22" - E 52° 14' 21"
			11.858	a: 1.885		456.179	
				b: 2.351			
				c: 638			
		sub-total	11.858	4.874		456.179	
xxxx-003	Samha	Hadramawt	5.063	26.917		243.083	N 12° 09' 33" - E 53° 02' 32"
xxxx-004	Darsa	Hadramawt	544	17.624		109.374	N 12° 07' 25" - E 53° 16' 24"
xxxx-005	Kalfarun	Hadramawt	31	11.072			N 12° 26' 22" - E 52° 08' 08"
xxxx-006	Sabunya	Hadramawt	8	12.420		91.997	N 12° 38' 13" - E 53° 09' 26"
		TOTAL	277.512	132.948	91.997	1.648.961	
TOTAL			410.460		1,740,958.00		

Textual description of the boundaries of the nominated property

The Archipelago is located in the North-Western Indian Ocean and includes the main islands of Socotra (or Soqotra), Abd al-Kuri, Samha and Darsa, as well as the smaller islets of Sabuniya and Kal Farun, and other rock outcrops.

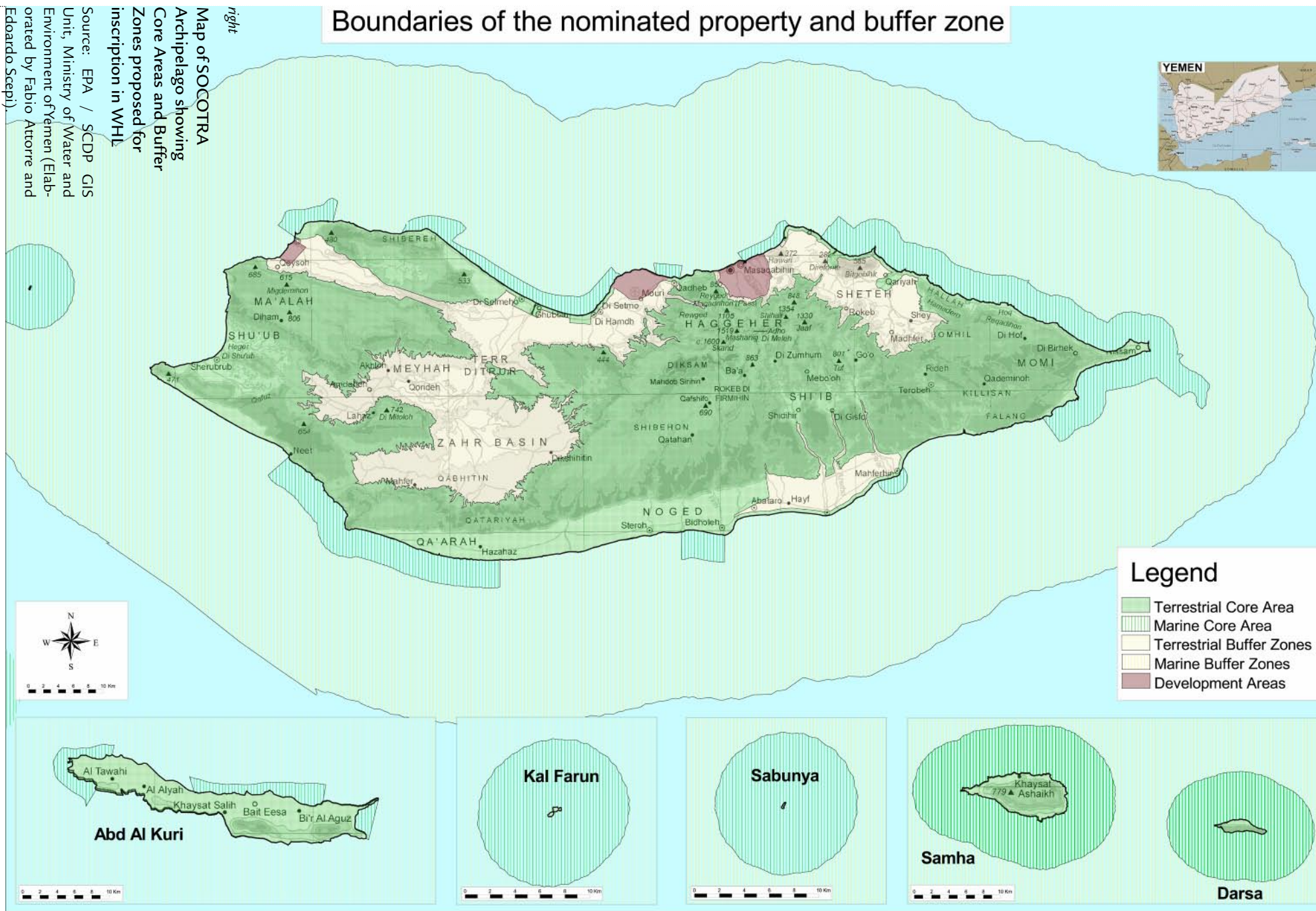
The Nominated Property includes approximately 97,5% of the archipelago's total the land area, and the quasi-totality of marine areas, extending for 12 nautical miles around the group of islands.

Boundaries of the nominated property and buffer zone



Map of SOCOTRA Archipelago showing Core Areas and Buffer Zones proposed for inscription in WHL

Source: EPA / SCDP GIS Unit, Ministry of Water and Environment of Yemen (Elaborated by Fabio Attorre and Edoardo Scapi).



Justification - Statement of Outstanding Universal Value

The Socotra Archipelago is one of the most significant and well-preserved island ecosystems in the world, containing a unique assemblage of species and habitats, and representing one of the few surviving examples of local people living in a delicate balance with their natural environment.

Due to the archipelago's relative isolation until recent years, the traditional balance established between people and nature has remained relatively undisturbed, preserving endemic species and their eco-systems. The archipelago's remarkable integrity and comparatively outstanding level of conservation, offer an exceptionally valuable opportunity to study and learn from an exceptional combination of flora and fauna, with its associated unique culture, language and traditions.

Each of the archipelago's three inhabited islands exhibits its own high level of endemism, rendering the archipelago as a whole even more significant.

Criteria under which property is nominated

CRITERION X – THE NOMINATED PROPERTY SHALL CONTAIN THE MOST IMPORTANT AND SIGNIFICANT NATURAL HABITATS FOR IN-SITU CONSERVATION OF BIOLOGICAL DIVERSITY, INCLUDING THOSE CONTAINING THREATENED SPECIES OF OUTSTANDING UNIVERSAL VALUE FROM THE POINT OF VIEW OF SCIENCE OR CONSERVATION.

The inscription of the Socotra Archipelago is proposed as a Natural Site as it contains one of the best-conserved and significant island habitats in the world. The site holds unquestioned global importance for in-situ conservation of biological diversity, and it hosts large numbers of rare and threatened endemic species of outstanding universal value (criterion X).

Due to its remote and peripheral location, and to historically difficult accessibility due to meteorological and sea conditions, the natural environment of Socotra has retained an impressive level of integrity till present date, making it the equivalent of a precious Noah's Ark, where ancient flora and fauna, as well as an associated unique culture and traditions, have survived until present day.

Name of contact information of official local institution/agency

Organization:

Socotra Conservation and Development Programme (SCDP), Ministry of Water and Environment (MOWE) / Environment Protection Authority (EPA), Yemen

Address: PO Box 16494, Sana'a, Yemen

Tel.: +967 1 425310

Fax.: +967 1 425309

E-mail: scdp@y.net.ye and aferyani@socotraisland.org

Web address: www.socotraisland.org

1.

Identification
of the
Property

1a. Country

Yemen

1b. State, Province and Region

Governorate of Hadramawt

1c. Name of Property

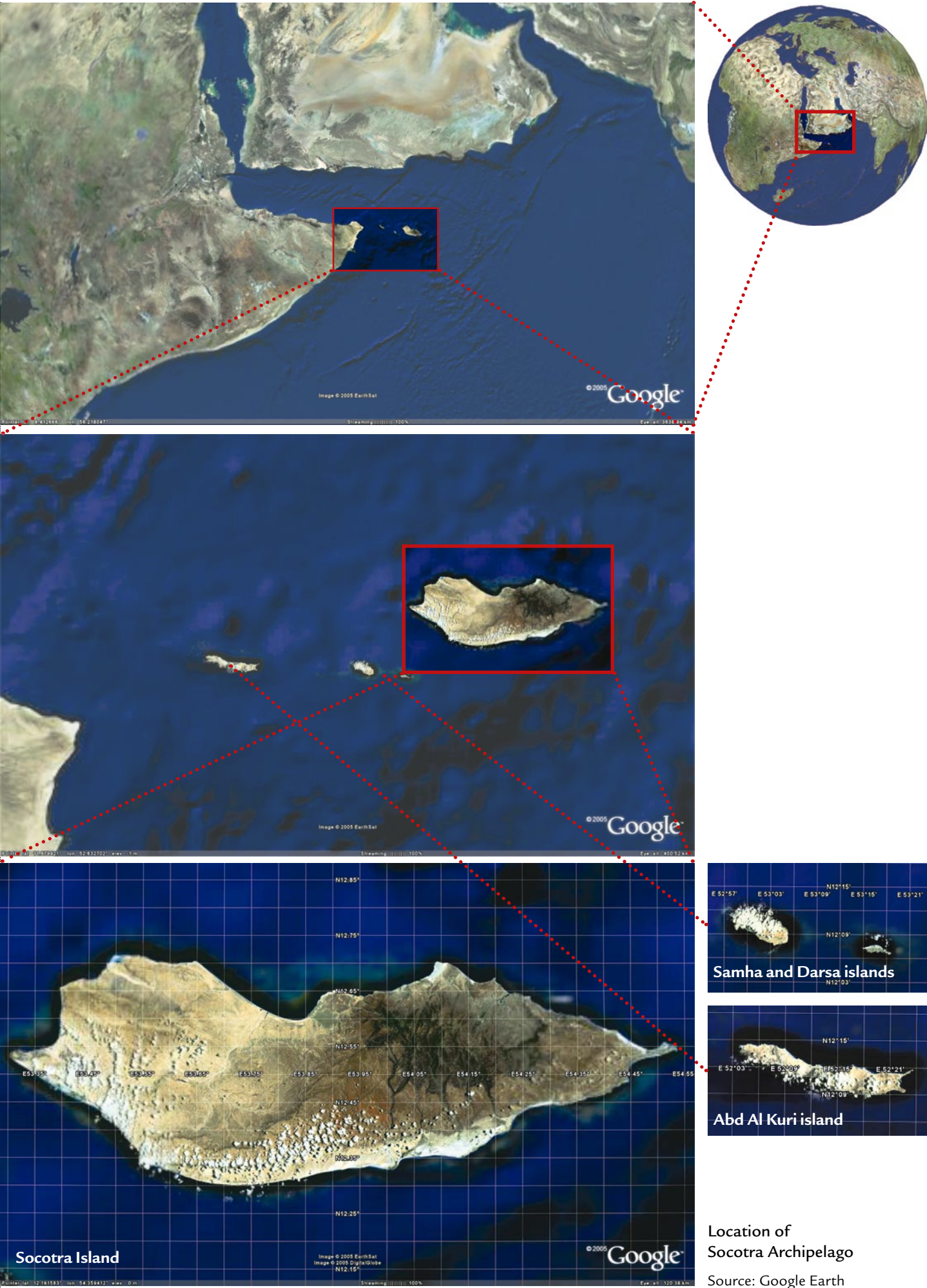
SOCOTRA Archipelago

1d. Geographical coordinates
to the nearest second

ID No.	Nome of the area	Discript	Corea Area (ha)		Buffer Zone (ha)		Coordinates
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				e: 30.412			
				f: 764			
				g: 3.098			
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		TOTAL	277.512	132.948	91.997	1.648.961	
TOTAL			410.460		1,740,958.00		

see maps at page 11

Socotra Archipelago

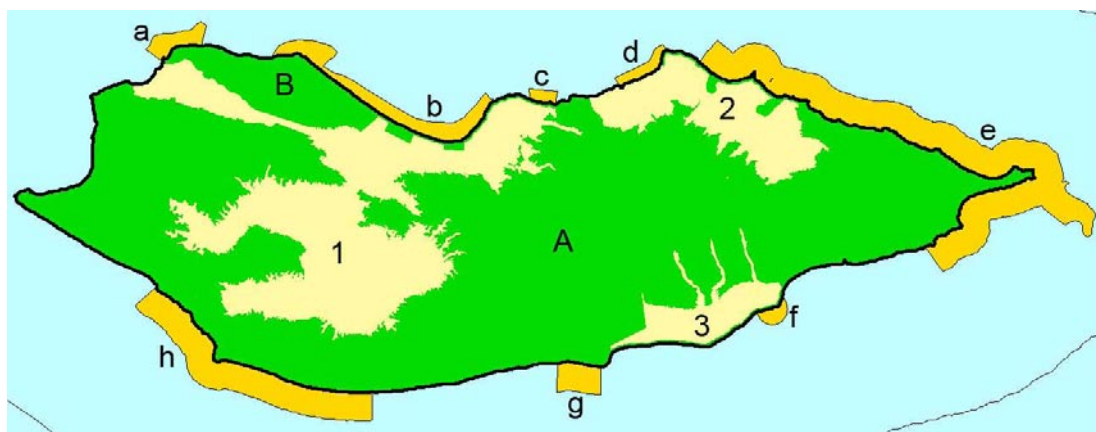


1e. Maps and plans, showing the boundaries of the nominated property and buffer zone

ID No.	Content	Page
001	Satellite views of Socotra Archipelago, Yemen <i>Source: Google Earth</i>	10
002	Satellite view of Socotra <i>Source: Socotra Conservation and Development Programme (SCDP), Environment Protection Authority (EPA) - Ministry of Water and Environment (MOWE), Yemen.</i>	12
003	Map of Socotra Archipelago showing core areas and buffer zones for inscription in WHL <i>Source: EPA / SCDP GIS Unit, Ministry of Water and Environment of Yemen (Elaborated by Fabio Attorre)</i>	6, 13
004	Map of Socotra Archipelago <i>Source: Socotra Conservation Fund (SCF) & Friends of Socotra (FOS)</i>	14
005	Map of Socotra Archipelago <i>Source: The Royal Geographic Society</i>	15
006	Socotra Archipelago Master Plan - Main Regions of Socotra <i>Source: EU Socotra Masterplan project - Socotra Conservation and Development Programme (SCDP), Ministry of Water and Environment of Yemen</i>	16
007	Socotra Archipelago Master Plan - Socotra Main Features <i>Source: EPA/MOWE/SCDP - EU Socotra Masterplan project, Yemen</i>	17
008	Average Annual Rainfall (2002-2005) <i>Source: DSS Unit, EPA-SCDP</i>	27
009	Socotra Archipelago Master Plan -Existing Agricultural Enterprises <i>Source: EPA/MOWE/SCDP - EU Socotra Masterplan project, Yemen</i>	88
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012	Socotra Archipelago Master Plan - Location of Existing and Proposed Strategic Roads and Tracks <i>Source: EPA/MOWE/SCDP - EU Socotra Masterplan project, Yemen</i>	122

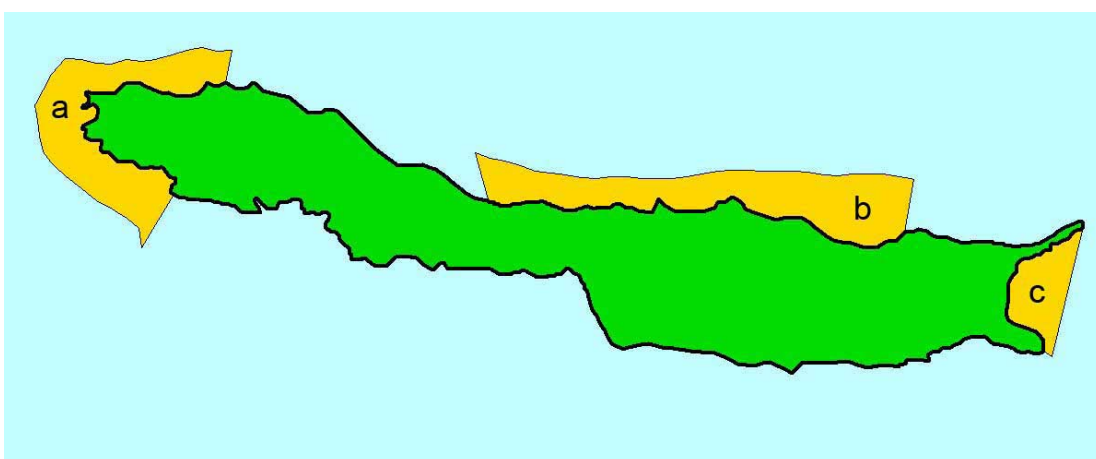
Right

Map of SOCOTRA showing the Core (in green and dark yellow) and Buffer zones (in light yellow and light blue)



Right

Map of Adb Alkuri showing the Core (in green and dark yellow) and Buffer zones (in light blue)



right

Satellite view
of SOCOTRA and DARSA
islands

Source: Socotra Conserva-
tion and Development Pro-
gramme (SCDP), Ministry of
Water and Environment of
Yemen.

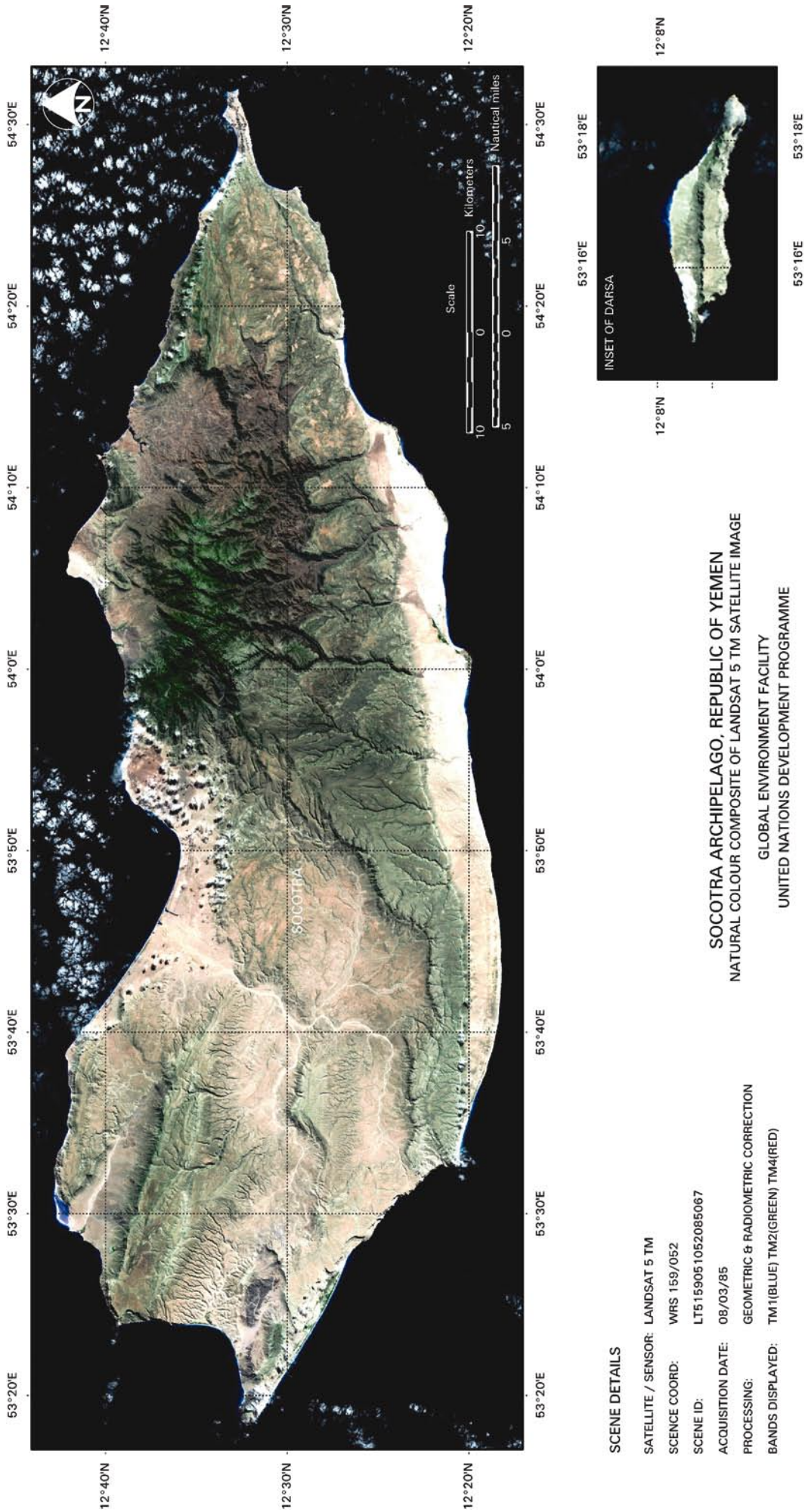
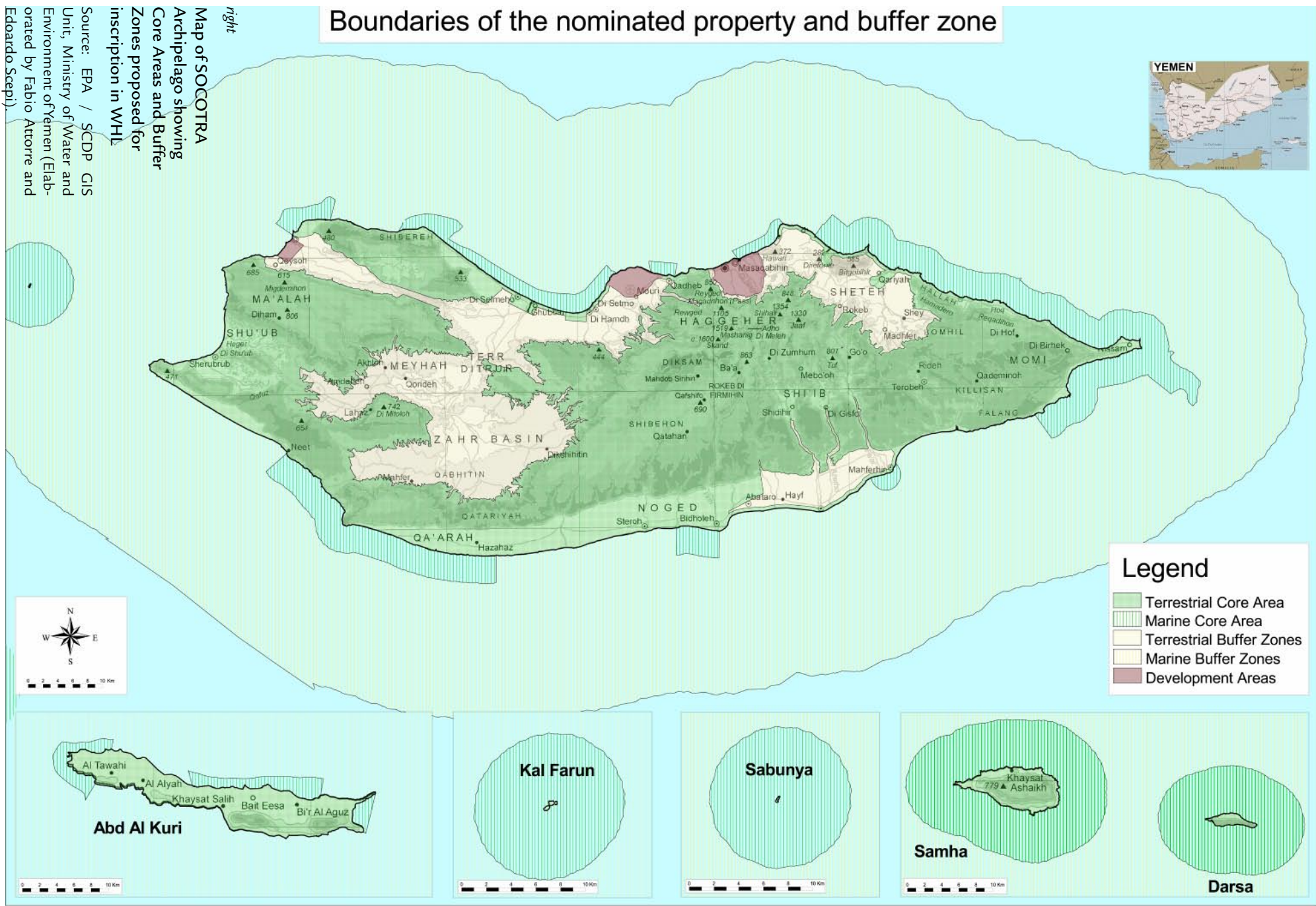


Figure 3: Natural colour composite of the Landsat 5TM image (8th March 1985) of Socotra

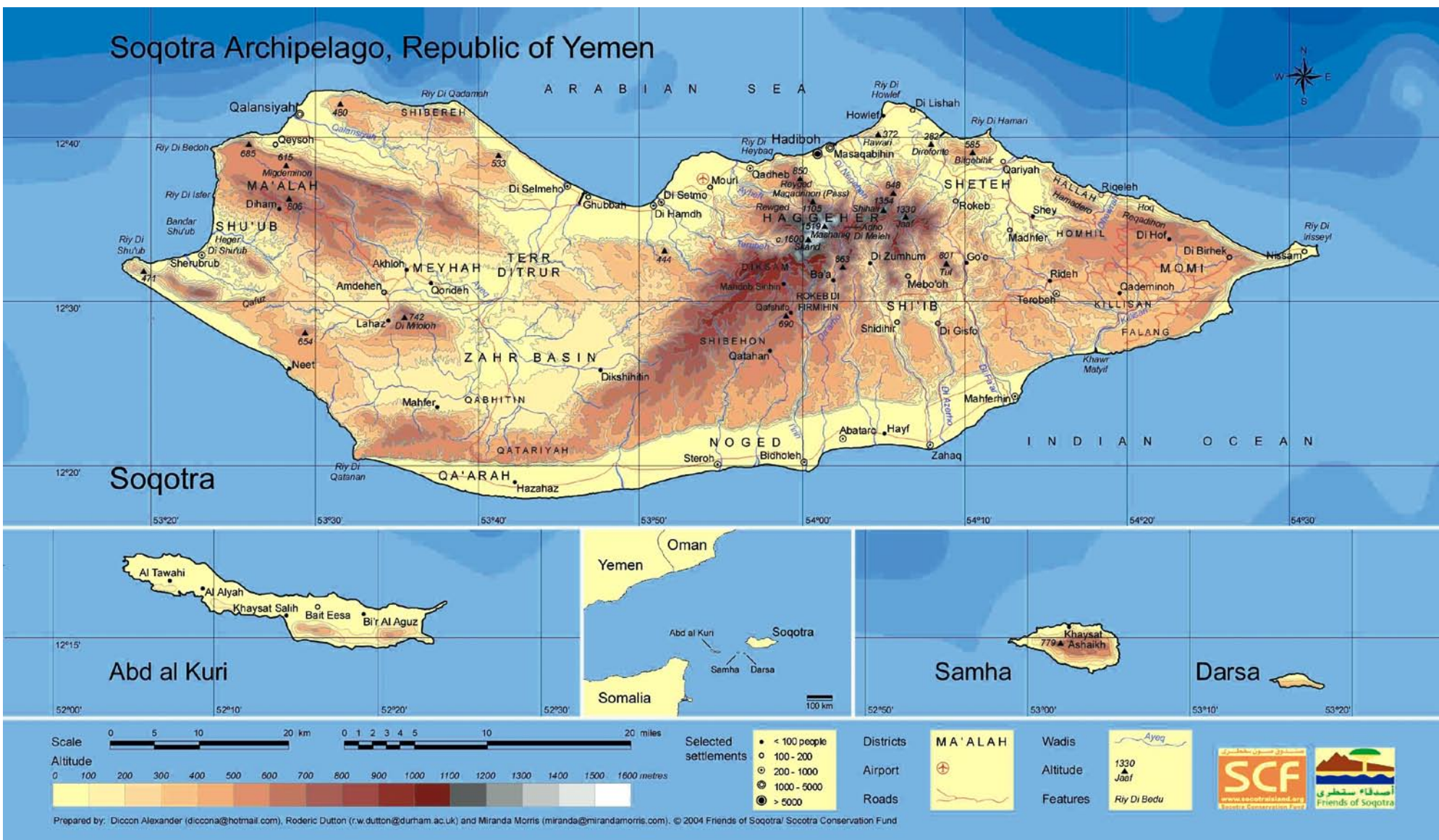
Boundaries of the nominated property and buffer zone



right

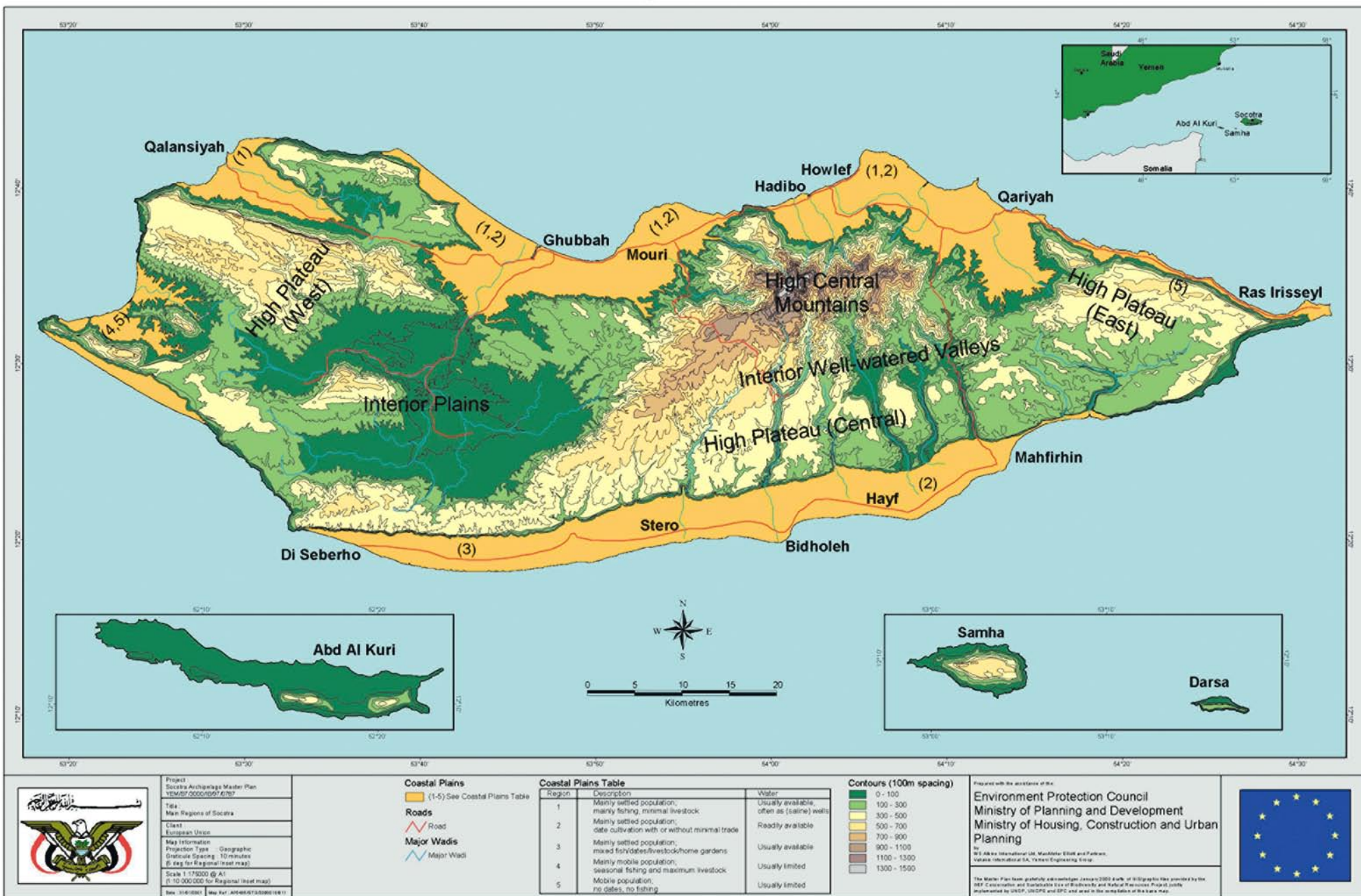
Map of SOCOTRA
Archipelago

Source: SCF & FOS



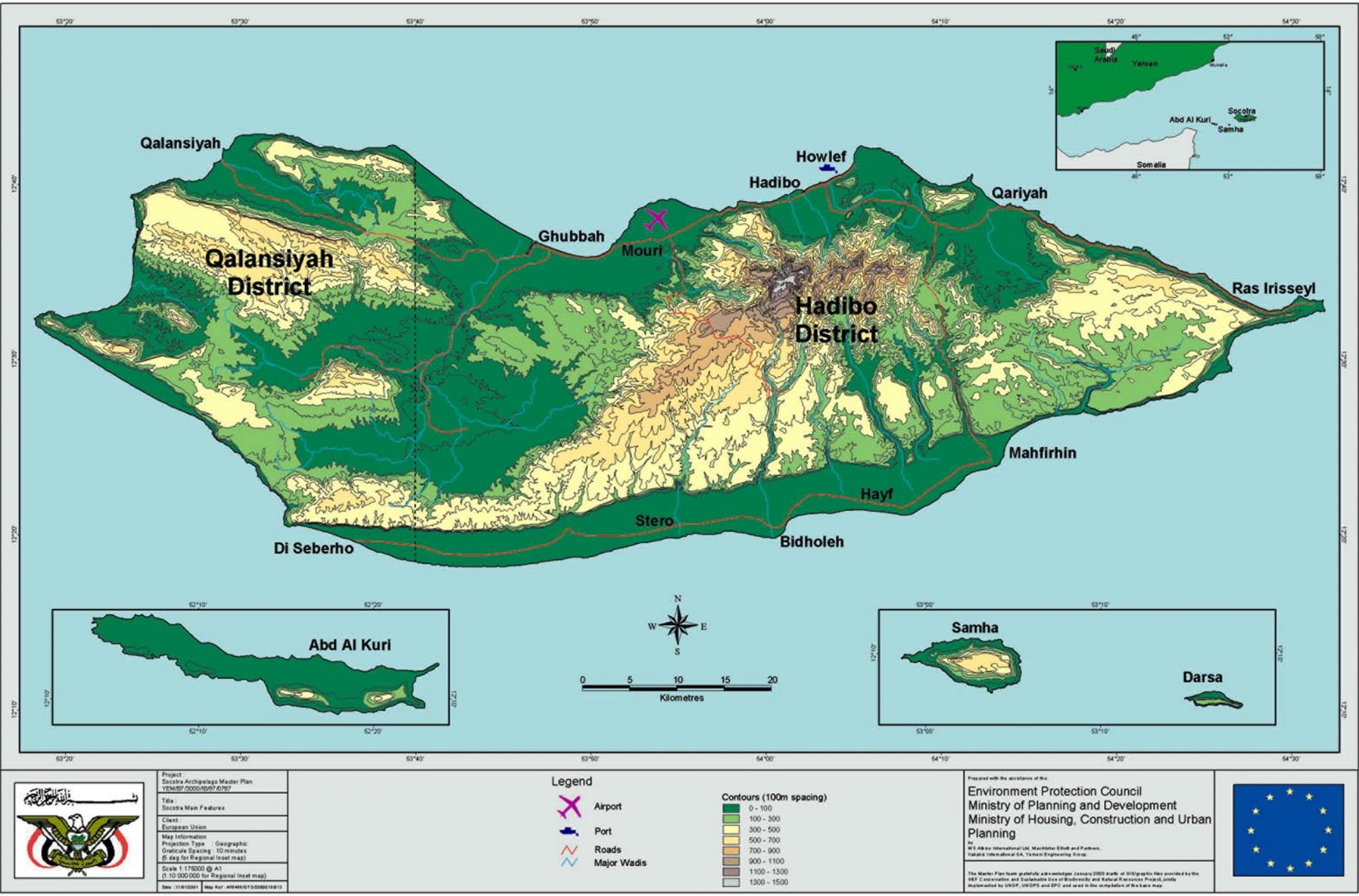
SOCOTRA ARCHIPELAGO MASTER PLAN

Main Regions of Socotra



SOCOTRA ARCHIPELAGO MASTER PLAN

Socotra Main Features



Project : Socotra Archipelago Master Plan
 YEM/SP/2000/100/0767
 Title : Socotra Main Features
 Client : European Union
 Map Information : Geographic
 Projection Type : UTM
 Scale : 1:175000 @ A1
 (1:10 000 000 for Regional inset map)
 Date : 11/01/2001 Map Ref : AF040101000000010

Legend

- Airport
- Port
- Roads
- Major Wadis

Contours (100m spacing)

- 0 - 100
- 100 - 300
- 300 - 500
- 500 - 700
- 700 - 900
- 900 - 1100
- 1100 - 1300
- 1300 - 1500

Prepared with the assistance of the:
 Environment Protection Council
 Ministry of Planning and Development
 Ministry of Housing, Construction and Urban Planning
 By : IREDA International Ltd, Manchester, United Kingdom
 YEM/SP/2000/100/0767
 The Master Plan team gratefully acknowledges January 2000 draft of GIS data provided by the
 YEM/SP/2000/100/0767
 YEM/SP/2000/100/0767
 YEM/SP/2000/100/0767





above

Dracaena cinnibari

Photo by Mario Caruso

1f. Area of nominated property (ha.) and proposed buffer zone (ha.)

Based on the Conservation Zoning Plan (see 1.e and section 5), the areas (in ha.) of the Socotra Archipelago and its different zones were calculated using the Geographic Information System (GIS) of the Environment Protection Authority (EPA), of the Ministry of Water and Environment of Yemen.

These are summarised the following table:

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		TOTAL	277.512	132.948	91.997	1.648.961	
TOTAL			410.460		1,740,958.00		

see maps at page 11

The areas of Core and Buffer Zone correspond to the following classification from the Archipelago's Conservation Zoning Plan*:

Core Zone = total of all Nature Sanctuaries and National Park areas (*terrestrial and marine*)

Buffer Zone = total of all Natural Resource Use areas (*terrestrial and marine*)

 *An accurate GIS elaboration of areas was conducted by the EPA GIS unit for the purpose of this nomination. A slight difference was noted between the total size of areas presented in this nomination (2006), and the corresponding total areas listed in the CZP (2000). This is due to improvements in the quality of GIS analysis by EPA, subsequently to the approval of the CZP.

GIS data presented here may therefore be considered as more accurate than data available in year 2000. The table and associated map were also elaborated and reviewed with external assistance by Dr. Fabio Attorre of the University of Rome, Italy.

2.

Description

2a. Description of Property

Significant features

The archipelago includes the main island of Socotra and the three smaller islands of Samha and Darsa – also known jointly as “The Brothers” – and Abd al-Kuri. Other minor rock outcrops are Qa’al Fir’awn (Kal Farun), two connected rocks to the north of Abd al-Kuri, and Sabuniya, two connected rocks to the west of Qalansi-yah.

Socotra Island lies in the north-western corner of the Western Indian Ocean, at the junction between the Gulf of Aden and the Arabian Sea at 12°30’N 54°00’E, some 380 km south-east of Ras Fartak on the Gulf of Aden coastline of Yemen and about 250 km east of Cape Guardafui, the tip of the Horn of Africa. The island is approximately 110 km long and about 40 km wide, with a total surface area of 3625 km². Its highest elevation is at Jabal Dryet (1526 m) in the central Haggier Massif.

The rocky island of Abd al-Kuri is almost halfway between Socotra and Cape Guardafui, approximately 80 km east of the cape. It is approximately 33 km in length and about 2-5 km across from north to south, with a total area of about 133 sq km.

The island of Samha, with a total area of about 41 sq km, is located 60 km east from the western tip of Abd al-Kuri.

The smaller and uninhabited island of Darsa lies 17 km east of Abd al-Kuri.

Physical attributes

Socotra

The island of Socotra can be divided into three main zones:

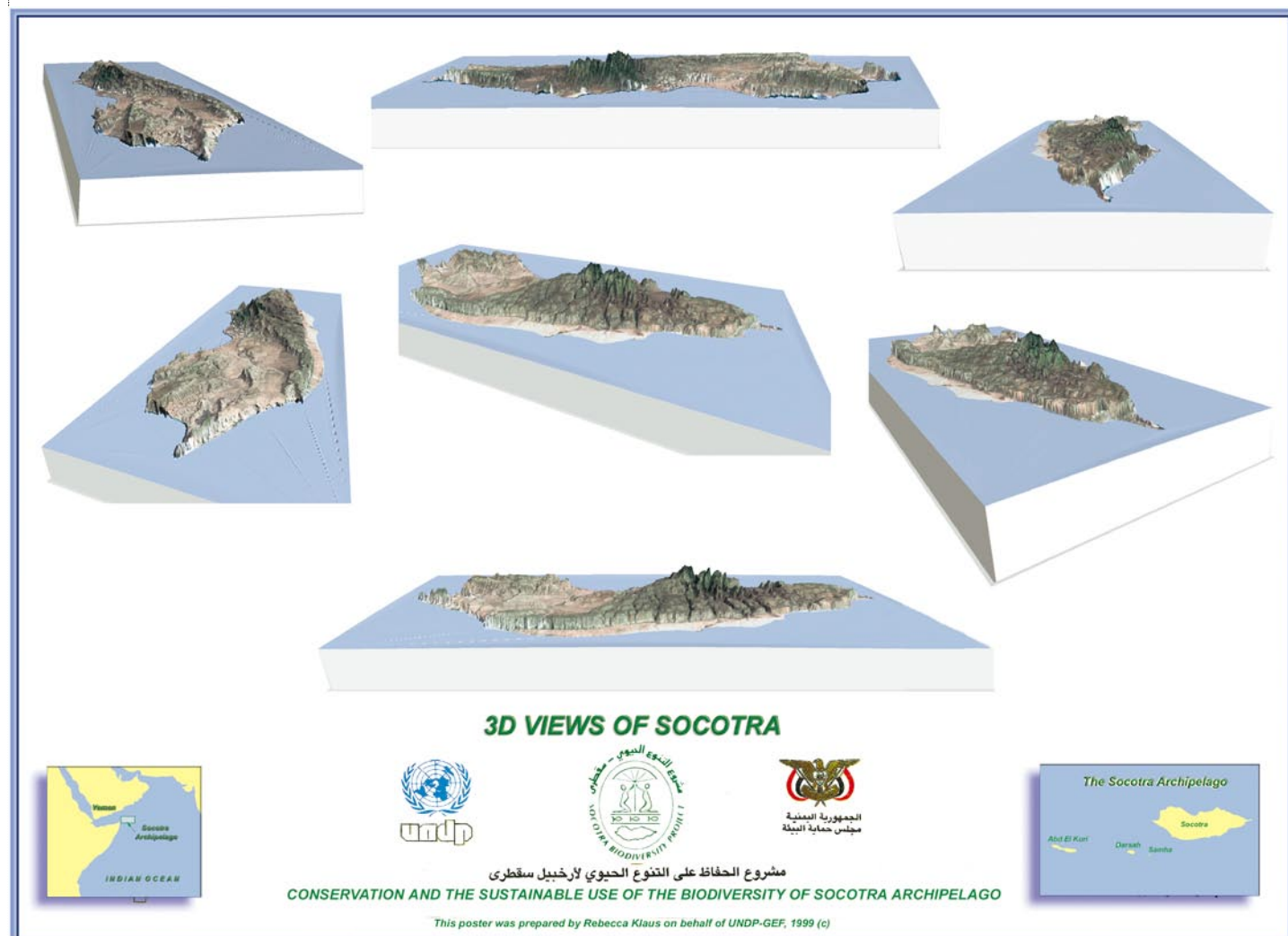
1. The Hajhir Mountains;
2. The limestone plateaux; and
3. The alluvial coastal plains

The backbone of the island is formed by the Haggier mountains located in the northwest of the island. With their jagged granite peaks, these mountains rise dra-

matically along their sheer northern face and slope off more gently along the southern and eastern flanks (PORTER & STONE 1996).

The limestone plateaux surround this elevation to the east, west and south, covering most of the island and averaging 300-700 m in altitude. They drop away at the edges in steep cliffs and are eroded on the surface into a karst topography (PORTER & STONE, 1996).

The southern coastal plain, which is 4-7 km in width, stretches over 60 km along the southern coast. It is terminated northwards by a precipitous escarpment averaging about 400 m in elevation. Southwards it descends in terraces, the marine sediments of which meet a strip of dunes at the shoreline and continue at a shallow gradient over at least 15 km out into sea. A much more irregular coastal plain occurs in the north, backed by the deep slopes of the plateau edge. This plain is less barren than the southern plain and is interrupted to the east by a number of headlands which



break it up into several small enclosed fertile areas to the north of the Hagghier Range (BEYDOUN & BISHAN, 1970; PORTER & STONE, 1996).

Abd al-Kuri

The island of Abd al-Kuri presents a range of mountains running the length of the island, those on the eastern end with two summits of 576 m and 743 m, and western hills also extending along the southern shore, rising to 268 m. The centre of the island is low lying with lower ranges of hills, outcrops of granite and a conglomerate, on the northern side interspersed with valleys. Level areas of the island consist of

above

3D virtual views
of Socotra

Source:
EPA/MOWE/SCDP, Yemen

raised beaches some 10.5 m above the present sea level; these extend to the foothills of the principal mountain range, which consists of granite capped by a layer of limestone. The north coast has sandy beaches with rocky points, whereas the south coast consists of sheer cliffs, except for a wide sandy bay in the centre of the island known as Ayrshire Bay (DOE, 1992).

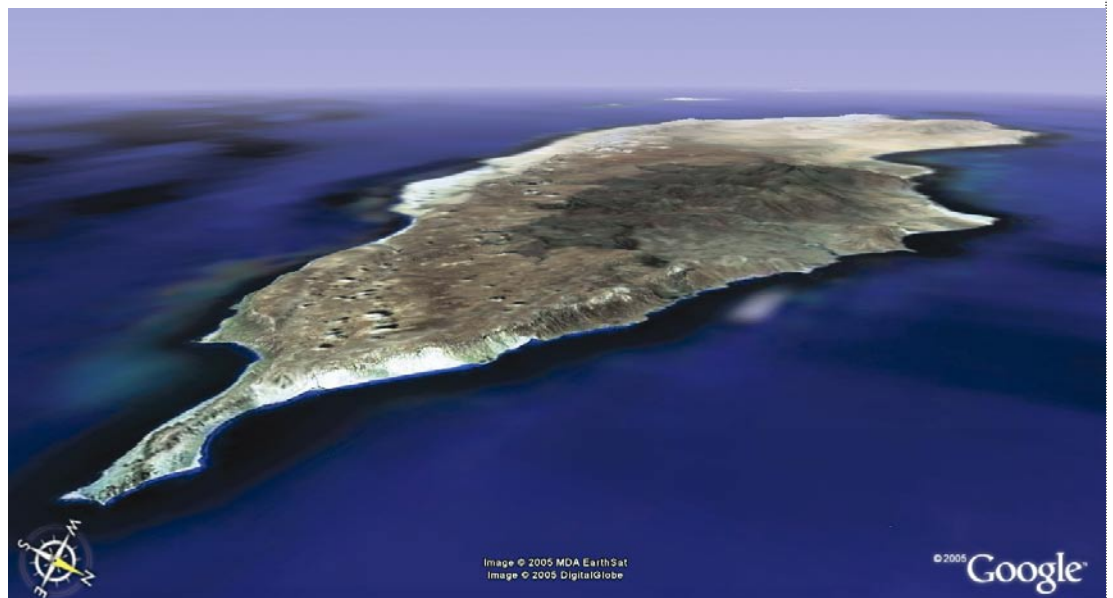
Samha and Darsa

Samha is largely desertic in aspect. The centre of it is dominated by a flat-topped limestone plateau the summit of which slopes gently upwards from the east to the highest point at c.680m in the west. The plateau is surrounded on all sides by steep cliffs dropping to the boulder-strewn foothills that cover the rest of the island. Along most of the coastline the foothills drop directly to the sea and there is little or no coastal plain, except in the west where a low, sandy peninsula extends c.2km into the sea.

below

Satellite 3D view
of Socotra

Source: Google Earth





View of the Wadi
Dahero, Mountains

Photo by Nigel Pavitt

Geology and Paleogeography

Until recently, the geology of the Socotra Archipelago received little attention. Most articles published in the late 19th and early 20th century were mainly descriptions of samples that had been collected by visitors to the islands. Beydoun and Bichan (1970) carried out the first comprehensive study, while Fleitmann et al. (2004) provided the most recent review of the geological history of Socotra.

The Socotran Platform, as part of the supercontinent Gondwana, was, at that time, nearest to Madagascar, India and the east coast of the African mainland. The archipelago, part of the African-Arabian tectonic plate, separated from the horn of Africa during the tertiary, by the same series of dislocation that produce the Gulf of Aden (WRANIK, 1998).

It comprises an igneous and metamorphic basement dating from the Pre-Cambrian Era and a complex of early Paleozoic volcanic rocks, which are overlain by a mantle of limestones, marls and sandstones from the Cretaceous and Eocene age. Intrusive granites of Hajhir massif break through the older metamorphic and magmatic formations. The backbone of Socotra (formed by the igneous Haggier) towers above the surrounding limestone plateau, the surface of which exhibits karst characteristic. Important caves and karstic formations have recently been discovered underlying some sections of the plateaux.

The Late Jurassic to Early Cretaceous break-up of eastern Gondwanaland, the simultaneous failed rifting of the Arabian Peninsula and the Oligocene-Miocene rifting of the Gulf of Aden are the three main tectonic events associated with the movement of the Arabian, African and Indian Plates, which affected the Socotran Platform (Brise et al. 1997). During the Tertiary period, the Socotra Islands were located close to the Hallaniyat Islands off the coast of Dhofar, Oman. Both basal siliciclastic and limestone deposits are continuous with corresponding layers in Somalia and Dhofar, and two major faults occurring in southeastern Socotra represent a continuation of the Masirah Fault in Oman (Samuel et al. 1997, Fleitmann et al. 2004).

Based on depositional evidence it seems likely that the continental promontory on which Socotra is located separated from Africa some 36 million years ago, at about

the same time as the rifting that created the Gulf of Aden, while the archipelago probably detached from Africa about six million years ago (see Beydoun & Bichan 1970, Fleitmann et al 2004 and Klaus & Turner 2004 for more details).



this page

Views of Hoq Cave

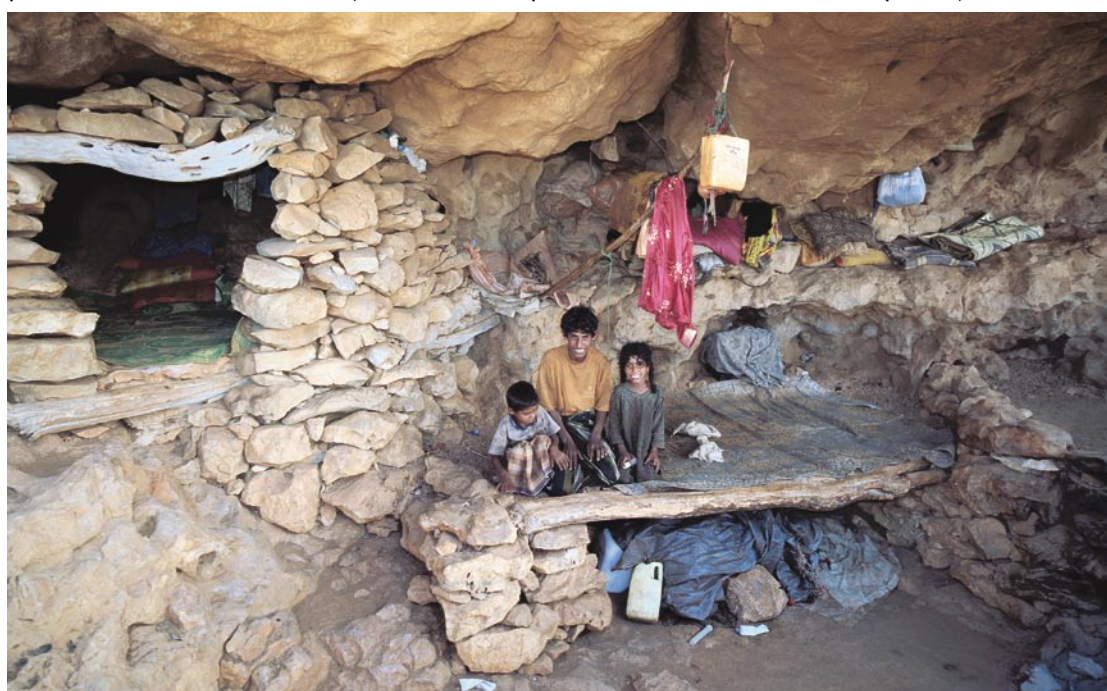
Photos by Peter de Geest

Cave Systems

Socotra possesses a number of sizable cave systems found within the limestone plateau that stretches over much of the island, averaging between 300-700m in elevation. These have only recently begun to be explored by a team of international scientists in co-ordination with Yemeni authorities and academics. While local inhabitants have made use of smaller caves for centuries, some of the most extensive systems have only been discovered in the last few years, and their importance has yet to be fully ascertained. A total of over 22km of caves has so far been explored for the first

time and mapped in recent years, and therefore are not yet exposed to significant pressure from i.e. visitors (with the exception of the accessible Hoq cave).

Cave	Length (in mt)	Depth	Latitude	Longitude	Altitude
GINIBA	7500	-84	12 26 06,5	53 56 21,4	404
HOQ	3112	89	12 35 11,6	54 21 15,4	335
PIT	1789	-145	12 25 23,1	53 56 41,6	400
DILGAGHAI	1662	-90	-	-	-
EHRER	1615	-6	12 33 00,5	54 27 35,6	250
KASEKAS	963	-50	12 33 20,0	54 18 33,3	542
DIGEILEI_HATA	869	-79	12 30 31,0	53 56 19,0	970
DISDAIDE	700	-47	12 33 00,1	52 19 92,4	508
GUDUM	509	-109	12 38 41,1	53 26 07,6	525
DILHAILHE	454	-55	12 29 55,4	53 56 44,7	878
FOSREHER	400	-100	12 37 37,4	53 30 44,2	626
EHRER CENTRAL	390	98	12 33 0,5	54 27 35,6	350
STJEETAF CAVE	376	49	12 24 40,4	54 01 38,6	365
TAITI'S CAVE	357	-19	12 36 57,4	53 57 24,4	110
DAHAI SI	355	-15	12 34 03,1	54 17 21,5	588
AFUR NUETET	326	-7	12 39 53,5	53 41 19,1	10
HARDWICKI	143	7	12 34 23,5	53 55 20,6	277
AFUR NABHOR 2	125	-18	12 24 12,1	54 06 41,1	354
HALAN	118	-83,5	12 27 18,0	53 55 59,5	683
DEJUB	100	14	12 23 4,42	54 00 56,6	130
AFUR NABHOR 1	91	-58,5	12 25 18,8	54 06 38,1	307
DEGOPAHIR	90	-40	12 30 23,0	53 56 12,0	964
IRON POLE	79	-26	12 26 11,8	53 29 53,2	404
DILEUTI	60	-37	12 28 01,6	53 59 12,8	655
DIHAPAK	40	-17	12 28 36,3	53 58 50,7	707
DIHAVRHAN	35	-3	12 24 55,5	54 07 40,7	65
DAHFERHEN	23	-22,5	12 28 12,2	54 13 13,8	445
BAT CAVE	20	1	12 30 23,3	53 33 27,4	175
TOTAL:	22.301 m (22.3 km)				



right

People living in a cave

Photo by Nigel Pavitt

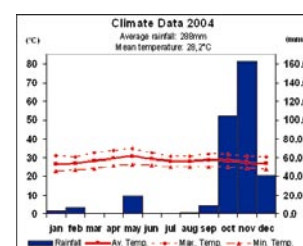
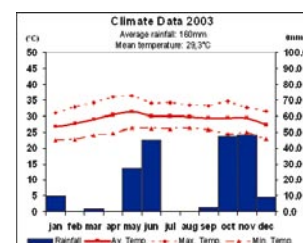
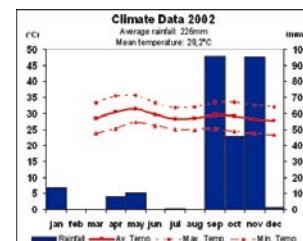
Climate

Within the Indian Ocean, the archipelago is situated in the rain-bearing monsoon belt (BEYDOUN & BISHAN, 1970), an area where significant air masses merge and are subject to a semi-annual cycle, dependent on the seasonal migration of the Intertropical Convergence Zone (ITCZ).

During the winter months, from October to April, the islands are under the influence of the tropical wet Northeast Monsoon. In November and December, this gentle wind usually brings two hours of rain per day on the northern coasts of the islands, while temperatures range from 18 °C to 27 °C and seas are relatively calm and warm. Occasionally thunderstorms and hurricanes occur and the wadies overflow.

From June to September, the hot dry sub-equatorial monsoon blows from the south-southwest. Especially during July and August, the winds from the Hagghier peaks blow down on the northern plains at 40-60 knots, drying up wadis and most of the exposed vegetation, and forcing the population to migrate to the interior of the island, where climatic conditions are more favorable. The temperature ranges from 30 °C to 45 °C, and rainfall is limited to the southern side of the Hagghier Massif and the central plateaux. Due to the high waves at wind forces of four to six in the Beaufort scale along the southern coasts and almost permanent gale-force winds on the northern coasts, seas around the archipelago are very rough. With the upwelling of deep and nutrient-rich waters, the seawater temperature drops by 2-4 °C during this season. The period of calm winds between the two monsoon seasons in May and June is characterized by increased heat and humidity.

While the average annual rainfall measures 150 mm (data recorded at sea level, Mori Airport meteo station), annual precipitation in the central Hagghier Mountains may increase to approximately 300 mm. Moreover, annual rainfall in the mountain peaks is thought to be as high as 1000 mm, leading to permanently lush vegetation and relatively abundant surface water (PORTER & STONE, 1996).



above

Climate data

Courtesy of Peter de Geest

Average Annual Rainfall (2002-2005)

Data spatialization procedure:
Universal kriging with DEM, Slope, Aspect as covariates

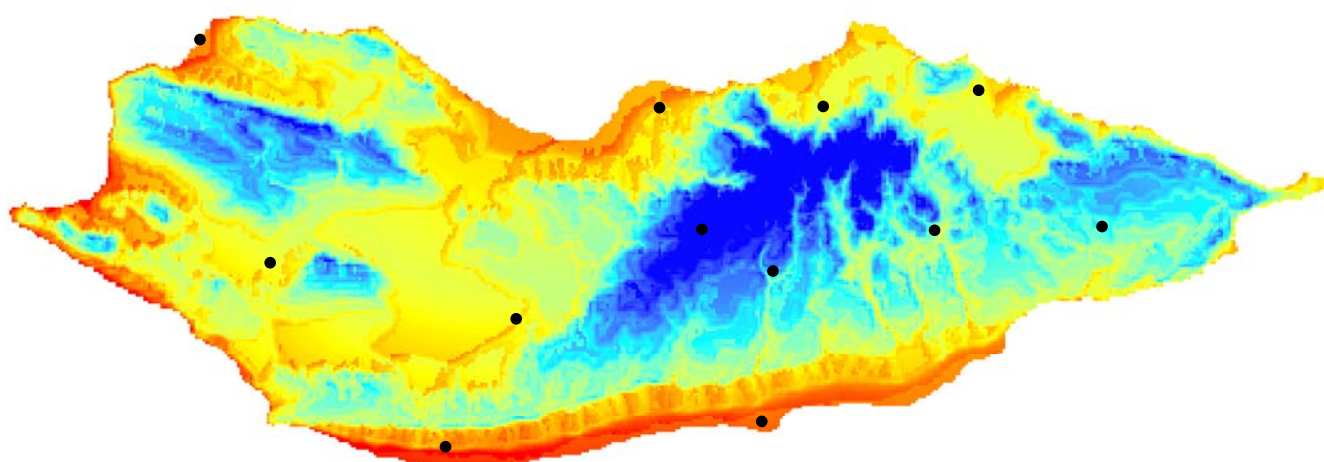
Data Source
DSS Unit, EPA-SCDP

Legend

● meteo stations

Average Annual Rainfall (mm) Value

High : 595,000000
Low : 7,000000



[illegible][illegible]

Mangroves

[illegible]

VEGETATION TYPES

- VEGETATION TYPES**
- Croton Shrubland
Mangrove
Montane mosaic
Semi-evergreen lowland woodland
Submontane shrubland
Succulent shrubland

Vegetation types as defined by Miller and Guarino (1992) system, refined by Piana (1995) and Liston (1996).
Note: Descriptions still provisional.
Data from relevés of 1998 and 1999 not yet incorporated.

Note: Descriptions still provisional.
Data from releases of 1998 and 1999 not yet incorporated



CONCLUSIONS



Sambha



Map showing the distribution of the vegetation types found around Socotra

Succulent shrubland.

[illegible]

THE VEGETATION OF SOCOTRA

UNOPS

CONSERVATION AND THE SUSTAINABLE USE OF THE BIODIVERSITY OF SOCOTRA ARCHIPELAGO

This poster was prepared by Rebecca Klaus on behalf of UNDP-GEF, 1999. (c)

Montane mosaic of evergreen woodland, grassland, dwarf shrubland and cushion vegetation

[illegible]

Open and woody-based herb communities of limestone plateau

[illegible]

Submontane shrubland

[illegible]

Types of terrestrial vegetation found in the Socotra Archipelago

In general the islands of the Archipelago of Socotra are sparsely vegetated and dominated by xeromorphic lifeforms. The development of the vegetation is strongly influenced by the desiccating winds that sweep the island in summer. In consequence it is only in sheltered valleys, escarpments and the high mountains that woodland develops. In general the exposed summit of the limestone plateau are covered with sparse shrubland or low woody-herb communities, with more luxuriant vegetation developing on cliff and in gullies. The coastal plains are largely subdesertic with open shrubland or in some areas more or less devoid of vegetation.

There are several distinctive vegetation formations on Socotra, particularly with respect to their physiognomy and structure. Perhaps the most famous, because of its

Vegetation types (adapted from Miller and Morris, 2004)

Table 2

Types	Sub-types	Topography:	Altitude:	Description:	Dominants:
Coastal vegetation	Mangroves	Coastal inlets and brackish areas	Sea-level	Mangrove thicket (5m)	<i>Avicennia marina</i>
Coastal vegetation	Vegetation of the coastal plains	Brackish coastal alluvial deposits including muds, sands and gravels.	Sea level	Mosaic of low succulent shrubs (1.5m), woody-based herb communities (0.5m), and patches of shrubland (3m).	Various including: <i>Limonium</i> spp., <i>Tamarix nilotica</i> , <i>Suaeda</i> spp., <i>Atriplex</i> spp.
Croton shrub-land of lowland plains		Coastal and inland plains; low rolling inland hills.	0-100m	Deciduous shrub-land (2.5m) with scattered emergents (5m) and open dwarf shrub (1m) layer below. If heavily grazed herb cover is dominated by <i>Cassia holosericea</i> and <i>Tephrosia apollinea</i> .	<i>Croton socotranus</i> .
Succulent shrubland		Cliffs and limestone escarpments; rocky slopes; rocky granite and limestone hills; steep wadi sides.	0-150 (-500) m	Open deciduous succulent shrub-land (<4m) with emergent trees (<6m) and lower layer (<1m) of cushion vegetation and subshrubs.	<i>Jatropha unicostata</i> and <i>Croton socotranus</i> with <i>Euphorbia arbuscula</i> , <i>Adenium obesum</i> and <i>Tephrosia apollinea</i> .
Semi evergreen woodland of lowland escarpments and sheltered ravines.		Steep limestone escarpments and sheltered parts of limestone plateau, also occasionally occurs on granite outliers (Homhil)	150-750m	Semi deciduous thicket (<5m) with emergent trees (<8m).	<i>Rhus thyrsoflora</i> , <i>Buxanthus pedicellatus</i> , <i>Carphalea obovata</i> , <i>Sterculia africana</i> .
Open and woody-based herb communities of limestone plateau		Limestone plateau	500-720m	Mosaic of woody-based herb communities (<0.5m), cleared grassland and dwarf shrubland (<2m). Relict woodlands, typically with <i>Dracaena cinnabari</i> and <i>Boswellia elongata</i> , are also occasionally found in this zone.	<i>Jatropha unicostata</i> , <i>Lycium sokotranum</i> , <i>Gnidia socotrana</i> , <i>Buxanthus pedicellatus</i> , <i>Croton socotranus</i> , <i>Leucas virgata</i> and <i>Cissus hamaderoensis</i> .
Sub-mountain shrubland		Granite mountains, slopes and cliffs.	150-750m	Semi-deciduous shrubland (<5m) with emergent <i>Dracaena</i> (<8m) and cleared grassland.	<i>Dracaena cinnabari</i> , <i>Rhus thyrsoflora</i> , <i>Euryops arabicus</i> , <i>Buxanthus pedicellatus</i> , <i>Gnidia socotrana</i> and <i>Cocculus balfourii</i> .
Montane mosaic of evergreen woodland, grassland, dwarf shrubland and cushion vegetation.		Exposed pinnacles, cliff slopes, sheltered ravines and patches of cleared grassland, all on granite.	950-1500m	Mosaic of dense evergreen woodland and thicket (<5m), patches of cleared grassland, dwarf shrubland (<1.5m) and cushion vegetation on exposed summits.	<i>Dracaena cinnabari</i> , <i>Rhus thyrsoflora</i> , <i>Hypericum</i> species, <i>Helichrysum</i> species and <i>Euryops arabicus</i> .

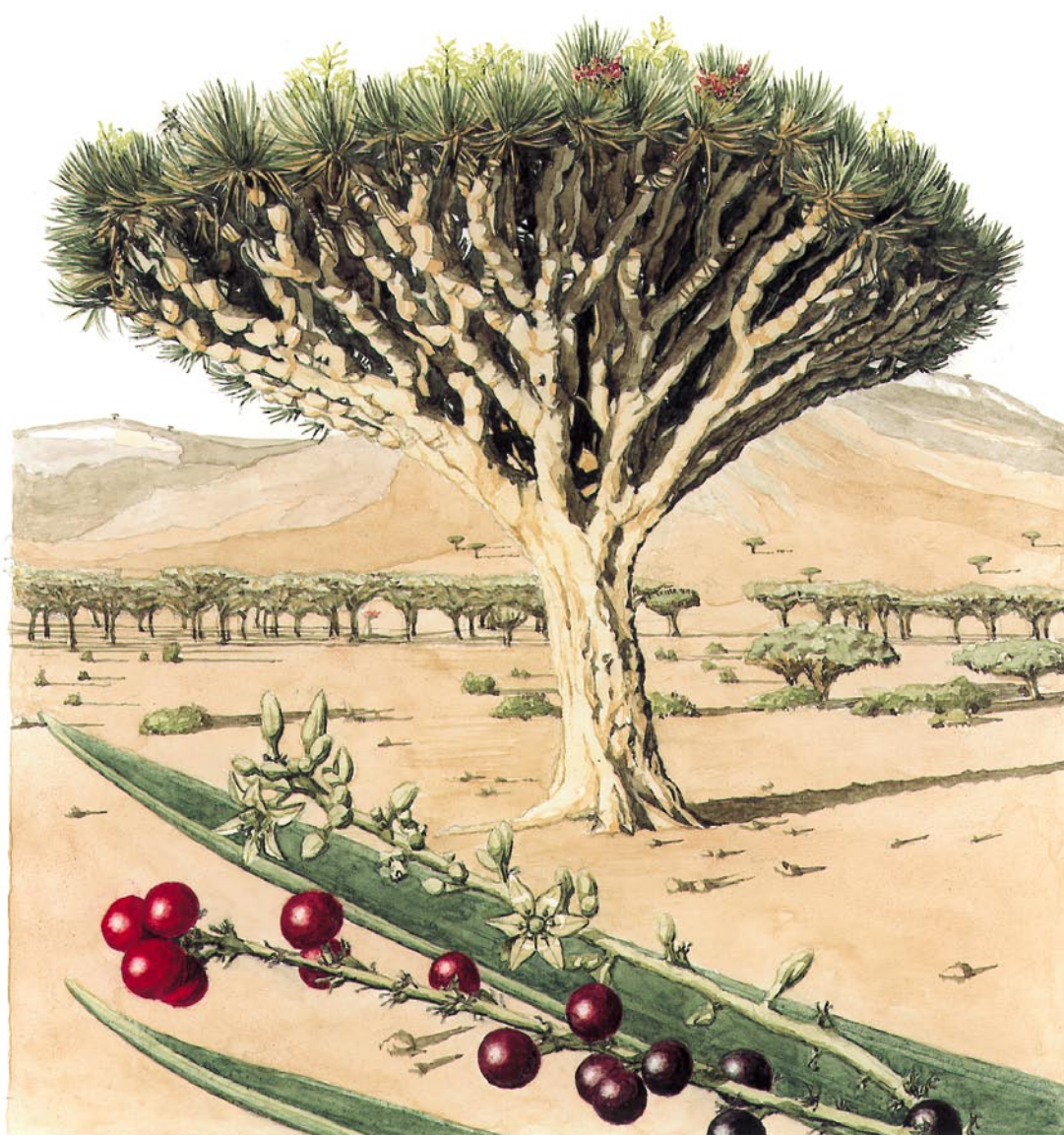


often bizarre appearance, is the shrubland dominated by the trees succulents such as *Dendrosyos socotranum*, *Adenium obesum* subsp. *sokotranum* and *Euphorbia arbuscula*. This occurs mainly on the foothills of the mountains and the limestone escarpments and is the vegetation type for which Socotra is most renowned. Another unique vegetation formation is the evergreen woodland dominated by the dragon's blood tree, *Dracaena cinnabari*, commented upon by White (1983, 1986) as the most 'singular community of Socotra'. The finest examples of this are found on the higher slopes of the limestone mountains, particularly in the center and east of the island.

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Dragon Blood Trees

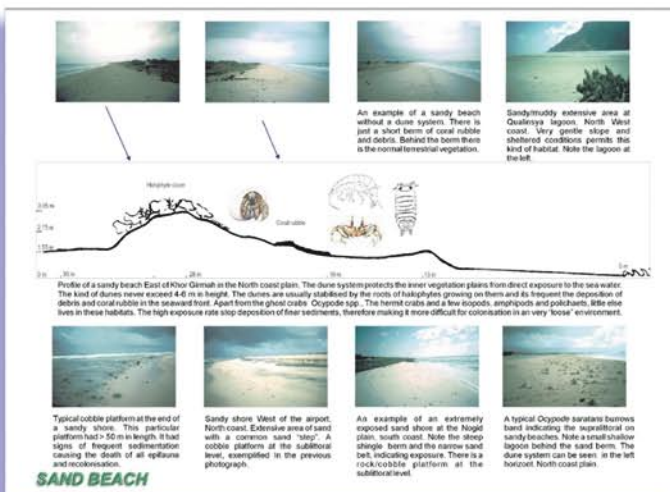
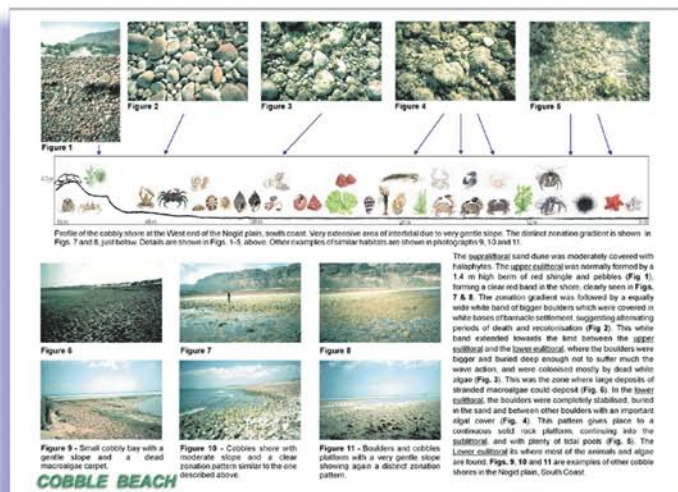
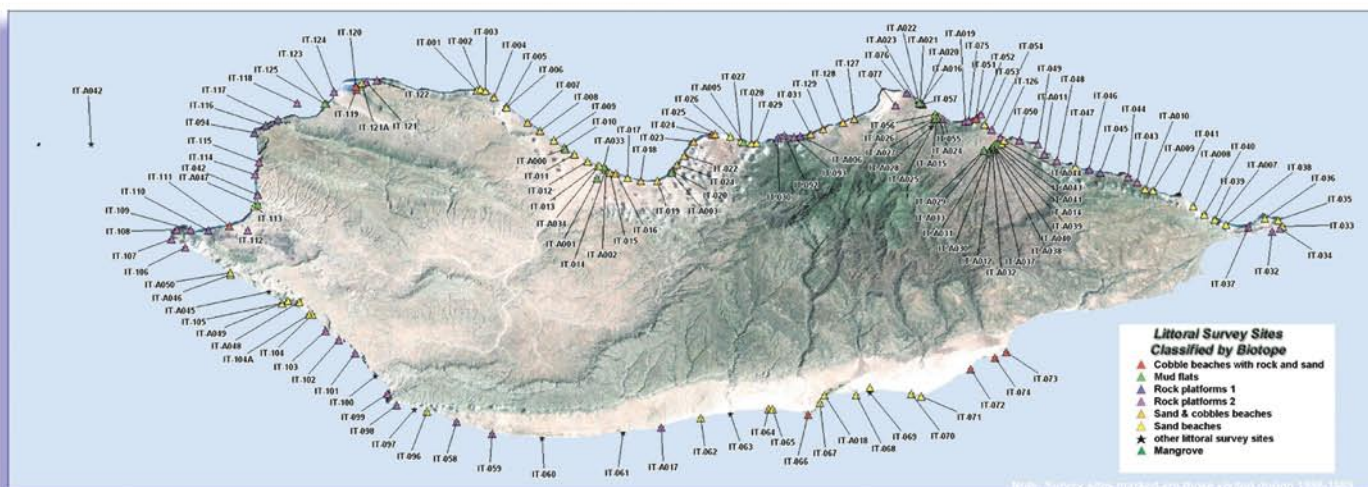
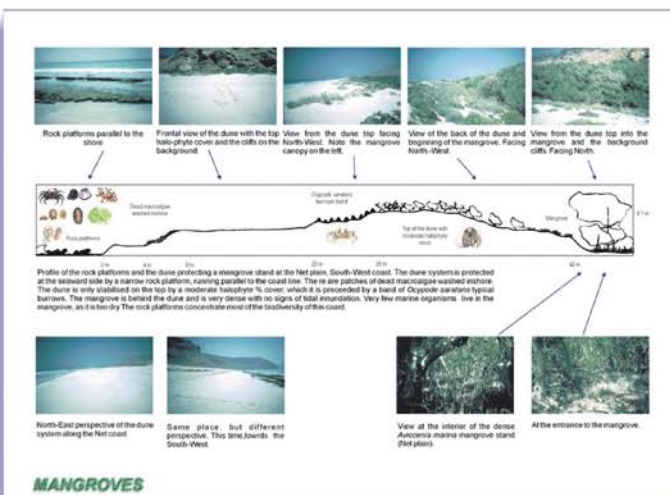
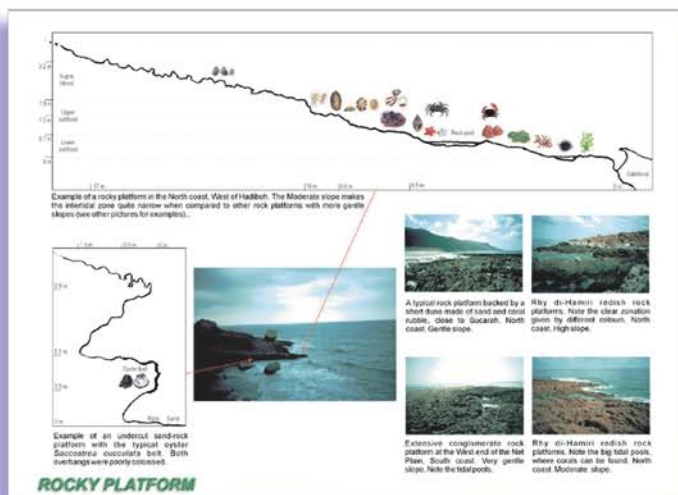
Photo by Nigel Pavitt



left

Dragon Blood Tree

Illustration by
Mike Langman



LITTORAL BIOTOPES OF SOCOTRA



UNOPS



undp



The Socotra Archipelago



CONSERVATION AND THE SUSTAINABLE USE OF THE BIODIVERSITY OF SOCOTRA ARCHIPELAGO

Photographs and data presented in this poster were prepared by Nuno Simoes and Rebecca Klaus on behalf of UNDP-GEF, 1999 (c)



Marine habitat types

(by Catherine Cheung & Lyndon de Vantier)

Like Socotra's unique landscapes with their rich floral and faunal diversity, its coastline and seascapes are no less spectacular and diverse – the sheer, wave-washed cliffs and huge boulders, fossil reef platforms, cobble and sand beaches, sheltered lagoons, seagrass, algae and coral patches. Socotra forms a kind of marine 'cross-roads' where the ocean currents and biogeographic realms of the Arabian Sea, Red Sea, Indian Ocean and wider Indo-Pacific meet.

The seasonally changing currents carry a large array of planktonic larvae from different biogeographic areas. The currents also bring major seasonal changes in temperature and nutrients. The other major factors affecting the structure and diversity of marine life around the islands are substratum – silty, sandy, rocky or coralline – and depth, with its corollaries of changes in illumination and wave energy. This oceanographic and topographic setting has promoted the development of unique marine habitats and communities.

Socotra's littoral and sub-littoral habitats were mapped using 'biotope' classification, based on the interpretation and extensive ground-truthing of LANDSAT satellite imagery. The littoral classification included six major habitat types – sediments, cobble beaches, bedrock, salt marshes, mangroves, khawrs and wadis, supporting 11 biotopes (Simões and Jones, 2000). The sub-littoral classification included a further six major habitats, several of which are shared with the littoral – sediments, cobbles, small rock boulders, large rock boulders, bedrock and cobbles (Klaus and Turner, 2004).

left

Top: Coral community in Socotra

Middle: Coral Community in Socotra

Bottom: The Marine Environment is yet quite intact

All photos: courtesy of EPA/SCDP, by Catherine Cheung

below

Socotra Sunbird

Illustration by
Mike Langman

FLORA AND FAUNA

Overview of Significant ecological features

The Socotra archipelago is a uniquely preserved living museum and a masterpiece of evolution.

The different sizes of its islands, the position between two continents and three of the world's major biogeographical regions, the uncommon isolation together with the traditional sustainable management by its local people, make this group of islands a survived Arch of Noah as well as a blend of enchanting spirits.

Large and small islands compose the Socotra archipelago, each one showing its own high level of endemism. Located between the Arabian Peninsula and the African continent, distant from the main land, the archipelago broke up from continental landmasses millions of years ago. The islands show a remarkably high degree of isolation from the geological, historical as well as climatic point of view, creating a striking example of how local people have responsibly managed their habitat and lived in harmony with their environment – virtually until present times.

The largest island of Socotra (3.625 sq km) hosts the highest variety of habitats and diverse vegetation types (the eight main vegetation types are described the above section: “Types of terrestrial vegetation found in the Socotri Archipelago”). The island shows an impressive high level of endemism of flowering plants and ferns (37 %); many being remnants of ancient floras, i.e. species which long ago disappeared from African-Arabian mainland.

In addition, each of the archipelago's other three inhabited islands exhibits its own high level of endemism rendering the archipelago as whole even more significant. For instance, the smaller island of Abd Al-Kuri (133 sq km), located closer to main land (only some 90 km from Cape Guardafui, on the horn of Africa), hosts 16 endemic species of plants and 2 endemic species of geckoes. The smaller island of Samha (41 sq km) hosts 8 endemic plants.

Six species of birds are endemic to the archipelago (plus the resident buzzard *Buteo* and scops owl *Otus*, the taxonomy of which are the subject of ongoing research). This is the highest concentration of endemic birds in the Middle East, outside the Yemen high-



lands. Moreover, at least 41 breeding birds are present on the islands, out of a total of 182 species recorded.

Reptiles also provide a clear measure of the conservation importance of the Archipelago: terrestrial reptiles are represented with 30 species, 27 of which are endemic (90 %). Among the different groups, out of the 18 geckoes present on the islands, 15 are endemic.

The first studies on key taxonomic groups of invertebrates show interesting results. The Woodlice (terrestrial crustaceans, isopoda) may be taken as an example to evaluate the presence and importance of the invertebrates' fauna. Recent studies indicate that the rate of endemic woodlice is impressive: 73%, especially considering that it is significantly higher than in the neighbouring and well-studied countries. The absence of some taxa and the presence of others seem to corroborate the faunistic evidence of the long isolation and evolutionary history of the Socotra Archipelago.

The Socotra archipelago is positioned near the junction of three of the world's main biogeographical regions: the Afro-tropical, the Oriental and the Palearctic. In biogeographical terms, terrestrial habitats of the archipelago are in general more closely linked with adjacent parts of Arabia, Horn of Africa, and Ethiopian Region, as well as with the Eremic Zone, i.e. the arid belt separating the above three main biogeographical regions.

The islands support also a highly diverse marine fauna and flora, forming some sort of marine 'cross-roads' where different oceanic currents and biogeographical realms meet. Therefore, in terms of total species and habitats richness, Socotra's marine biodiversity rivals other much larger coastal areas, such as the whole Red Sea.

Long isolation is the key to Socotra's pristine environment.

The breakdown from mainland that is thought to have occurred in the Tertiary Age is the key determining exceptional factor that affected the evolution of the archipelago. The resulting isolation led to the evolution of these group of islands in the absence of land mammals and, therefore holding an impressive percentage of endemism and particularly relict species that were wiped out by mammal presence elsewhere.

Due to high winds and rough seas effectively cutting off these islands from mainland for five months of the year, and the lack of a suitable natural harbour, the archipelago remained one of the most inaccessible and pristine places on earth, until the recent opening of an airport only in the late 90's. The harsh climatic conditions, combined with the absence of natural harbors, actually deterred any long-term external colonization. The Greek (from the 4th century BC), the Portuguese (around



below

Socotra Bunting

Illustration by
Mike Langman

1500 AD) and the English (in the last century), never managed to reside more than few years on the island. This factor, once again, contributed to the continued isolation of the archipelago.

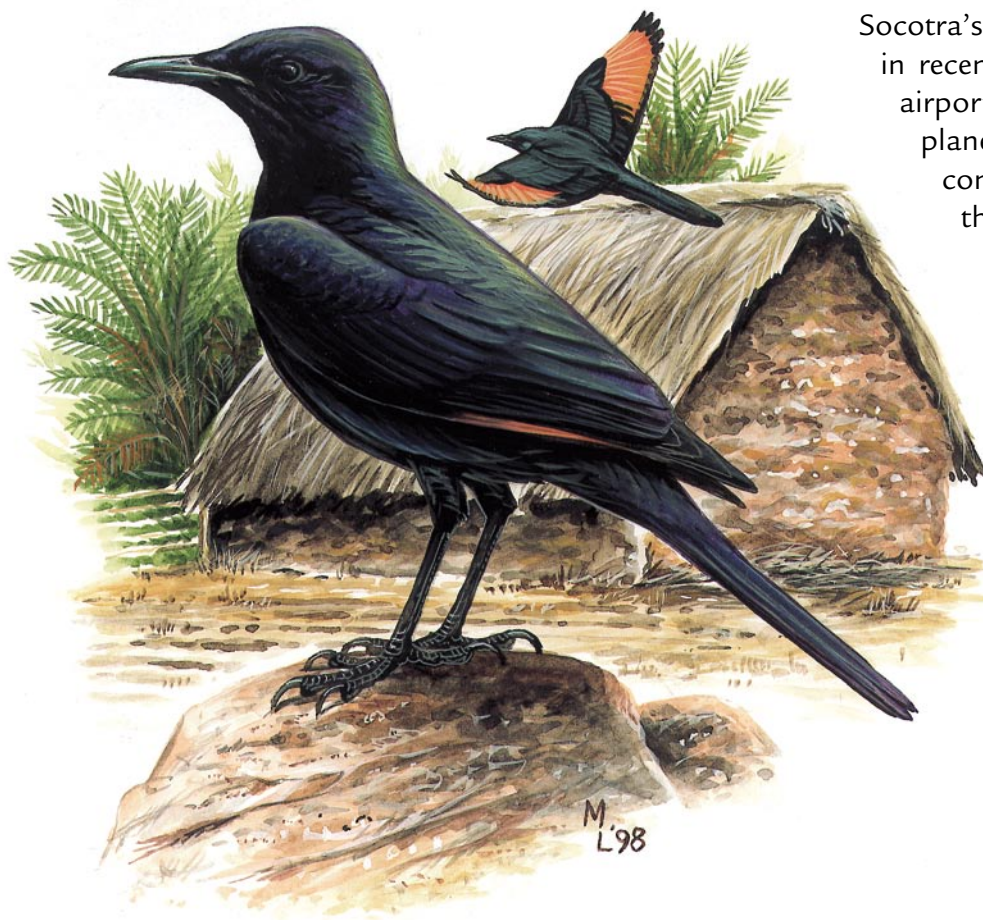
Socotra's isolation has only been affected in recent years, with the opening of the airport in 1999. Previously, only military planes and some rare civilian flights connected Socotra to mainland through a small gravel airstrip.

This high degree of isolation led the Socotran people to establish and preserve a delicate balance with their environment through a set of unique traditional practices aimed at the sustainable use of their natural resources (i.e. establishment of traditional marine protected areas, restrictions in the use of fishing gear at certain time of the year, restrictions on the use of timber and fuelwood, rangeland rotational use, suitable harvesting of resins and medicinal plants allowing plant survival and reproduction, etc. see Miller and Morris 2004). This natural balance

between humans and nature has effectively protected the biological diversity of the island over thousands of years, until present.

As a result human population in the island is currently quite low (approx. 43,000) and intervention on natural habitats of the subsistence pastoralist tribes gradates from none to very limited in most of the archipelago. Intensive human influence can currently be found only in approximately 2-3% of the entire archipelago's land area, and it mostly dates from very recent years (approx. 1998 onwards). Therefore, while Socotra's biological diversity compares very favourably with other islands, it is this striking ancient relationship between people and nature, largely preserved until present, which qualifies the archipelago uniquely for global recognition and support.

Last but not least, the archipelago's ecology cannot be understood without taking the influence of the monsoon into account. Each year, from June until September, the seasonal Southwest monsoon blow, bringing hot and dry winds from Africa. These winds often average 70mph on the north coast of the islands, and generate high seas on the southern coasts. Therefore, until very recently, the island was cut off from the outside world during these periods. The alternance of extreme desiccation and mist, brought about by the seasonal winds had an important effect on the evolution of habitats and vegetation.



above

Socotra Starling

Illustration by
Mike Langman

FLORA

Adapted from Miller and Morris, 2004

Flora - Introduction

Biologists find islands such as Socotra irresistible because they are “living laboratories” for the study of evolution and ecology.

Islands represent a small part of the Earth’s land area but a large part of its biodiversity, including about one-sixth of the total flora, so they are critical to global conservation.

These floras are particularly susceptible to extinction. For a start, they often cannot compete with weedy plants brought in from outside. And because they usually evolve in the absence of large grazing animals most of these plants lack anti-grazing defences such as thorns or poisons and are killed by livestock.

Socotra’s rare species have escaped this fate. Relics of ancient species are so abundant that the island looks like most people’s idea of a prehistoric world .

Until at least 10 million years ago Socotra was part of the African mainland and, before that, part of the African-Arabian tectonic plate. Today the ancestors of plants from these ancient landmasses can still be found growing on the island.

Socotra has been famous for its botanical riches for hundreds of years. As well as cinnabar, other products exported to the ancient Mediterranean region included resins of the local Frankincense (*Boswellia*) and Myrrh (*Commiphora*) trees, used in medicines and rituals, and the juice of the native Bitter Aloe (*Aloe perryi*), used as a purgative. By the 19th century news of Socotra’s rich flora had reached the British Association for the Advancement of Science in London.

In 1880 the Association launched the first ever scientific expedition to the island, led by the Scottish botanist Isaac Bayley Balfour who put Socotra on the map. In seven weeks Balfour collected more than 500 plant species, over 200 of which were new to science. But by 1967 a group of British botanists



Isaac Bayley Balfour
(1853-1922)

below

Socotran Desert Rose

Illustration by
Diccon Alexander



Aloe parryi

Euphorbia abdelkuri

Euphorbia corollata

Punica protopunica

Boswellia ameero

Abdelkuri (35 endemics)

Samha (42 endemics)

S.W. Socotra (54 endemics)

W. Socotra (106 endemics)

N. Socotra (201 endemics)

N.E. Socotra (95 endemics)

Location	Area (km ²)	Percentage (km ²)	% of Island	% of Endemics	No. of Endemics	% of Endemics	Total Endemics
Abdelkuri	1.1	0.01	0.01	14.43	5	1.43	5
Samha	1.1	0.01	0.01	14.43	5	1.43	5
S.W. Socotra	361	0.03	0.03	14.43	5	1.43	5
W. Socotra	361	0.03	0.03	14.43	5	1.43	5
N. Socotra	361	0.03	0.03	14.43	5	1.43	5
N.E. Socotra	361	0.03	0.03	14.43	5	1.43	5
TOTAL	1212.12	100	100	100	25	100	105

Total Endemics: 203

Comparison of Endemics in Suggested Areas	Western Socotra	Eastern Socotra	Abd el Kuri	Samha
Number of Endemics	106	54	35	42
Area (km ²)	361	361	1.1	1.1
Percentage (km ²)	0.03	0.03	0.01	0.01
% of Island	0.03	0.03	0.01	0.01
% of Endemics	14.43	14.43	14.43	14.43
No. of Endemics	5	5	5	5
% of Endemics	1.43	1.43	1.43	1.43
Total Endemics	111	59	40	47

Number in comparison

Table to show the area and number of endemic species within the suggested conservation areas

Table comparing the number of endemic species within the suggested conservation areas

Acridocarpus socotranus

Adenium obesum

Graderia fruticosa

Dracaena cinnabari

Begonia socotrana

Dorstenia gigas

ENDEMIC PLANTS AND SUGGESTED CONSERVATION AREAS AROUND THE SOCOTRA ARCHIPELAGO

visiting the island came away believing that most species faced imminent extinction for increasing human activity. If unchecked goat grazing and woodcutting would rapidly destroy the natural vegetation. So many botanists gave up hope for the flora and visits to the island dropped.

Then in 1985 the island botanist Quentin Cronk resurveyed Socotra and found that the predictions of earlier scientists had been too pessimistic. Although there were still large herds of livestock and extensive woodcutting, the environment was largely unspoilt. "Having seen the degradation overgrazing can cause," says Cronk, "I was staggered to come across a place which was in all probability substantially the same now as 1000 years ago." His discovery revived international scientific interest in Socotra. Specialists in Arabian flora have found many new species and traced almost

Quentin Cronk
University of British
Columbia



above

Socotran Aloe
Aloe Perryi

Illustration by
Diccon Alexander



all the previously recorded flora, including the only Socotran plant officially recorded as extinct by the World Conservation Union, the pink-flowered shrub, *Taverniera sericophylla*.

Many are the factors that contribute to the surviving of such and ancient flora on the Socotra Archipelago.

Endemism in oceanic islands				Table 3
	Size (sq km)	Total plant spp.	Endemics	% Endemics
Socotra	3799	825	307	37
Azores	2235	600	55	9
Canary Is.	7273	2000	569	28
Madeira	769	760	760	17
Ascension	94	25	11	44
St Elena	121	320	49	15
Mauritius	1865	800-900	280	31-35
Rodriguez	104	145	48	33
Galapagos	7844	543	229	42
Norfolk Is.	13	174	48	28
Juan Fernandez	93	147	118	80
Cape Verde	4033	724 (spermatophyte)	65	11.1*

**From Arechevaleta, m., N. Zurita, M.C. Carrero & J.L. Martin, 2005*

Socotra’s inaccessibility is one factor. The two weekly flights from Yemen to the new airport outside Hadiboh are only active since late 1999. Without an influx of people and technologies the Socotrans have had to use and protect their natural resources. They live by fishing, herding livestock, date cultivation and gathering plant products-a lifestyle that has changed little since the first settlers arrived over 2000 years ago. There is only a small jetty and no natural ports , the first roads are being built since year 2001, no sewerage facilities and limited solid waste management systems are in place on the island, and Hadiboh has electricity for only a few hours a day.

With very little in the way of modern building materials and medicines, wild plant products are crucial to the survival of the Socotran people. So much so that they have developed a system for preventing over-exploitation of the island flora. A network of tribal elders who control, for example, the cutting of live trees and shrubs, enforces these rules. The tribal elders also ensure that livestock are moved from one area to another to prevent overgrazing.

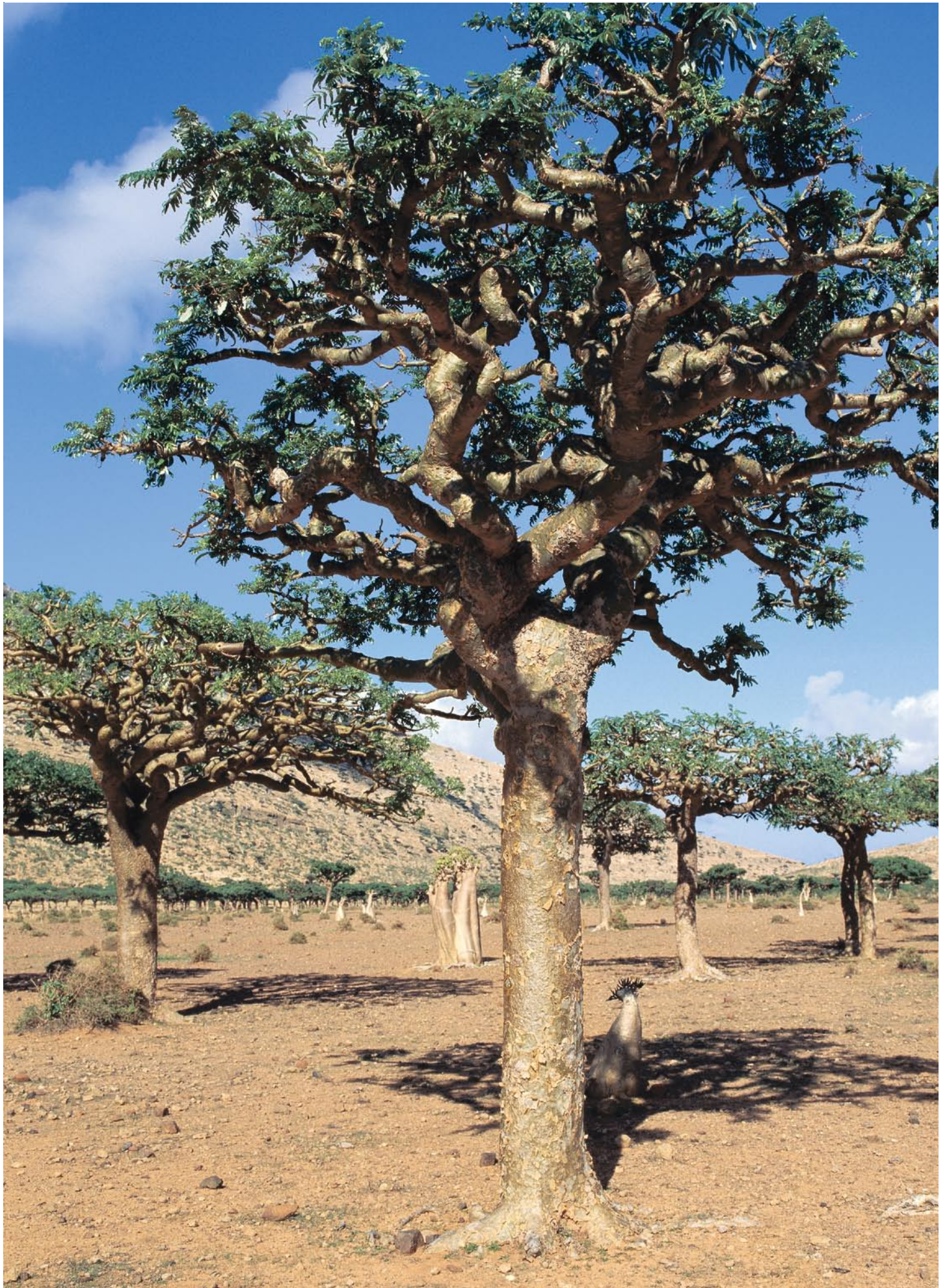
opposite page

Cucumber Tree
Dendroshykos socotranum
Photo by Nigel Pavitt

right
View of Hadibo
Photo by Nigel Pavitt







Flora - General

In general a significant amount of data is available on the occurrence and distribution of flowering plants and ferns in the Socotra archipelago and it is now possible to give a fairly accurate estimate of their numbers and distribution.

According to Withe (1983, 1986) the Socotra Archipelago falls within the Somalia-Masai Regional Centre of Endemism and enough species are confined to the islands to make them stand out as a local centre of endemism.

The figures for botanical diversity confirm the Socotra Archipelago's global status as one of world's most botanically important island groups, comparing favourably in floristic richness and endemism with such famous islands as Mauritius, the Galapagos and the Canary islands. (See Table 8 and the comparative analysis in section 3.c).

The essential statistics for the Flora of the Socotra Archipelago are summarised below:

Flora of Socotra	
Flowering plants and ferns species	850
Flowering plants and ferns genera	389
Flowering plant families	99
Endemic taxa	293
Endemic genera	12

Flora - Plants of Conservation Importance

The peripheral location of the islands and the strong traditional land-use management practices employed by the indigenous population, have both served to protect the vegetation and biodiversity of the Socotra Archipelago.

The conservation status of the 307 endemic species and seven endemic infraspecific taxa (varieties and subspecies) has been assessed based on the IUCN red list categories and criteria.

The assessments made here are provisional and still have to be approved by the relevant committees of the Species Survival Commission. Plants have been placed in seven categories. The results are summarised below:

IUCN categories for Socotra Archipelago's endemic plants	
Extinct	4
Critically Endangered	3
Endangered	27
Vulnerable	115
Near threatened	14
Least Concern	118
Data Deficient	33
Total	314

opposite page

Socotran Frankincense
Boswellia Elongata

Photo by Nigel Pavitt

Flora - Endemic plants

Island endemics make up a third of the world’s threatened plants, and many are already extinct.

The number of endemic plant species on an island depends on its age, size, topography, climate, degree of isolation and geological history.

Broadly there are three types of island endemics-relict species, newly adapted species and adapted-relict species.

Relict species are found on islands, which, like Socotra, were once part of larger landmasses but have become isolated through continental drift and changes in sea level. The species may die out on the mainland, leaving remnants of once widespread ancient floras on the island. Most of the plants of Madagascar and New Caledonia are relicts.

Newly adapted species are the product of accidental colonisation of an island by individual plants, which then adapt to the new environment. This type of endemic is commonly found on islands, which have never been part of larger landmasses and are volcanic in origin, such as the Galapagos and Hawaiian Islands.

The third type of island endemic, adapted-relict species is the result of a second burst of evolution in the relict species.

Many Socotran plants are descendants of ancient species, which have adapted to their new island environment. A varied landscape of semi-desert coastal plains, limestone hills and granite mountains, together with an extreme climate of low rainfall and hot summer winds of up to 70 miles per hour, create countless ecological niches and explain the wealth of endemic plants. Often these are restricted to highly localised habitats.

Socotra has one subendemic family – the Dirachmaceae, which was known only from one Socotran species until recent discovery of a second species in Somalia. There are 15 endemic genera and 307 endemic species. Endemism is not only evenly distributed across plant families. Grasses from the biggest family on the Archipelago, with 112 species, but have only endemic species and no endemic genera. On the other hand Acanthaceae is represented by 34 species and 15 genera, of which 24 species and three genera are endemic.

The Table 4 gives a breakdown of the Socotran flora by species, genera and families, and the distribution of endemics.

Flora by Species, Genera and Families				Table 4
Families	Genera	Species	Endemics	
Ferns	10	18	26	1
Gymnosperms	1	1	1	---
Dicots	82	312	625	276
Monocots	21	90	173	30
Total	114	430	825	307

FAUNA

The Fauna of the archipelago is not yet well studied and documented as its Flora. However recent research has greatly increased our level of knowledge on key taxonomic groups, and a number of important scientific papers are being published as a result of new scientific work carried out in recent years. This section provides a summary of information available to date, focusing on key taxonomic groups that are better documented. Table 5 provides a tentative and preliminary summary of current knowledge on the numbers of species so far recorded in the archipelago.

An outline of current knowledge on key taxonomic groups is provided below. Groups have been selected on the basis of recent studies available, and on their biogeographical significance and conservation importance.



INVERTEBRATES

WOODLICE, ONISCIDEA (CRUSTACEA, ISOPODA)

Adapted from Taiti & Ferrara, 2004

Among terrestrial fauna, the taxonomic group Oniscidea (Crustacea, Isopoda) of the Socotra Archipelago may be taken as a biological indicator of the special paleo-geographical and geological events that characterised the evolutionary history of these islands.

This taxonomic group does offer a very representative case, as it is relatively well studied in the archipelago itself, as well as in neighbouring archipelagos of the Comoros, Seychelles and Mascarene islands, and nearby mainland (Somalia and Ara-

Number of species Preliminary summary		Table 5
GROUPS		number of species
INVERTEBRATES		
Arachnids		~ 40
Crustacean		~ 45
Myriapods		~ 15
Insects		~ 600
Molluscs		~ 65
MARINE LIFE		
reef-building coral		253
soft corals		30
coastal fishes		730
marine decapod Crustacea		250
inter-tidal molluscs		129
macro-algae		124
Marine Mammals		10
VERTEBRATES		
Fresh Water Fishes		1
Reptiles		34
Birds		182
Mammals		14

bian Peninsula).

The number of species of Oniscidea found in Socotra archipelago (38) is quite impressive considering the arid climate of the region, and the lack of humid habitat

above

Crocothemis erythraea

Photo by
Richard Porter

conditions in most part of the islands, that are both unfavourable factors for the establishment and flourishing of these terrestrial crustaceans.

The rate of Oniscidea endemism in Socotra is an impressive 73%. It is significantly higher than in neighbouring Somalia (52%), Arabia Peninsula (50%), the Seychelles (50%), Comoros (40%) and Mascarene islands (40%).

Other important characteristics include the absence of taxa that are typical of the neighbouring continental areas (Somalia and the Arabian Peninsula) as well as the presence of taxa with biogeographical affinities with both the Afrotropical (East African) and Oriental Regions and, to a lesser extent, with the Mediterranean Region.

These characteristics confirm the long isolation and evolutionary history of the Oniscidean fauna of the Socotra Archipelago. This long isolation favoured speciation events, and probably also permitted the survival of relict taxa that are no longer present on the mainland.



above

Dioscoridillo melanoleucos Ferrara & Taiti, 1996 (fam. Eubelidae)
endemic to Socotra Island

Photo by Stefano Taiti



above

Dioscoridillo cavicolus Taiti & Ferrara, 2004 (fam. Eubelidae)
occurring in some caves in the eastern limestone area of Socotra Island

Photo by Stefano Taiti

ANTS (HYMENOPTERA: FORMICIDAE)

Adapted from Collingwood et Alii, 2004

The ants on the Socotra archipelago are represented with 18 species.

The only early record of ants was one collected by the 1898/1899 expedition of the Vienna museum. Later on Collingwood, 1985 reported 5 species, collected in 1967. During 1994 a guidebook to the ants of Yemen listed 10 species from Socotra. Two more species were then added in 1996, collected in 1993.

After the recent series of expeditions, it is quite clear that the Archipelago is poor in ant species. While it has turned out that ants are not nearly as numerous on Socotra and its outlying island as in comparable habitats in the African tropics and the Arabian Peninsula, they still occur in all major terrestrial habitats in the island.

Oceanic islands usually support impoverished native ant faunas supplemented with many species introduced by man. As import of ants to areas outside their natural distribution through human influence has been taking place for a long time, it is sometimes difficult to say whether a species recorded on a given island is native there or not. Eight of the 18 ant species recorded on Socotra Island are definitely adventive, as they are well known, mostly cosmopolitan or pantropical tramps, often with uncertainty regarding their native distribution. Six of the total ants found can be regarded as likely native, though that is difficult to prove with certainty.

In any case the number of indigenous species is very low, considering the size of the island and its relative proximity to the African continent. This may be a reflection of a early separation from all major land masses.

More over, the arid climate of the Socotra Archipelago may account for particularly low species richness in comparison with wet tropical islands.

That said, it should be noted that the surveys conducted on Socotra up to now have been largely limited to the more anthropogenically-influenced lowlands. A few specimens of some additional, probably native species indicate that further sampling in remote places is bound to discover more indigenous and possibly endemic ants.

Concluding, at least 8, but probably more, of the 18 species recorded on the islands, have been transferred to the Archipelago by human commerce. There is little evidence that ecosystems have been strongly influenced by alien ants up to now. Those ants most feared globally for their invasive potential and destructive impact on native fauna are yet absent from Socotra. To preserve this situation, diligent quarantine measures are of great importance.



below

Socotra Chamaleon

Photo by Mark Jeffrey

VERTEBRATES

REPTILES

Adapted from Roesler & Wranik, 2004

Reptiles, on the archipelago of Socotra, have been quite well studied, both from the past expeditions and from the very recent researches.

It is reported in the “Periplus of the Erythrean Sea”, a shipping manual written in the first century A.D. by an unknown Greek sailor, that Socotra had large reptiles, as various tortoises, lizards and crocodiles. No certain traces of them have been

found so far and they are not mentioned in local legends.

On Socotra 34 species are listed. Out of the 30 terrestrial species, the high number of 27 is thought to be endemic, representing a very significant high level of endemism (90%). At the generic level, 42% of the genera are endemic and include *Haemodracon*, *Hakaria*, *Pachycalamus*, *Dityopphis* and *Hemeropis*.

Summary of Reptiles' Families Table 6

Families	number of species
Cheloniidae	3
Dermochelyidae	1
Chamaeleonidae	1
Gekkonidae	18
Scincidae	2
Lacertidae	2
Trogonophidae	1
Typhlopidae	1
Leptotyphlopidae	3
Colubridae	2

The Table 6 shows the reptile fauna by families.

The geckos (Gekkonidae) are the most diverse group among recent reptile fauna of the Socotra Archipelago, comprising 18 species, of which 15 are considered endemic. Out of those, 10 are present on Socotra, 2 on Abd Al Kuri, 1 on Socotra and Samha, 1 on Socotra and Abd Al Kuri and 1 on Samha and Darsa.

Only two species of skinks (Scincidae) inhabit the archipelago, and both species are endemic.

The Lacertidae are also represented by two species, both endemics.

The Chamaeleonidae are widespread in Africa, Madagascar, Arabia and Indian sub-continent, having species centres in the first two regions. On the Archipelago, there is only one endemic species known from the main island of Socotra.

This is also the case for the Trogonophidae, which occur in northwestern and northeastern Africa and in southern and eastern Arabia, and for the blind snake family Typhlopidae, found in Africa, Asia and Australia.

Three endemic Socotran species are reported from the Leptotyphlopidae, another blind snake family, known from the Old and the New World.

The widespread colubrid snakes (Colubridae) are represented by two endemic species.

No traces of snakes have yet been found on Abd al-Kuri Island.

The Table 7 shows the endemic figures for each family.

Endemic species (reptiles) Table 7

Chamaeleonidae	1
Gekkonidae	15
Scincidae	2
Lacertidae	2
Trogonophidae	1
Typhlopidae	1
Leptotyphlopidae	3
Colubridae	2

At present it appears that the archipelago's reptiles are abundant. Perhaps the only exception to this conclusion is *Pristurus obsti*: if the species is really restricted to mangroves, it must be considered as endangered as is this declining habitat.

On the basis of current information, the reptile fauna of the islands has its closest phylogenetic and zoogeographic relationships to those of Africa and the Arabian Peninsula.

BIRDS

From Porter, 2005 pers. comm.

Socotra is rich in bird life. Whilst the number of species recorded in the Archipelago is not high at least seven are endemic and many others are also of world importance for conservation. The number of endemic species is the highest concentration in the Middle East outside the highlands of Yemen.

The avifauna of the Archipelago has been studied in detail in recent years, notably by Birdlife International and is summarised in Porter (2003). These studies have identified 22 Important Bird Areas (IBAs), which are recognised as being of world or regional importance for bird conservation, (Evans, 1994). Furthermore, the distribution of all breeding species has been mapped, thus helping to determine those regions of the island that are the most important for wildlife.

In terms of species' numbers, the islands' bird list stands at 182 (with a further nine claims awaiting supporting evidence). Of these 41 are breeders, 88 are regular migrants and 53 vagrants, though several of the latter will doubtless prove to be regular visitors as more observers visit Socotra.

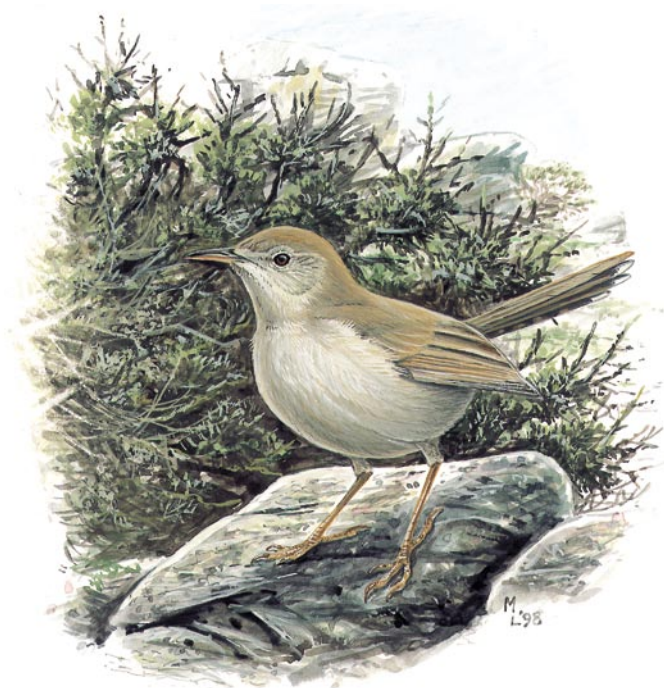
Of the 41 breeding species, ten are seabirds, five raptors, two waders, 16 passerines and two are introduced: the Feral Pigeon *Columba livia* and House Crow *Corvus splendens*. With the exception of the endemics (see below), breeders likely to most interest the visiting birdwatcher or naturalist include Masked Booby *Sula dactylatra*, Jouanin's Petrel *Bulweria fallax*, Persian Shearwater *Puffinus persicus* and Socotra Cormorant *Phalacrocorax nigrogularis* (all regular in the seas around the island, probably for most of the year), Red-billed Tropicbird *Phaethon aethereus* (usually difficult to see) Egyptian Vulture *Neophron percnopterus* (the most conspicuous and tamest bird on the main island) Cream-coloured Courser *Cursorius cursor*, Lichtenstein's Sandgrouse *Pterocles lichtensteinii*, White-browed Coucal *Centropus superciliosus* (very elusive) Nubian Nightjar *Caprimulgus nubicus* (difficult to see due to it being very localised) Forbes-Watson's Swift *Apus berliozi* (in spring it is possible to see large flocks), Somali Starling *Onychognathus blythii* (widespread) Golden-winged Grosbeak *Rhynchostruthus socotranus* (widespread) and African Rock Bunting *Emberiza tahapisi* (also widespread)



above

Socotra Buzzard

Illustration by
Mike Langman



above

Socotra Warbler

below

Socotra Cisticola

Illustrations by
Mike Langman



Birds of conservation importance

Globally threatened species

According to the latest assessment by BirdLife International, none of the bird species on Socotra is globally Endangered or Critically Threatened. Three are afforded Vulnerable status, Socotra Cormorant, Socotra Cisticola and Socotra Bunting, and two are considered Near Threatened, Jouanin's Petrel and Persian Shearwater.

Internationally important populations

By definition, all of the endemics have internationally important populations, as do several other breeders, notably Egyptian Vulture (probably over 1000 individuals on Socotra) and Forbes-Watson's Swift (Socotra is its stronghold). The archipelago is also suspected of harbouring internationally important populations of the following three species: Long-billed Pipit *Anthus similis* (over 100,000 individuals), Southern Grey Shrike *Lanius meridionalis* (over 15,000 individuals) and Golden-winged Grosbeak (over 6000 individuals).

Pride of place, however, probably goes to the seabirds. The following were found to have internationally important populations during 1999 surveys: Masked Booby, Brown Booby *Sula leucogaster*, Persian Shearwater, Red-billed Tropicbird, Sooty Gull *Larus hemprichii*, Bridled Tern *Sterna anaethetus*, Saunders's Tern *S. saundersi* and Common Noddy *Anous stolidus*.

Endemic birds

Among the breeders, it is the endemics that will undoubtedly attract the birdwatcher to Socotra. The commonest and most widespread is Socotra Sparrow *Passer insularis* with a population of over 200,000 (this and other population assessments are highly provisional calculations from the BirdLife International surveys of 1999–2001, and are presented purely as an indication

left

Egyptian Vulture

Illustration by
Mike Langman



below

Egyptian Vulture

Photo by
Mario Caruso





above

Socotra Bunting

Illustration by
Mike Langman

right

Socotra Buzzard

Photo by Richard Porter

of abundance). Next, in terms of numbers and distribution, is Socotra Sunbird *Nectarina balfouri* with over 30,000 individuals. The fruit-eating Socotra Starling *Onychognathus frater* is widely dispersed and numbers c. 14,000 individuals, while the more secretive Socotra Warbler *Incana incana* has a population in the order of 20,000. That of the lowland and coastal plain-dwelling Socotra Cisticola *Cisticola haesitatus* has recently been calculated to be around 3000 pairs, while Socotra Bunting *Emberiza socotrana* (of the highlands) is the rarest of the endemics and probably numbers no more than 1000 individuals; it is also the most difficult to find. The taxonomically enigmatic buzzard and scops owl are widespread, with populations of fewer than 500 pairs; current studies will hopefully determine whether they should be given endemic species status. Finally mention must be made of the Jouanin's Petrel. Whilst this seabird ranges widely in the Arabian Seas, its only known breeding colony in the world was discovered in 2000 on Socotra; it can thus be classed as an island endemic.



Checklist of the birds of the Socotra Archipelago (at November 2003)

180 species of birds have been recorded on Socotra, its neighbouring islands and rocky outcrops. A records committee to maintain the Socotran bird list has recently been formed (Omar Al-Saghier, Richard Porter, Nadim Taleb and Simon Aspinall).

The committee works on behalf of BirdLife International, the Socotra Conservation and Development Programme (SCDP) and the Yemen Society for the Protection of Wildlife (YSPW).

Observations and papers on the birds of Socotra regularly appear in Sandgrouse, the journal of the Ornithological Society of the Middle East.

Key:

(B) Breeding species; (E) Endemic; (V) Vagrant; (G) Globally threatened

Species not labelled are migrants or winter visitors to the islands or surrounding ocean. Species in bold have internationally important populations on Socotra

Little Grebe <i>Tachybaptus ruficollis</i> (V)	Red Knot <i>Calidris canutus</i> (V)	Yellow Wagtail <i>Motacilla flava</i>
Jouanin's Petrel <i>Bulweria fallax</i> (B) (G)	Sanderling <i>Calidris alba</i>	Citrine Wagtail <i>Motacilla citreola</i> (V)
Wedge-tailed Shearwater <i>Puffinus pacificus</i>	Little Stint <i>Calidris minuta</i>	White Wagtail <i>Motacilla alba</i>
Flesh-footed Shearwater <i>Puffinus carneipes</i>	Temminck's Stint <i>Calidris temminckii</i>	Grey Wagtail <i>Motacilla cinerea</i>
Persian Shearwater <i>Puffinus persicus</i> (B) (G)	Curlew Sandpiper <i>Calidris ferruginea</i>	Bluthroat <i>Luscinia svecia</i>
Wilson's Storm-petrel <i>Oceanites oceanicus</i>	Dunlin <i>Calidris alpina</i>	Black Redstart <i>Phoenicurus ochruros</i>
Red-billed Tropicbird <i>Phaethon aethereus</i> (B)	Broad-billed Sandpiper <i>Limicola falcinellus</i> (V)	Pied Wheatear <i>Oenanthe pleschanka</i>
Masked Booby <i>Sula dactylatra</i> (B)	Ruff <i>Philomachus pugnax</i> (V)	Isabelline Wheatear <i>Oenanthe isabellina</i>
Brown Booby <i>Sula leucogaster</i> (B)	Common Snipe <i>Gallinago gallinago</i>	Desert Wheatear <i>Oenanthe deserti</i>
Socotra Cormorant <i>Phalacrocorax nigrogularis</i> (B) (G)	Pintail Snipe <i>Gallinago stenura</i>	Blue Rock Thrush <i>Monticola solitarius</i>
Long-tailed Cormorant <i>Phalacrocorax africanus</i> (V)	Black-tailed Godwit <i>Limosa limosa</i> (V)	Socotra Cisticola <i>Cisticola haesitatus</i> (B) (E) (G)
Darter <i>Anhinga rufa</i> (V)	Bar-tailed Godwit <i>Limosa lapponica</i>	Socotra Warbler <i>Incana incana</i> (B) (E)
White Pelican <i>Pelecanus onocrotalus</i> (V)	Whimbrel <i>Numenius phaeopus</i>	Ménétries's Warbler <i>Sylvia mystacea</i>
Yellow Bittern <i>Ixobrychus sinensis</i> (V)	Eurasian Curlew <i>Numenius arquata</i>	Lesser Whitethroat <i>Sylvia curruca</i>
Night Heron <i>Nycticorax nycticorax</i>	Spotted Redshank <i>Tringa erythropus</i>	Common Whitethroat <i>Sylvia communis</i> (V)
Striated Heron <i>Butorides striatus</i>	Common Redshank <i>Tringa totanus</i>	Wood Warbler <i>Phylloscopus sibilatrix</i> (V)
Squacco Heron <i>Ardeola ralloides</i>	Marsh Sandpiper <i>Tringa stagnatilis</i> (V)	Common Chiffchaff <i>Phylloscopus collybita</i> (V)
Madagascar Pond Heron <i>Ardeola idae</i> (V)	Common Greenshank <i>Tringa nebularia</i>	Spotted Flycatcher <i>Muscicapa striata</i> (V)
Indian Pond Heron <i>Ardeola grayii</i> (V)	Green Sandpiper <i>Tringa ochropus</i>	Socotra Sunbird <i>Nectarinia balfouri</i> (B) (E)
Cattle Egret <i>Bubulcus ibis</i>	Wood Sandpiper <i>Tringa glareola</i>	White-breasted White-eye <i>Zosterops abyssinicus</i> (B)
Western Reef Heron <i>Egretta gularis</i>	Terek Sandpiper <i>Xenus cinereus</i> (V)	Eurasian Golden Oriole <i>Oriolus oriolus</i> (V)
Little Egret <i>Egretta garzetta</i>	Common Sandpiper <i>Tringa hypoleucos</i>	Southern Grey Shrike <i>Lanius meridionalis</i> (B)
Intermediate Egret <i>Egretta intermedia</i> (V)	Ruddy Turnstone <i>Arenaria interpres</i>	Isabelline Shrike <i>Lanius isabellinus</i>
Great White Egret <i>Egretta alba</i>	Red-necked Phalarope <i>Phalaropus lobatus</i>	Indian House Crow <i>Corvus splendens</i> (B) Introduced
Black-headed Heron <i>Ardea melanocephala</i> (V)	Arctic Skua <i>Stercorarius parasiticus</i> (V)	Brown-necked Raven <i>Corvus ruficollis</i> (B)
Grey Heron <i>Ardea cinerea</i>	White-eyed Gull <i>Larus leucophthalmus</i>	Socotra Starling <i>Onychognathus frater</i> (B) (E)
Purple Heron <i>Ardea purpurea</i>	Sooty Gull <i>Larus hemprichii</i> (B)	Somali Starling <i>Onychognathus blythii</i> (B)
White Stork <i>Ciconia ciconia</i> (V)	Lesser Black-backed Gull <i>Larus fuscus</i>	European Starling <i>Sturnus vulgaris</i> (V)
Glossy Ibis <i>Plegadis falcinellus</i>	Heuglin's Gull <i>Larus (fuscus) heuglini</i>	Socotra Sparrow <i>Passer insularis</i> (B) (E)
African Spoonbill <i>Platalea alba</i> (V)	Baraba Gull <i>Larus (cachinnans) barabensis</i>	Golden-w Grosbeak <i>Rhynchostruthus socotranus</i> (B)
Greater Flamingo <i>Phoenicopterus ruber</i>	Caspian Gull <i>Larus (cachinnans) cachinnans</i>	African Rock Bunting <i>Emberiza tahapisi</i> (B)
Greater White-fronted Goose <i>Anser albifrons</i> (V)	Black-headed Gull <i>Larus ridibundus</i>	Socotra Bunting <i>Emberiza socotrana</i> (B) (E) (G)
Cotton Teal <i>Nettapus coromandelianus</i> (V)	Gull-billed Tern <i>Sterna nilotica</i> (V)	
Eurasian Wigeon <i>Anas penelope</i>	Caspian Tern <i>Sterna caspia</i>	
Gadwall <i>Anas strepera</i>	Lesser Crested Tern <i>Sterna bengalensis</i>	
Common Teal <i>Anas crecca</i>	Swift Tern <i>Sterna bergii</i>	
Mallard <i>Anas platyrhynchos</i> (V)	Sandwich Tern <i>Sterna sandwicensis</i>	
Northern Pintail <i>Anas acuta</i>	Roseate Tern <i>Sterna dougallii</i> (V)	
Garganey <i>Anas querquedula</i>	Common Tern <i>Sterna hirundo</i>	
Northern Shoveler <i>Anas clypeata</i>	White-cheeked Tern <i>Sterna repressa</i>	
Common Pochard <i>Aythya ferina</i> (V)	Bridled Tern <i>Sterna anaethetus</i> (B)	
Ferruginous Duck <i>Aythya nyroca</i>	Sooty Tern <i>Sterna fuscata</i>	
Tufted Duck <i>Aythya fuligula</i> (V)	Saunders's Tern <i>Sterna saundersi</i> (B)	
Black Kite <i>Milvus migrans</i> (V)	Whiskered Tern <i>Chlidonias hybridus</i> (V)	
Egyptian Vulture <i>Neophron percnopterus</i> (B)	White-winged Black Tern <i>Chlidonias leucopterus</i> (V)	
Western Marsh Harrier <i>Circus aeruginosus</i> (V)	Brown Noddy <i>Anous stolidus</i> (B)	
Pallid Harrier <i>Circus macrourus</i> (V)	Lichtenstein's Sandgrouse <i>Pterocles lichtensteini</i> (B)	
Steppe Buzzard <i>Buteo buteo vulpinus</i> (V)	Feral Rock Pigeon <i>Columba livia</i> (B) Introduced	
Socotra Buzzard <i>Buteo (buteo) sp.</i> (B) (E)	Laughing Dove <i>Streptopelia senegalensis</i> (B)	
Osprey <i>Pandion haliaetus</i> (B)	Namaqua Dove <i>Oena capensis</i> (V)	
Common Kestrel <i>Falco tinnunculus</i> (B)	Bruce's Green Pigeon <i>Treron waalia</i> (B)	
Amur Falcon <i>Falco amurensis</i> (V)	Jacobin Cuckoo <i>Clamator jacobinus</i> (V)	
Sooty Falcon <i>Falco concolor</i>	Common Cuckoo <i>Cuculus canorus</i>	
Peregrine Falcon <i>Falco peregrinus</i> (B)	White-browed Coucal <i>Centropus superciliosus</i> (B)	
Common Quail <i>Coturnix coturnix</i>	Socotra Scops Owl <i>Otus sp</i> (B) (E)	
Water Rail <i>Rallus aquaticus</i> (V)	Nubian Nightjar <i>Caprimulgus nubicus</i> (B)	
Spotted Crane <i>Porzana porzana</i> (V)	European Nightjar <i>Caprimulgus europaeus</i>	
Common Moorhen <i>Gallinula chloropus</i>	Forbes-Watson's Swift <i>Apus berliozi</i> (B)	
Common Coot <i>Fulica atra</i> (V)	Little Swift <i>Apus affinis</i>	
Common Crane <i>Grus grus</i> (V)	Blue-cheeked Bee-eater <i>Merops persicus</i>	
Houbara Bustard <i>Chlamydotis undulata</i> (V)	European Roller <i>Coracias garrulus</i>	
Pheasant-tailed Jacana <i>Hydrophasianus chirurgus</i> (V)	Abyssinian Roller <i>Coracias abyssinica</i> (V)	
Eurasian Oystercatcher <i>Haematopus ostralegus</i> (V)	Indian Roller <i>Coracias benghalensis</i> (V)	
Black-winged Stilt <i>Himantopus himantopus</i>	Eurasian Hoopoe <i>Upupa epops</i>	
Crab Plover <i>Dromas ardeola</i> (V)	Black-crowned Finch Lark <i>Eremopterix nigriceps</i> (B)	
Cream-coloured Courser <i>Cursorius cursor</i> (B)	Greater Short-toed Lark <i>Calandrella brachydactyla</i>	
Collared Pratincole <i>Glareola pratincola</i> (V)	Sand Martin <i>Riparia riparia</i>	
Little Ringed Plover <i>Charadrius dubius</i>	Rock Martin <i>Hirundo fuligula</i> (B)	
Common Ringed Plover <i>Charadrius hiaticula</i>	Barn Swallow <i>Hirundo rustica</i>	
Kentish Plover <i>Charadrius alexandrinus</i> (B)	Northern House Martin <i>Delichon urbica</i>	
Lesser Sand Plover <i>Charadrius mongolus</i>	Tawny Pipit <i>Anthus campestris</i>	
Greater Sand Plover <i>Charadrius leschenaultii</i>	Long-billed Pipit <i>Anthus similis</i> (B)	
Pacific Golden Plover <i>Pluvialis fulva</i>	Tree Pipit <i>Anthus trivialis</i>	
Grey Plover <i>Pluvialis squatarola</i>	Red-throated Pipit <i>Anthus cervinus</i>	

Records pending (awaiting evaluation)

Eurasian Spoonbill *Platalea leucorodia*
 Eleanor's Falcon *Falco eleonorae*
 Sooty Falcon *Falco concolor*
 Barbary Falcon *Falco peregrinoides*
 Caspian Plover *Charadrius asiaticus*
 Great Knot *Calidris tenuirostris*
 Crested Coot *Fulica cristata*
 Hume's Tawny Owl *Strix butleri*
 Bimaculated Lark *Melanocorypha bimaculata*
 Willow Warbler *Phylloscopus trochilus*

Unsubstantiated claims

Streaked Shearwater *Calonectris leucomelas*
Red-footed Booby *Sula sula*
 Great Cormorant *Phalacrocorax carbo*
Little Bittern *Ixobrychus minutus*
 Lanner Falcon *Falco biarmicus*
 Harlequin Quail *Coturnix delegorguei*
 Lesser Noddy *Anous tenuirostris*
 Common Swift *Apus apus*
 Pallid Swift *Apus pallidus*
 Crag Martin *Pyonoprogne rupestris*
 Little Rock Thrush *Monticola rufocinerea*



MARINE BIODIVERSITY

From Cheung, C. and L.M. Levantier, in press.

Contrary to earlier scientific belief that the islands were poor in tropical marine species (Scheer 1971) because of the absence of coral reefs (Darwin, 1842) and pervading influence of cool water upwelling, the islands support a highly diverse marine fauna and flora, with some 253 species of reef-building coral (DeVantier et al., 2004) and 30 soft corals (Reinicke et al., 2000), 730 species of coastal fishes (Kemp, 1998; Zajonz et al. 2000; Zajonz and Khalaf, 2002), 250 species of marine decapod Crustacea – crabs and allies (Apel, 2000), 129 species of inter-tidal molluscs (Janssen, 2000) and 124 species of macro-algae (Schils and Coppejans, 2003a,b; Schils et al. 2003). Socotra's marine biodiversity rivals other much larger coastal areas, such as the Red Sea, in total richness.

The high tropical marine diversity is related to several factors. Primary among these is oceanographic dispersal bringing larvae from different source areas – East Africa and the western Indian Ocean, Arabian Sea and Gulf, Red Sea, and greater Indo-Pacific; the variety of habitats and gradients in respect of environmental extremes, particularly the strong seasonal upwelling; and the presence of regional endemics.

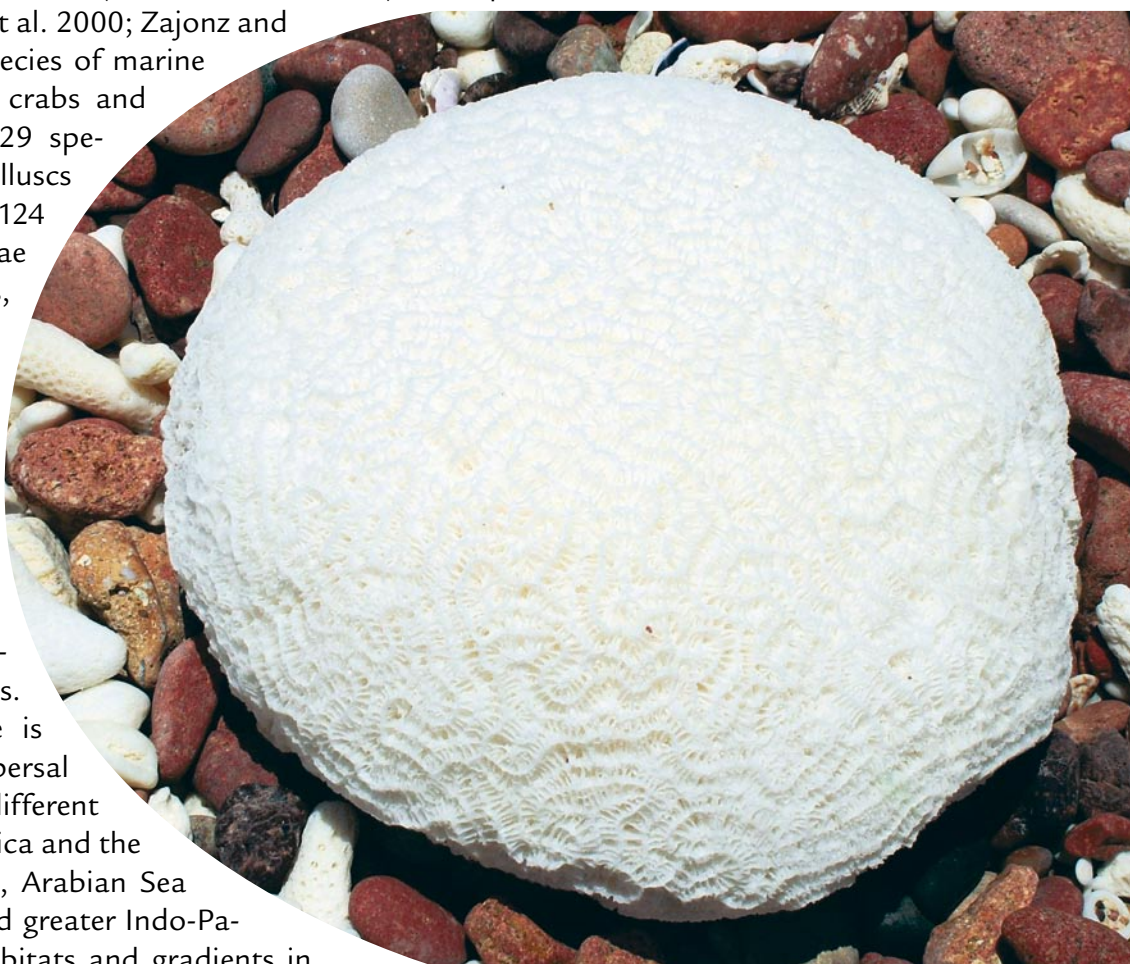
Socotra's marine biodiversity highlights the faunal similarity and close zoogeographic affinities between the archipelago and the Red Sea, the Gulf of Aden and the southern Arabian region, whilst also illustrating oceanographic links with more distant areas. Socotra is the northern, western, southern and eastern most location for many species with distributions otherwise restricted respectively to East Africa, the more eastern Indian Ocean, the Arabian Sea and Red Sea, or further afield.

“The Archipelago's (marine) species composition has a strong cosmopolitan component, consistent with the islands acting as a ‘trap’ for larvae or rafted recruits that have drifted from various distinct source populations. These populations may be as ‘close’ as the Gulf of Aden, Gulf of Oman, Red Sea, and Somalia, may be further afield in East Africa, Madagascar, the Seychelles and the Maldives or even more distant in the Indian Ocean and West Pacific. The Archipelago lies at a ‘cross-roads’ in surface ocean currents and the different water masses may transport ... larvae from all of these regions at various times. Thus these communities ... may be important ‘stepping stones’ connecting ... populations in the northwestern Indian Ocean” (DeVantier et al., 2004).

below

Di-Hamri
Corals and stones

Photo by Mario Caruso



left page

View of Di-Hamri

Photo by Mario Caruso

Marine biodiversity of conservation importance

The islands are globally significant for nesting sea birds, important nesting sites for sea turtles, and support numerous cetaceans. Socotra's unique marine biogeographic position makes it particularly important as a 'stepping stone' in maintaining connectivity and gene flow among marine populations in the north-western Indian Ocean and further afield. In the latter respect, all its marine biodiversity is of international conservation importance.



The islands' algal and coral communities and their associated fauna are unique, including many species that are not known to occur anywhere else in the Arabian Seas Region or the western Indian Ocean. The coral communities exhibited high variability in condition in the late 1990s, mostly related to the differential effects of coral bleaching in 1998 (DeVantier et al., in press). Of international importance, coral communities of the outer islands were little or unaffected by the bleaching, in contrast with many other reef areas of the Indian Ocean. From the perspectives of resistance

above

Di-Hamri
Corals and stones

Photo by Mario Caruso

and resilience in the face of future disturbances, including global change, and of maintenance and replenishment of populations, these communities were afforded high conservation priority in the Conservation Zoning Plan (DeVantier et al., 2004; Di Micco and Zandri, 2004; Klaus and Turner, 2004).

Socotra also hosts a diverse array of apex marine predators, many of which are of increasing conservation importance due to overfishing globally. These include Hammerhead, Tiger and Whaler or Requiem sharks, Marlin (*Makaira* spp.) and other bill- and sailfish. Some of these apex predators are enormous, reaching several metres in length and weighing more than a tonne. Yet these are still just 'small fry' in comparison with the true ocean giants feeding on the plankton in these highly productive waters. These include Manta or Devil Rays *Manta birostris* and *Mobula thurstoni*, Whale Sharks *Rhincodon typus*, and various species of baleen and toothed whales.

Globally threatened species

Socotra hosts four species of endangered marine turtles - the Loggerhead turtle *Caretta caretta*, the Green turtle *Chelonia mydas*, the Hawksbill turtle *Eretmochelys imbricata* and the rarer Olive Ridley turtle *Lepidochelys olivacea*. Loggerhead and Green turtles nest on various beaches around the islands. No nesting has yet been confirmed for Hawksbill and Olive Ridley turtles. The Leatherback *Dermochelys coriacea* is a rare pelagic visitor to the western Indian Ocean, although it is not known from Socotra (Wranik, 2003). Being migratory, marine turtles require various develop-

mental habitats throughout their range and at each stage of their life cycle - clean beaches free from human encroachment, healthy coral reefs, seagrass beds, and unpolluted open oceans free from debris and fishery pressures. Socotra provides many of these essentials, although local and international pressures pose significant threats.

Socotra also has a diverse and abundant marine mammal fauna, the full species complement of which remains to be determined. The Northwest Indian Ocean hosts some 30 cetacean species and around Socotra there are at least six dolphin species, the Common dolphin *Delphinus delphis*, the Humpback dolphin *Sousa chinensis*, the Spotted dolphin *Stenella attenuata*, the Spinner dolphin *Stenella longirostris*, the larger Bottlenose dolphin *Tursiops truncatus* and Risso's dolphin *Grampus griseus* (Wranik, 2003). Sperm Whales *Physeter macrocephalus* are also present. Adjacent coastal waters of southern Arabia, and particularly Southeast Oman from Masirah Island northeast to Ras Al Hadd, support one of Earth's most diverse and concentrated cetacean assemblages, with some 22 species, two of which may be endemic to the area. The resident population of Humpback Whales *Megaptera novaeangliae* is unique; the only Humpback population in the world that does not migrate to the poles for summer feeding. Characterized by its sedentary behaviour and distinctive songs, these whales are believed to be isolated from other Humpback groups around the world (Baldwin, 2004). Numerous other whales migrate to the area to breed and calve, including the Bryde's, Sperm and Sei Whales.

The importance of its whale populations and continuing poaching and killings, recently under the guise of science, prompted the International Whaling Commission to declare the entire Indian Ocean an international whale sanctuary since 1979. The sanctuary received increased support in 2001, through the Nairobi Convention initiated by the United Nations Environment Programme and ten East African coun-

below

Coral community in Di-Hamri

Photo by Catherine Cheung



tries concerned for the marine environment of the region. Distribution and foraging ranges of many Indian Ocean whale populations are little known at present, and some frequent Socotran waters, including as noted above, one of the world's largest in the Sperm Whale.

Internationally important populations

These include various endemic species in such diverse marine groups as algae, molluscs, crustaceans, corals and fishes, and the sea turtles and cetaceans. As noted above, species composition of Socotra's marine communities is unique, illustrating its transitional biogeographic location and importance in connectivity.

“The Socotra Archipelago ... represents a transition zone, in which related but distinct faunal communities overlap. ... It is apparent ... that Socotra will prove to be of pivotal importance for the dispersal of species in the northern and western Indian Ocean, supporting sympatric occurrences of formerly isolated populations or species” (Zajonz and Khalaf, 2002).

This is particularly well illustrated by Socotra's fish fauna, notably species of Butterfly and Angelfish.

Endemic species

The Arabian Sea and Red Sea are major centres of marine endemism (Klausewitz, 1989; Randall, 1996; Veron, 2000; Schils and Coppejans, 2003b), and Socotra hosts populations of many regional endemics. Some of Socotra's marine species show significant variations in colour and form from other populations located elsewhere, posing significant taxonomic challenges. Several of the corals, fish, squid, crabs and algae were previously unknown to science, and are, for the present at least, considered endemic (e.g. Khromov, 1988; Apel, 2000; Veron, 2000, 2003; Gill and Zajonz, 2003; Schils and Coppejans, 2003a,b; DeVantier et al., 2004). Other species present show major discontinuities in their distributions, being recorded from the Indian Ocean for the first time, from as far afield as Japan and Hawaii, with notable reproductive and perhaps evolutionary consequences.

For example, discovery of the previously undescribed red alga *Reticulocaulis obpyriformis* extends the distribution range of its genus into the Indian Ocean for the first time, from Hawaii (Schils et al., 2003). Among the corals, many regional endemics, including *Acanthastrea maxima*, *Parasimplastrea sheppardi* and *Fungia puishani*, have important populations around Socotra. Among the decapod crustaceans, some 16 species were new to science (Apel, 2000). Socotra is also the type locality for two species of cuttlefish, *Sepia (Doratosepion) sokotriensis* and *Sepia (Doratosepion) mirabilis* (Khromov, 1988).

2b. History and development

The remoteness and inaccessibility of the Socotra Archipelago, in conjunction with the limited information available to travellers and historians, has kept the islands shrouded in an aura of mystery until recent times. Many aspects of the islands' history and culture, such as the very etymology of the name "Socotra", the actual time of human colonization as well as the composition and origins of the population and their religion, are still characterized by a mix of historical evidence, myths and legends.

On the other hand, a series of short scientific expeditions - started in early 19th century - took place for about 200 years, giving us a general account of the biodiversity of the Archipelago. Those activities, culminated in the recent EPA/GEF/UNDP Socotra Biodiversity Project - started in 1997 - supported the most extensive research activities conducted so far on the archipelago and adjacent waters. The results of both terrestrial and marine research brought into being a Conservation Zoning Plan for the entire archipelago, laid out in the "Presidential Decree 275" in 2000.

The archipelago of Socotra reached its present form and condition through the impressive degree of isolation it was subject to, throughout its history. Geological, climatic and historical isolation are the key factors that determined the preservation of its pristine environment; the former two factors are extensively clarified in section 2.a. and this section focuses on the history of the Archipelago.

Glimpses of History

(Adapted from Naumkin, 1993)

The island of Socotra has been known since antiquity, although no one has yet established when and who first inhabited it.

The first record that could be referred to Socotra is by an unknown Egyptian author, dating back in 18th century BC. After that, reference to an island that could be identified as Socotra, was made by Herodotus (on the 5th century BC), by Indian authors (4th century BC), by Diodorus of Sicily (1st century BC) and by an unknown Greek sailor (1st century AD).

Indians, Arabs and Egyptians ranged extensively across the Indian Ocean expanses and it is well documented that by the middle of the 1st millennium BC the south Arabians has established their own ports in the region. By that time Socotra, depending on South Arabians traders, was of major importance as a staging post in the incense trade.

The Yemeni historian al-Hamdani (d. 334/945), and his contemporary al-Mas'udi (d. 345/956), both recorded that Alexander the Great sent a small group of Greeks to Socotra to cultivate the famous aloe. In his

Chronological Summary

18th century BC, in an Egyptian document Socotra, as "Pa'-anch", is mentioned as a home of incense.

5th century BC, Herodotus cited Socotra as "Panchaia", the Roman version of Pa'-anch.

4th century BC, Indians referred to Socotra as "Dvipa Sukhadhara", the island Abode of Bliss.

1st century BC, Diodorus of Sicily describes Socotra, Panhaeia, as a source of incense, and its inhabitants as Greek, Indian, and Arab.

1st century AD, unknown Greek sailor, gave a long and detailed description of Socotra, referred as to as Dioscorida.

3rd century AD, Hoq cave a religious site attracting pilgrims from the Middle East and India.

4-6th centuries AD, first evidence of Christianity on the island.

ca. 9th century, first colonization of Socotra by tribes from Mahra region.

Archaeological and Historical records attest to continuous habitation from the 10th century AD onwards.

ca. 1480, Socotra comes under direct rule of the Banu 'Afrar Sultanate in Mahra.

1507-11, brief Portuguese occupation of the island, following which the 'Afrar reassert their control.

1834, Socotra's Sultan rebuffs British advances, though soon after the island falls under British influence.

1876-1967, period of British Protectorate.

1967-1989, Socotra is administrated by the Socialist People's Democratic Republic of Yemen (PDRY), from Aden.

1990-present, Socotra becomes part of a united Republic of Yemen.

Fields of Gold, the latter author adds the detail that it was Aristotle himself he advised Alexander in this matter. Al-Mas'udi also mentioned that Indians had once worshipped idols on the island, a reference that can tentatively be linked to the inscriptions in Indian languages found within Hoq cave. The Greeks are said to have conquered the local Indian population and remained there.

Besides legends of Alexander's interest in the island, Socotra was quite certainly settled at the latest by the first centuries AD by a mixture of Hadrami Arabs and Indians. This was a time when Socotra's inhabitants are thought to have cultivated large quantities of dragon's blood, frankincense and aloe. The archipelago was integrated into the larger Frankincense trade routes, and the products listed here were sought after as luxury goods in Egypt and other affluent countries.

Historical records on Socotra started to be more detailed and numerous around the 10th century AD, by the Arab historian and geographer Al-Hamdani and the medieval geographers Al-Idrisi, Ibn Battuta, Yaqut Al-Hamawi and Al-Muqaddasi.

Christianity and Islam

A lack of written sources allows this period of Socotra's history to easily merge with legend. Tradition has it that the apostle St. Thomas introduced Christianity to Socotra in the year 52 when he was shipwrecked there, though this report does not necessarily invalidate the possibility that Greeks introduced Christianity in the 4th century.

Tradition suggests that the Greek colonists brought Christianity to Socotra, as referred by Al-Hamdani: "It is said that the people from the Rum country [Greeks] were left there by their Caesar. They were followed by the Mahra tribes, which began to live together with them and, like them, became Christians."

The name Socotra

The archipelago has been cited very early in the literature, with many different names, which changed and evolved with different legends.

An Egyptian (18th century BC) refers to Pa'-anch, the land of the king of incense, thought to be Socotra.

Later Pliny the Elder and Herodotus (5th century BC) passed on the tale of the Arabian Phoenix, a large bird that died in a cinnamon and incense nest. From its bones and marrow sprang a small worm, which turned into a bird. The new bird carried its nest to the city of sun near "Panchaia", the Roman version of Pa'-anch.

In the first century BC, Diodorus of Sicily wrote about the island of "Panhaeia", which according to some scholars shows a certain degree of resemblance to Socotra. The island was said to provide the entire world with incense. The inhabitants were a mixture of aborigines, Greeks, Indians and Arabs.

Before the 4th century BC, the island belongs to the Indians, who named it, in Sanskrit language, Dvipa Sukhadhara (the Island Abode of Bliss).

Later on the same century, by the time of Alexander the Great, the Greeks took the island and name it Dioscorida. The name might be a translation from the Sanskrit or derived from the Dioscuri -Castor and Pollux- the twins worshipped for they were said to hold the power of the winds and the waves.

Another theory tells of the name Socotra as derived from the combination of the two Arabic words: suq (marketplace) and qatir (dropping essences).

In 524 AD, Cosmos Indicopleustes visited the islands from Ethiopia and wrote that the Nestorian Church dominated there.

Five hundred years later the people of Socotra were still Christians. This is reported during the 10th century by both Al-Hamdani ("people from all the Mahra tribes, including 10,000 fighting men, all of them Christian.") as well as Al-Mas'udi ("The majority of its people are Christian Arabs").

Later, on the 13th century, the great Venetian seafarer, Marco Polo, reported: "The inhabitants are baptized Christians and have an archbishop. ... It should explain that the archbishop of Socotra has nothing to do with the pope of Rome, but is subject to an archbishop who lives in Baghdad. ... You should know also that, if the archbishop of Socotra dies, his successor must be sent from Baghdad, otherwise there could never be an archbishop here."

Up to the end of the 15th century Europe received little or no further information about Socotra, by which time it seems probable that the group of Greek, Arab and Indian settlers on the island had ceased to be outsiders and had become Socotrans, adopting the language

and customs of the local people and integrating with them to form a cohesive population.

The Arabs

In the middle of the 15th century, Socotra found itself subordinated to the Sultanate of Fartak, which had been established in South Arabia with its capital at Shihri in the Hadramaut by the Kathiri, a powerful Dhufari tribal alliance. Late in the same century, the Taharids, whose land extended from the Red Sea to Dhufar, took the power on Socotra.

In the late 15th and early 16th centuries account were given by Ahmad Ibn Majid, the great Arab pilot who guided the ship of Vasco Da Gama from the Somali port of Malindi to the coasts of India. These comments show that Socotra was clearly in Mahri hands, although they had apparently failed to establish direct control of the whole island.



above

Inscriptions at
Mori Plateau

Photo by Mario Caruso

The Portuguese

The 16th century ushered in a period of Socotran history that is perhaps better known than any other. This was the era of the Portuguese colonial expansion across the Indian Ocean.

During 1497-1498 Vasco Da Gama left Lisbon to sail to India. From the writings of Da Gama's pilot, Ibn Madjid, we learn that the population of Socotra was then Christian, and that its inhabitants were ruled over by a woman who had influence over the island's clergy. He also observed that Christian priests, who lived in churches, controlled the ceremony of marriage.

The opening to a regular sea route from Europe to India was an event of historic significance.

Information about Socotra had reached Portugal, and the island was recognized as potentially one of the key points in trade with the Far East.

Captain Diego Fernandes Pereira, in 1503, was forced by the monsoons to seek shelter on Socotra. He claimed that the locals requested the protection of the King of Portugal and his aid against the Mahri Arabs of Qishn on the mainland. The Portuguese decided to station a garrison on Socotra, and thus hinder the access of the Arab competitors to the Gulf of Aden and the Red Sea.

The Portuguese king, Dom Manoel I, wrote to de Almeida to inform him that Socotra should be seized and fortified because of its good harbours, navigable at any season, and its food supplies. In addition there were many local Christians and not many Moors (Muslims). Therefore, "wishing to have a fortress there and our men, we order Tristao da Cunha and Alfonso de Albuquerque to seize the island and build a fortress there".

In January 1507, the Portuguese arrived on Socotra and were unpleasantly surprised by the Arab fortress at Suq, which was well defended by around 130 men. Da Cunha, after unsuccessful attempt to deal with the locals, decided to attack the fort,



relying on the small number of its garrison. After some months of fear battle, a peace treaty was concluded with the local population, the Arab fort, now called San Miguel, was repaired, and the mosque building was converted into the church of Our Lady of Victory. At the beginning of August Tristan da Cunha sailed to India and Albuquerque sailed to Oman, leaving behind a garrison of one hundred men under the command of Alfonso de Naronha.

Following the Portuguese conquest, the conquerors were unable to convince the local population of their good intentions and suffered repeated attacks and a consistent lack of cooperation. An initial optimism regarding the island and its inhabitants turned into disenchantment, leading the Portuguese's stay on the island to end after only four years.

Early in 1511 two ships were sent to Socotra with orders to raze the fortress and evacuate, together with all the Christians who wanted to leave.

So the Portuguese departed and the island reverted to the control of the Mahrís.

Despite this failed colonization, Portuguese ships continued to stop in Socotra in the following years, often receiving warm receptions from the local population.

During the Portuguese voyage to India in 1541-2, St. Francis Xavier stopped briefly in Socotra. He reported an absence of ordained clergy, and a general ignorance of Christianity. While the sign of the cross was greatly respected, baptism was no longer practiced, though monogamy and circumcision were observed. Of interest is that the Socotris practiced two Lents, during which they fasted from meat, milk and fish. A little later St. Ignatius of Loyola visited the island and similarly deplored the state of the Christianity he found there.

above

View of the bay of Hadi-bu-Suq in January 1541

Source: ROTEIRO DO MAR ROXO

De Dom Joao De Castro
MS. COTT. TIB. DIX DA
BRITISH LIBRARY

INAPA, LISBON 1991

In the following century (17th century) the islands were visited by Padre Vincenzo, a Carmelite who described the further loss of Christianity. While it was reported that all the women were named Maria and there were still houses of worship, the Socotris were also said to make sacrifices to the moon, to cut off the hands of chosen individuals, offering them to the moon in times of draught.

The British

From the beginning of the 17th century onwards Suq was replaced as the capital of Socotra by Hadiboh, a few kilometers to the west of the former capital on the northern coastal plain of the island. There are records from this period of British visits to the island, seeking the aloes it supplied. These visits ceased by the end of the century as the British found other, more easily accessible sources for these goods. In the 19th century interest arose again in Socotra, due to its potential as a fuelling station between Suez and Bombay.

In 1834 the British government reached an agreement with Sultan Ahmed bin Sultan of Fartak and his cousin Sultan bin Amr of Qishn in which the British would be able to land and store coal (for the steamships) on the island. Yet this agreement was never put into effect, as the local ruler of Socotra refused. At that time the ruler of Socotra, Sheikh Omer Abn Tuari, stated: “Your Government wish to purchase Socotra, do they? Socotra! which for to many ages has been the heritage of my fathers? Never! Were they to heap this room with gold, they should not obtain a space equal to its floor’s breath!”

Although Socotra’s ruler changed his mind some years later and opened negotiations with the British, the capture of Aden, with its more suitable harbour, in 1839 by the British rendered Socotra superfluous and unattractive as a fuelling station, also due to lack of a proper all-year round anchorage in the island.

The period of formal British influence in the island didn’t begin until 1876 when they and the Sultan of Qishn agreed that in exchange for an annual fee, Socotra would never be ceded to anyone save the British. In 1886 this relationship was strengthened, when Socotra officially became a British protectorate.

British rule of its Socotra protégées was restricted to despatching occasional shipments of food or medicines at time of famine or epidemic, and there was little interference in the island’s internal affairs. During its period under British rule, Socotra was increasingly visited for purposes of research and scientific exploration. Other than that, during this period contacts with the western world were very limited, with no permanent settlements by outsiders, other than small numbers of camping troops to support a temporary and marginal military airfield set-up during war times.

On 30 November 1967 a detachment of the South Yemeni National Front, which had led the struggle for the liberation of their country from the British, landed on Socotra. The sultanate of Mahra and Socotra was abolished and the island became part of the independent People’s Republic of Yemen that had been proclaimed on the same day.

The language of Socotra

(Adapted from Naumkin, 2003 pers. comm.)

The Socotri language, spoken only in the archipelago, is thought to have derived from an old proto-Semitic language that was the origin of Akkadian (Assyro-Babylonian) and most of the known Semitic languages (Hebrew, Phoenician, Aramaic, Arabic, etc.).

It is the ancestor of some modern ‘relict’ languages, which are still spoken in the Gulf and Yemen and include Mahri, Jibbali, Harsusi, Bethari, Hobyot and Socotri.

Of these Socotri is by far the most thriving, whereas Harsusi and Bethari are almost extinct.

Socotri branched off some time during the first half of the first millennium BC, much earlier than the appearance of Mahri and Jibbali. This was before writing made its appearance, and Socotri has continued until today as a non-written language.

All these factors together have preserved an astonishing archaic language, as revealed in its phonetics, grammar and lexicography.



Between 1970 and 1990 it was a region of the People's Democratic Republic of Yemen, and was used as a military outpost, with restricted access.

In 1990, with the unification of Yemen, and increasingly so following the victory of North Yemen in the civil war of 1994, it came first under the administration of Sana'a, and was then assigned to the governorate of Aden and later to the province of Hadramawt and locally administered from Mukalla, until present.

It is important to note that the Socotran archipelago had until then only

very limited contact with the outside world. This was due to its status as "military zone of restricted access" with only a minor gravel airstrip operational only in suitable weather conditions. Until recently, the island was largely cut off from the outside world during the monsoon season (June-September), until the airstrip was asphalted and extended in 1999, allowing civilian flights of Yemenia airline to land year round, including during the monsoon season (earlier smaller airstrips had been build during the British protectorate and by the PDRY in 1987).

Since unification of the country, the Yemeni government has demonstrated interest in conserving the then little known archipelago's valuable biodiversity and cultural heritage. This first signs of this interest appeared clearly with the resolution following the international Aden Conference on Socotra in 1996, the signature by Yemen of the international Convention on Biological diversity and the subsequent request to the United Nations Development Programme for the establishment of the Socotra Biodiversity Project (SBP), funded by the Global Environment Facility (GEF).

Under the SBP, a process of gradual strengthening of the local branch of the Environment Protection Authority (EPA) was initiated and is yet ongoing. The EPA led an extensive community consultation process and the first systematic terrestrial and marine surveys of Socotra. This significant effort led to the layout of an initial draft of the Conservation Zoning Plan for the entire archipelago. Following a presentation of this plan to local authorities and community leaders on Socotra, a meeting was held between local and national authorities in 1999 in Sana'a. A final version of the Zoning Plan proceeded from this meeting, and was then ratified and signed by the Yemeni President 'Ali 'Abd Allah Saleh in 2000 as Presidential decree 275. This Zoning Plan is currently being implemented by the EPA (now part of the Ministry of Water and Environment), and constitutes the basis of future plans for the management of the island .

The SBP was replaced in 2001 by the expanded Socotra Conservation and Development Programme (SCDP), which has a broader mandate to support donor coordi-

above

Traditional Socotran greetings

Photo by Nigel Pavitt

nation, local NGOs and has direct programmes in the health, education, agriculture and local governance sectors in the island.

In 2003 the Socotra Archipelago was designated by UNESCO's as a Man and the Biosphere Reserve – the result of local and global efforts for the recognition of the value of Socotra's unique ecology. In recent years, Socotra's status as a site of global conservation importance and a centre of high endemism and biological diversity has been increasingly recognised by Yemeni institutions, UNDP/GEF, WWF, UNESCO, IUCN, Birdlife International, and the International Plant Genetic Resources Institute (IPGRI), all of which have documented and reconfirmed this on the basis of historic and recent scientific surveys.

Since the opening of the airport in late 1999, development has rapidly been reaching the island: several new asphalt roads are being built (often without proper planning and Environmental Impact Assessments), a new port is planned, and communications, fuels supply and trade have significantly increased in only a few years. This is having a significant impact on the fragile balance between the people of the island and their natural habitats that had so far survived for thousands of years. At the time of writing (2005), Socotra is at a critical point in its history: a crossroads between becoming a well managed and preserved prime eco-tourism destination at international level, or becoming just another biodiversity-impooverished island like many others, dependent on external and government help, due to the irreversible loss of its main assets: its uniquely preserved nature and culture.

The scientific exploration of Socotra

(Adapted from Wranik, 2003)

Following the 1876 agreement between the Sultan of Qishn and the British government, the scientific exploration of the archipelago was greatly facilitated.

The first scientific expedition on Socotra Archipelago can be considered the one that took place in 1880, led by Prof. I.B. Balfour. Balfour's team focused on botany, but also conducted zoological and geological studies, resulting in a first botanical account with a description of more than 200 plant species new to science. Balfour was later named the Regius Keeper of the Royal Botanic Garden (RBG) in Edinburgh, which became the holder of his specimens and began the relationship of the RBG with Socotra that continues until today.

One year later, two German naturalists, G.A. Schweinfurth and E. Riebeck, spent six weeks on Socotra studying people and the Socotri language and, to a lesser extent, flora and fauna.

The British archaeologists T. and M. Bent visited Socotra in 1896/97, accompanied by E.N. Bennett. Their expedition yielded some important plant and animal collections.

Overview of the most important scientific expeditions to Socotra *(Adapted from Wranik, 2003)*

1834	J.R. Wellsted
1847	L.H. Boivin
1876	W. Perry
1877	J. Collins
1880	I.B. Balfour
1881	G.A. Schweinfurth and E. Riebeck
1896-97	J.T. Bent, M.V.A. Bent and E.N. Bennett
1898	W.R. Ogilvie-Grant and H.O. Forbes
1898	D.H. Muller, S. Paulay, F. Kossmat, O. Simony and A. Jahn
1950 c.a.	G.B. Popov
1956	D. Botting and M.D. Gwynne
1964	A.D. Forbes-Watson
1964-65	P. Boxhall, A. Radcliffe-Smith, J. Lavranos and K.M. Guichard
1982	Scientific mission from the Univ. of Aden
1985	Q. Cronk
1990's	several short missions with the participation of FAO and UNESCO, such as: - The Royal Botanic Garden Edinburgh - Bird-Life International - Aden University and Yemen Ministry of Agriculture - Forschungsinstitut Senckenberg Frankfurt - Rostock University with Museum Fur Tierkunde Dresden

1998-2005 first permanent international team stationed full-time on the island, and several missions under the Conservation and Sustainable Use of the Biodiversity of Socotra Archipelago (UNDP, Project YEM/96/G32) and the Environmental Protection Council first, and the Socotra Conservation Development Program and the Environmental Protection Authority after.



above

Inscriptions at
Delisha

Photo by Mario Caruso

logical surveys.

In spring 1967, the British Middle East Command conducted an interdisciplinary expedition to Socotra, in which the botanists A. Radcliffe-Smith and J. Lavranos and the entomologist K.M. Guichard participated.

In 1982, the University of Aden sent a scientific team to Socotra that was led by the German zoologist W. Wranik.

The Royal Botanic Garden of Edinburgh's team renewed their research on the island's flora in the 1980s as well, and was instrumental in mobilizing international attention to the conservation of the archipelago's unique wildlife and culture.

After the unification of North and South Yemen, systematic research on the flora and fauna of Socotra by Yemeni and international teams of scientists was initiated under the auspices of the Environmental Protection Authority (EPA), with the support of several international organizations.

These activities culminated in the Socotra Biodiversity Project (supported by the UNDP Global Environment Facility - GEF), which has supported the most

In 1898 and 1899, W.R. Ogilvie-Grant of the British Museum in London and H.O. Forbes of the Liverpool Museum spent three months on Socotra and Abd al-Kuri. Forbes published the results of their zoological survey in 1903.

At the same time, a team of scientists from the Vienna Academy of Sciences conducted the Austrian expedition to Southern Arabia and the Socotra Archipelago, collecting large numbers of insects, reptiles and fishes. Their geological and biological results were published in a special volume of the "Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften".

Half a century later, the British entomologist G.B. Popov studied locusts of Socotra and carried out eco-

Recent Archaeological Findings

Eriosh Petroglyphs

Recent evaluations of the petroglyphs at Eriosh suggest that this site contains the earliest evidence of the presence of Christianity on the island, dating back to the 4-6th centuries AD - although earlier scholarship has argued that these symbols may be a thousand years older. When considered in conjunction with a tablet recently found in the Hoq cave that has been dated to 258 AD, the little studied Eriosh site offers the promise of information that will help elucidate patterns of trade and migration linking India to the Red Sea.

Hoq Cave and the Tablet

Additionally, a number of so far little studied inscriptions in a variety of languages (Syriac, Ethiopian, pre-Arabian, pre-Indian) were also found in the Hoq cave, along with well preserved pottery, will help shape our understanding of a period of both Socotri and world history for which we have few written sources. A perfectly preserved wooden tablet bears the text (Gorea, 2003):

"In the month of Tammuz (July), the 25th day of the year 569 (258 AD), I, Abgar son of 'Absmaya, came to the country of nysy, to this place; may the god who dwells here bless you, you who will read this tablet, he will bless me and leave the tablet in its place".

This evidence found in the Hoq cave corroborates earlier archaeological finds at Harjya, two kilometers south of Suq (Socotra's medieval capital), where a Roman amphora handle was found, and strongly suggesting settlement during the Late Antique if not Classical period. At both Harjya and the western city of Qalansiyya evidence of 10th-14th century settlements has also been found, suggesting that the island was continually inhabited from the early centuries AD until the present day. The full significance of Socotra's archaeological sites, including the Hoq, Eriosh, and Harjya areas, should be revealed through research during the coming years.

Delisha Stones

In early 2005, a number of stones near Delisha on the north shore of the island were uncovered, bearing inscriptions in a number of languages. Future research should explain if and how these inscriptions relate to those found at Hoq and Eriosh.

Surveys of the rest of the island have revealed many sites of additional archaeological and historic interest, including graves, houses, forts and long walls or demarcations that stretch over much of the island of Socotra and are thought to be possibly related to a period when Socotra produced large commercial quantities of incense and aloë.

extensive research activities conducted so far on the archipelago and adjacent waters. In the framework of this project, a multi-disciplinary zoological and botanical expedition was conducted in February and March 1999. This venture co-ordinated by the Royal Botanic Garden Edinburgh, United Kingdom, and the local project team, was the largest ever undertaken on the island and aimed to provide as comprehensive an inventory as possible of the archipelago's terrestrial fauna. In total, 3,956 animal specimens were collected by the expedition, representing four phyla, at least 10 classes, 33 orders and 64 families.

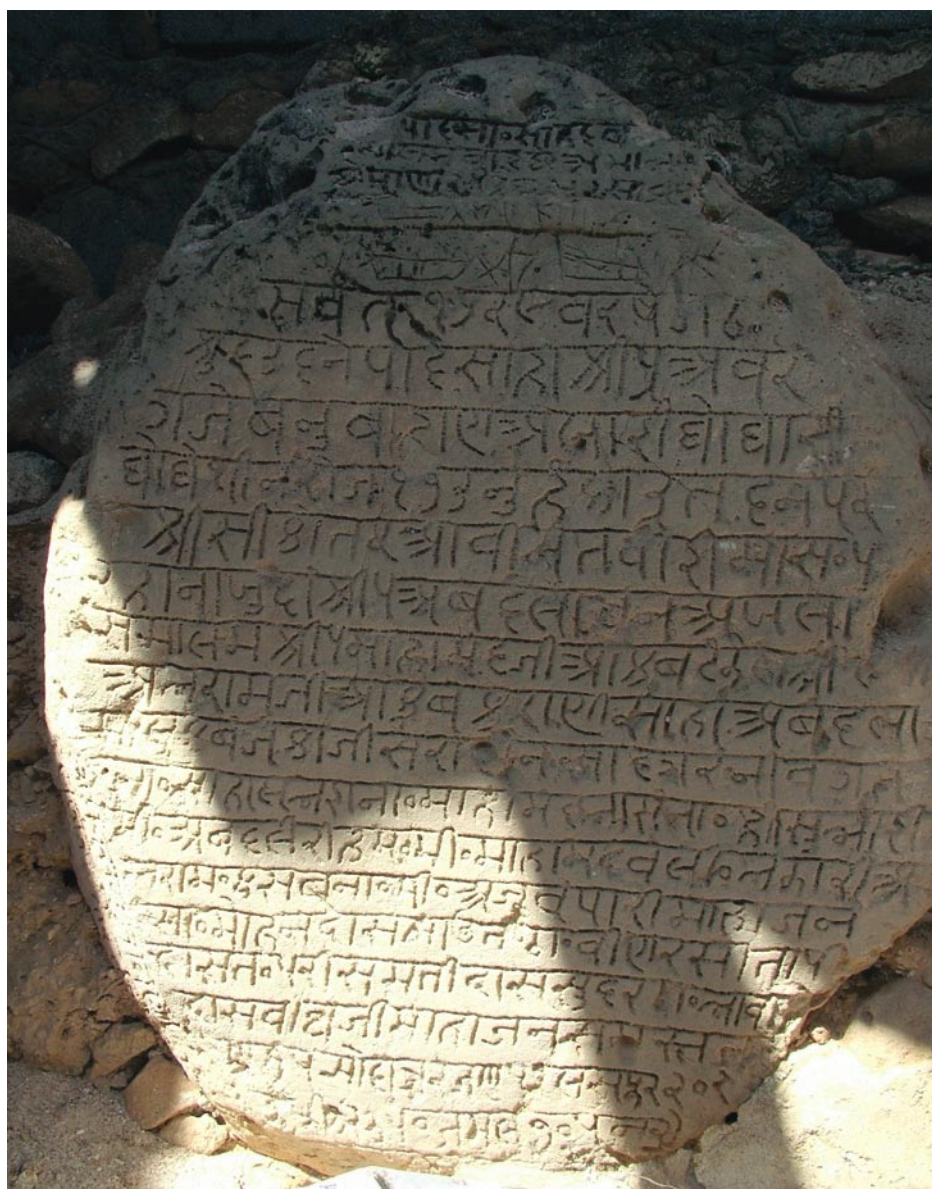
These numbers are remarkable, considering the fact that the areas surveyed were limited to the eastern part of Socotra Island, its north and south coasts (excluding the West) and the outer islands of Abd al-Kuri and Samha (excluding Darsa Island). Not surprisingly, 89 % of the specimens collected were invertebrates.

Simultaneously, in the framework of the same GEF project, an international multi-disciplinary team of scientists led by the Senckenberg Research Institute in Frankfurt, Germany, in partnership with Hariri & Associates in Sana'a, Yemen, the Marine Science Station in Aqaba, Jordan, and the Red Sea University in Port Sudan, Sudan, conducted extensive marine habitat, biodiversity and fisheries surveys. This study resulted in the compilation of information regarding the differing types of biotopes present on the Socotran coastline.

This effort was combined with extensive community consultation and dialogue with local authorities conducted by the EPA and GEF team on the island, and led to the establishment of a Conservation Zoning Scheme for the Socotra archipelago. This zoning scheme then played an critical role in the development of the archipelago, and was approved Presidential Decree 275 in the year 2000.

Currently the island became far more accessible for visitors, and Yemeni and international biologists, anthropologists, geologists, linguists, and archaeologists are able to carry out work on Socotra with support from the local offices of the Environment protection Authority. This in the coming years will doubtlessly increase our understanding and appreciation of the archipelago's value.

Both national and international researchers are currently coordinated by the EPA with support from the Socotra Conservation and Development Programme, informing ongoing efforts towards conservation and development.



above

Inscriptions at
Delisha

Photo by Mario Caruso

3.

Justification
for
Inscription**3a.** Criteria under which inscription is proposed (and justification for inscription under these criteria)

CRITERION X – THE NOMINATED PROPERTY SHALL CONTAIN THE MOST IMPORTANT AND SIGNIFICANT NATURAL HABITATS FOR IN-SITU CONSERVATION OF BIOLOGICAL DIVERSITY, INCLUDING THOSE CONTAINING THREATENED SPECIES OF OUTSTANDING UNIVERSAL VALUE FROM THE POINT OF VIEW OF SCIENCE OR CONSERVATION.

The inscription of the Socotra Archipelago is proposed as a Natural Site as it contains one of the best-conserved and significant island habitats in the world. The site holds unquestioned global importance for in-situ conservation of biological diversity, and it hosts large numbers of rare and threatened endemic species of outstanding universal value (criterion X).

Due to its remote and peripheral location, and to historically difficult accessibility due to meteorological and sea conditions, the natural environment of Socotra has retained an impressive level of integrity till present date, making it the equivalent of a precious Noah's Ark, where ancient flora and fauna, as well as an associated unique culture and traditions, have survived until present day.

Biogeographic features

Situated at the junction between the Red Sea and Gulf of Aden, the Indian Ocean and the Arabian Sea, and long separated from the main African and sub-Arabian continents, the Archipelago is a recognised globally significant terrestrial and marine biological system. In view of its geological isolation, geographical position, land topography and morphology and evolutionary history, the Socotra Archipelago supports a wide range of unique habitats and a high number of endemic plant and animal species. Some of these habitats and species are still pristine and have seen little human impact. Such high level of endemism ranks Socotra among the top 10 islands in the world in terms of botanical conservation importance (Miller, 1996; see also section 3.c).

Recognized Global Conservation Importance

The Archipelago's global conservation importance was recently highlighted by the inscription as the first UNESCO Man and Biosphere Reserve in Yemen (UNESCO

MAB, 2003). The IUCN recognizes Socotra as a globally important center of endemism and is actively supporting its conservation. Birdlife International has been actively involved and recognizes 22 Important Bird Areas in Socotra (Important Bird Areas in the Middle East, 1994). The WWF lists the archipelago among the most important sites in the world (WWF - Global 200 Eco-regions) Conservation International has recently included Socotra in the global network of “Biodiversity Hotspots”. The Archipelago is also part of the regional (Red Sea and Gulf of Aden) network of important Marine Protected Areas (PERSGA, 1998).

The island’s high conservation importance was fully recognized by the Global Environment Facility’s (GEF) attention and support since 1996, while recent baseline surveys, largely funded by GEF-UNDP, have greatly enhanced its ranking among the most important conservation areas in the world. Recent floristic studies concluded that as many as 10 plant genera of 300 species, 7 species of birds and 12 subspecies, 24 reptiles, and over 300 invertebrates are endemic to and only found in the Archipelago. The fauna is almost entirely endemic (see section 2.a for more details)

Marine biodiversity

The marine biodiversity of the Archipelago is characterised by unique mixture of species from different bio-geographic regions: Western Indian Ocean, Red Sea, Arabia, East Africa and the wider Indo-Pacific. The first surveys conducted during the GEF project (1998-9) concluded that the numbers of species of hard corals and fish in Socotra are comparable to those of the Red Sea despite the smaller size of the island. A variety of new species have been discovered, and their distribution ranges, including

those previously thought to be endemic to the Red Sea and Arabia have been documented. In addition, the Archipelago may provide the crucial link for some marine species in maintaining their distribution governed by current patterns and the duration of their planktonic larval stages.

The natural Balance between People and Nature

Humans have lived in balanced harmony with the natural habitat of Socotra since their settling of the archipelago, contributing to the preservation of the islands’ varied and rich ecology and to the associated development of a unique culture and traditions, rotating around the sustainable use of natural resources and biodiversity. With less than 2% of the archipelago’s land currently under intensive human use, and the rest occupied by a small population of subsistence pastoralist tribes, the environment remains comparatively undisturbed and this represents one of the archipelago’s greatest assets, requiring careful protection and appropriate development.

below

Traditional land use

Photo by Mark Jeffrey



3b. Proposed Statement of Outstanding Universal Value

The Socotra Archipelago is one of the most significant and well-preserved island eco-systems in the world, containing a unique assemblage of species and habitats, and representing one of the few surviving examples of local people living in a delicate balance with their natural environment.

Due to the archipelago's relative isolation until recent years, the traditional balance established between people and nature has remained relatively undisturbed, preserving endemic species and their eco-systems. The archipelago's remarkable integrity and comparatively outstanding level of conservation, offer an exceptionally valuable opportunity to study and learn from an exceptional combination of flora and fauna, with its associated unique culture, language and traditions.

Each of the archipelago's three inhabited islands exhibits its own high level of endemism, rendering the archipelago as a whole even more significant.

below

Dragon Blood Trees

Photo by Mario Caruso



3c. Comparative analysis (including state of conservation of similar properties)

The relative importance of the Socotra Archipelago is well recognised by several authors and conservation organizations worldwide, and is well summarised by Miller and Morris: “The figures for botanical diversity confirm the Socotra Archipelago’s global status as one of the world’s most botanically important island group, comparing favourably in floristic richness and endemism with such famous island as Mauritius, the Galapagos and the Canary Islands”. (Miller and Morris, 2004)

Endemism in oceanic islands				Table 8	
	Size - km ²	Total plant - spp.	Endemics	% Endemics	
Juan Fernandez	93		147	118	80
Ascension	94		25	11	44
Galapagos	7844		543	229	42
Socotra	3799		825	307	37
Mauritius	1865	800-900	280		31-35
Rodriguez	104		145	48	33
Canary Is.	7273		2000	569	28
Norfolk Is.	13		174	48	28
Madeira	769		760	760	17
St Elena	121		320	49	15
Cape Verde	4033	724 (spermatophyte)	65		11.1*
Azores	2235		600	55	9

*Table from Miller and Morris, 2004 – *data for Cape Verde from Arechevaleta, M., N. Zurita, M.C. Carrero & J.L. Martin, 2005*

The above table illustrates how the Socotra archipelago is ranked in the fourth place globally, in terms of botanical conservation importance. However an accurate comparative analysis among different islands or archipelagos in the world is a complex exercise. The different Archipelagos that were taken into consideration belong to different biomes, are dissimilar in size, show a variety of geological and climatic features. Their history of human habitation and current population and development pressures are different, and not all island groups were studied to the same degree.

There are however some common features that are worth comparing and that clearly highlight the international importance of Socotra. For this purpose we may take into consideration the archipelagos of the Galapagos, the islands of Macaronesia (Canary Islands, Madeira, and Cape Verde) and the Mascarene. In all these archipelagos, the impact of European colonization has severely affected the survival of original endemic species and unique habitats. The level of extinction of endemics has been very significant over the past few centuries, and was largely due to loss of habitat, introduction of alien and invasive species of animals and plants, and to human activities in general.

Name	Location	Biome	Size (km ²)	Conservation Status
Socotra	Islands east of the Horn of Africa and south of Yemen	Deserts and Xeric Shrublands	3,788	Critical / Endangered
Galapagos	Galápagos Islands, off the coast of Ecuador	Deserts and Xeric Shrublands	7,844	Critical / Endangered
Mascarene	Islands of Réunion and Mauritius, east of Madagascar	Tropical and Sub-tropical Moist Broadleaf Forests	4,900	Critical / Endangered
Canary	Atlantic Ocean, out of the northwest coast of Africa.	Mediterranean Forests, Woodlands, and Scrub	7,273	Critical / Endangered
Madeira	Atlantic Ocean, out of the coast between Morocco and Portugal	Temperate Broad-leaf and Mixed Forests	769	Critical / Endangered
Cape Verde*	Atlantic Ocean, West of Senegal	Tropical and Sub-tropical Dry Broad-leaf Forests	4033	Critical / Endangered

Table – data sources: WWF Global 200 eco-regions and *Edoardo Zandri pers.comm.

Today, in all these islands, examples of original vegetation types survive only in very small and inaccessible areas, and have been largely replaced in the past 4-5 centuries by alien introduced species that dominate the landscape. The administrations of all these archipelagos are currently all struggling to preserve remaining patches of natural habitats, and eradicating introduced species that affect the functionality of the ecosystem.

In Socotra, a combination of historic factors has instead resulted in the preservation of the islands' natural and cultural heritage almost intact until present days. These key factors include i.e. inaccessibility by sea/air for extended periods, lack of any significant European occupation until present (and associated over-exploitation of natural resources and introduction of invasive alien species), the low number of local inhabitants (up to 10 times lower in Socotra than in most the above comparable archipelagos), as well as the recent (until 1994) status of military restricted area.

Therefore, beyond the sheer comparison of available figures on population and wild-life species, the archipelago of Socotra stands out for its unique degree of conservation of the natural ecological balance between biodiversity and indigenous people. A very fragile balance that has long been lost in all other comparable archipelagos taken into consideration. A fragile balance that is now under severe threat, as the islands are opening up to outside influences.

Similar Archipelagos compared with Socotra at a glance

(from WWF Global 200 Eco-regions, and E. Zandri Pers. Comm.)

The **Galapagos** Archipelago is almost twice as large, and belongs to the same Biome as Socotra: Desert and Xeric Shrubland. The biodiversity of these previously uninhabited islands was well studied since the visits by C. Darwin in the 19th century, and the site is a National Park since 1968.

Endemism is high in all taxonomic groups, and the variation in elevation, size, and distance between the islands has contributed greatly towards the species diversity and level of endemism on each island.

The state of this eco-region has been deteriorating since humans first began visiting the islands in the 1800's, introducing alien species such as goats, rats, pigs, cats, dogs, horses, donkeys, cattle, sheep and mice. These introduced species are damaging and out-competing native species, causing population reduction and in some cases extinction. This is currently a major issue that conservation scientists struggle to control. The example of goats is prominent: today, the goats pose severe threat to the natural vegetation of Galapagos and their number is currently estimated near 125,000 on Isabela Island alone – a multi-million dollar eradication programme is ongoing. In comparison, Socotra currently hosts an estimated (and traditionally managed) total population of 30,000 goats, 7,000 sheep, 2,500 cattle and 400 camels (WS ATKINS INTERNATIONAL, 2001. Socotra Archipelago Master Plan, SAMP).

Introduced plants species, now outnumbering native species, represent a major problem in the Galapagos as they compete with native vegetation, taking over habitats more quickly than the native vegetation can adapt to these assailants.

Tourism is rapidly becoming a significant source of income that is driving people to immigrate and settle in these islands, increasing pressure on available natural resources. When organised tourism began in 1969, the National Park Service enacted strict rules to prevent visitors from damaging the ecosystems and wildlife. Current number of visitors for Galapagos is approximately 60,000 per year, while in Socotra visitor numbers stand at 450 (in 2004).

Mascarene Islands (Reunion, Mauritius, and Rodrigues) fall in the Tropical and Subtropical Moist Broadleaf Forests Biome. They have otherwise a comparable size and are the closest geographical location to the Socotra Archipelago (although in the southern hemisphere).

While the Mascarenes still support many endemic species, they are as well known for the large number of species that have become extinct since human occupation in the 1600's. The vast majority of original forest habitat has been lost to agriculture and tourist development and little remains for the native species (Stuart et al. 1990). **Mauritius** has one of the highest human population densities in the world, 634 persons/km² (CIA 2000). On all of the Mascarene Islands, there has been a vast loss of the original forest habitat. On **Reunion**, it is estimated that currently less than 40% of the island is covered with natural vegetation; on Mauritius, only about 5% of the natural vegetation survives; and on **Rodrigues**, the natural vegetation covers around 1% of the total land area. The natural habitats of these islands are heavily fragmented due to the anthropogenic activities that have continued since the 17th century. On Reunion, most of the remaining larger habitat blocks are found at higher elevations. The habitats of this eco-region are greatly under-protected, even though little habitat remains. There are several protected areas on Reunion, but only three are greater than 10 km².

In comparison, Socotra is almost entirely (95%) covered with natural vegetation dominated by endemic species and conserved by local ancient traditional practices, it has a relatively low population (43,000, with a density of approx 12 person/km²), and the protection status granted by recent legislation covers 97.5% of the islands' land area and the 12 nautical miles marine zone around it.

The **Macaronesia** includes the oceanic islands groups of the Canary islands, Madeira and Cape Verde.

Canary Islands fit in to the Mediterranean Forests, Woodlands, and Scrub Biome, and, as for Mascarene, have a comparable size to Socotra, and through the UNESCO MAB (Man and Biosphere) programme, three reserves have been declared in the Canaries.

Canary and Madeira Islands support remnants of laurel forest, considered a Tertiary relict vegetation type, having once extended across southern Europe and northwest Africa. This unique subtropical humid forest (very similar to permanent mountain cloud forest) constitutes an extremely important ecosystem type that is rare worldwide. Tall tree species compose the canopy; most belong to the Lauraceae family and are endemic to Macaronesia.

However these natural habitats of the Canary Islands today are mostly surviving in inaccessible places such as cliffs, highest mountains, or rocky isles. Moreover the development of mass tourism in the Canary Islands in recent years has led to enormous habitat loss, as natural areas are cleared for beach houses and resorts.

Madeira belongs to the Temperate Broadleaf and Mixed Forests Biome is much smaller than Socotra in size and is part of the Natural World Heritage List of UNESCO since 1999

On Madeira the habitats of the eco-region are threatened by a variety of human activities, from clearing land for agriculture to urban development. Today, only scattered fragments remain of the once common dry evergreen forests. The native laurisilva forests have been greatly reduced in extent and however continue to recover from over-use, currently covering about 16 % of the island.

In **Cape Verde** is located at a similar latitude to Socotra and belongs to the Tropical and Subtropical Dry Broadleaf Forests Biome. The original natural vegetation has essentially been wiped out since the start of human occupation in the late 16th century: forests were cleared for timber, coal and firewood production, alien grazing animals were released into the islands, water resources were over-utilized and agricultural fields have now reached the highest slopes, causing soil erosion on a large scale. Protected areas are currently being established in existing forestry reserves that were planted with exotic species for decades, however these protected areas are very small in size (approx. 3% of land is so far protected) (compared to 97.5% in Socotra). These main conservation issues in these protected areas is that they are dominated by exotic species, crowded by alien invasive species and do not hold viable populations of endemic species any longer. The human pressure on the environment is extremely high, with a resident population of Cape Verde now amounting to some 432,000, with a population density of approx 107 pers./km².

In comparison, Socotra has virtually not suffered and is yet almost untouched by external development influence that has affected so much all islands of Macaronesia for the past 4 centuries, and has effectively started in Socotra only in 1999. In Socotra the landscape is at present entirely dominated by ancient endemic species that have been preserved until present by traditional practices of the local people. Natural and semi-natural habitats are largely in balance with existing local population that has a density (12 pers./km²) at least 10 times lower than in most Macaronesian islands. The introduction of invasive alien species is a potential problem, that will need to be addressed with adequate preventive action, however no irreversible damage has been caused by this factor as yet. The principal cause of the above striking differences is the fact that Socotra was occupied for millennia by an indigenous population that relied on the sustainable use of its natural resources, with limited and controlled introduction of alien species (including grazing animals) – therefore the severe over-exploitation associated with European colonization has essentially never touched these islands until present.

3d. Integrity

(i) The Nominated Site includes all elements necessary to express its outstanding universal value

The Socotra Archipelago Conservation Zoning Plan (see section 5.d) identifies approximately 97,5% of its land (as well as the 12 nautical miles zones surrounding the islands) for the preservation of biological diversity, landscapes and associated traditional culture, language and traditions. Only the remaining 2,5% of the islands' land area is allocated for intensive human use and development.

The conservation of the archipelago in its almost entirety ensures the inclusion of all necessary elements to preserve the Archipelago's outstanding universal value.

(ii) The nominated site is of adequate size to ensure the complete representation of features which convey the property's significance.

As stated in section (i), the objective of the Government of Yemen is the conservation and appropriate development of the archipelago as a whole. This entails that the maximum possible size (approx. 97,5% of land area) has been allocated for the conservation of biodiversity and associated sustainable community development purposes.

below

Traditional fishing system

Photo by Nigel Pavitt





above

Wadi Dahero

Photo by Mario Caruso

This entails the inclusion of all areas containing outstanding natural features, and provides the largest possible size to ensure the complete representation of all natural and cultural features that convey the sites's significance.

(iii) The degree to which the Socotra Archipelago suffers from the adverse impact of development and/or neglect is among the most limited in the world, for islands with a comparable size.

The Socotra archipelago has enjoyed a high level of integrity in recent history, resulting from a well-established natural equilibrium between people and environment. This is fully recognised by the listing as UNESCO Man and Biosphere Reserve (2003). Difficult access by sea, the lack of a safe port and civil airport, and the archipelago being designated as a military zone of strategic importance, were all critical factors that contributed to preserving the archipelago's historic isolation. This started to change significantly only less than a decade ago: the first landing dock was built in 1997, and the civil aviation airport opened in mid 1999. The islands are now undergoing the fastest and most dramatic changes in their history, and will face their greatest challenge in the coming years as they come under the growing external pressures of development.

Natural Balance between people and nature

As noted by Miller and Morris (2001), man has inhabited the island along with livestock (including goats, sheep, camels, donkeys and cows) for at least two thousand years. This has resulted in the establishment of a natural balance between local people and the islands' endemic flora and fauna, including marine life. The Local population has historically occupied the island in relatively limited numbers, adapting their traditional land and sea management practices to the harsh conditions dictated by this dry environment. Due to their complete isolation for extended period of the year, the careful and sustainable use of the limited terrestrial and marine resources available became an integral part of the islander's way of life. There is no evidence to suggest that exiting traditional land and sea management practices have changed over the past few hundred years. However unless properly conserved, this pattern of traditional use is now likely to change due to external influences and foreseen population increase. Hence, the integrity of Socotra's environment is at present considered remarkably high (probably the highest in the world) when compared with other similar inhabited islands. It is however under threat and requires immediate protection (see section 5.d)

The Yemeni government's and international community's ongoing efforts to conserve the island's environment and biodiversity, as detailed in the relevant sections of this document, attest to the significant national and international commitment to preserving Socotra's integrity, however highlighting the need for consistent and increased support for this unique site.

(iv) The site is among the most biologically diverse and representative island ecosystems in the world

The comparative tables provided in section 3.c highlight the high relative importance of Socotra when compared with similar islands around the world. When compared with other inhabited islands (see also section 3.c), the importance of Socotra ranks significantly higher, placing it amongst the top ten islands in the world in terms of biodiversity conservation importance.

97,5% of the entire archipelago is nominated as a WHS, ensuring the maintenance of its ecosystems' integrity and consequent ability to support islands' endemic biota.

4.

State of
Conservation
and factors
affecting
the Property**4a. Present state of conservation****Data on Species Trends and Integrity of Ecosystems**

For most species of wildlife in the archipelago, the first systematic studies were carried out only in recent years (1994-2004). This effort built upon the very important however yet relatively limited (with the notable exception of the islands' Flora) prior research carried out until then. This recent effort resulted in the publication of a large number of scientific papers and survey reports (see section 6.c) on key taxonomic groups, increasing the knowledge on the islands' biodiversity by over 500%.

Recent and prior studies focused mostly on the identification and description of new species to science, the production of species lists with species distribution maps, and the documentation of traditional practices and uses of plants. Very limited work has been possible on the ecology of species, and on species and habitats conservation trends.

Permanent monitoring programmes for terrestrial vegetation types, bird populations, underwater habitat types, nesting of marine turtles, fishing efforts, cave systems, meteorology, etc. have been initiated by EPA (in collaboration with several international institutions) in the period 1999-2001, and are ongoing, however at their very initial stages.

The above studies were designed to provide a "baseline scenario" on which to monitor future changes in species status and distribution, as well as the status of key ecosystems. Currently a Decision Support System (DSS) – a powerful database that will enable cross referencing of all environmental and development data related to the archipelago – is being developed by the EPA with support from the UN and IUCN, and in the future this is expected to enable greater precision and power in analyzing data collected in monitoring activities.

The baseline information available has also provided the basis for the preparation of the present nomination file, and is therefore largely presented in section 2.

The archipelago's present state of conservation is therefore discussed below in general terms, and considering the fact that any assessment of species or habitat trends may only be regarded as preliminary at this stage.

Sub-Sections:

- 1. General Ecology
- 2. Flora and Fauna
- 3. Marine Biotopes
- 4. Cave Systems

Important recent publications

Socotra has been fortunate to have had two exceptional scientific monographs recently published on the subject of its flora and fauna. The *Ethnoflora of the Soqotra Archipelago* (Edinburgh, 2004) was authored by Anthony G. Miller, Miranda Morris, Diccon Alexander and Ruth Atkinson and contains the results of several years of research by Miller and Morris. The volume contains a detailed documentation of the archipelago’s flora along with ethnographic notes on the uses of each plants. Similarly, the *Fauna of the Socotra Archipelago: Field Guide* (Rostock, 2003), authored by Wolfgang Wranik, O.S. al-Saghier, S. Aspinall, R.F. Porter and H. Rösler, provides general information on the animals of the archipelago. Volumes 19 and 20 of the scientific journal “*Fauna of Arabia*” are largely or entirely (Vol 20) dedicated to publications about Socotra, and contain the most recent and accurate accounts of recent scientific work conducted in the archipelago. Also the book “*Socotra: A Natural History of the Islands and their People*”. By Catherine Cheung & Lyndon DeVantier. Science Editor: Kay Van Damme (in press.) provides a comprehensive account on current knowledge on the archipelago’s fauna and flora and conservation issues

1. General Ecology

The general isolation of Socotra for the past centuries and the balance with the surrounding environment achieved by the local population have resulted in the archipelago’s ecology enjoying a relatively high degree of conservation and protection (Miller/Morris 2004). Monitoring activities carried out by the Environment Protection Authority (EPA) with support from the UN and in collaboration with major international research institutions funded under the UNDP-GEF project, over the past nine years have shown that the integrity of the island’s ecology is yet almost intact .

2. Fauna and Flora

Recent studies by Miller, Morris, Wranik, and many others on the rich flora and fauna of the archipelago have all been positive in their conclusions on the present status of key taxonomic groups and habitats. There is general concurrence that – should current conservation measures be maintained and consistently improved as done so far – the majority of Socotra’s flora and fauna may be able to withstand the potential severe pressures which threaten them.

Flora

The following table gives an overview of the status of the archipelago’s endemic plants which number 307, with an additional 7 varieties and subspecies, (following the most recent studies) according to the criteria of the World Conservation Union (IUCN):

Table comparing the application of IUCN status based on the 1994 version and the 1999 review			
IUCN Status	1994 Version	1999 Review	2001 Review
Extinct	0	0	4
Critically Endangered	4	4	3
Endangered	15	15	27
Vulnerable	203	138	115
Near Threatened	8	8	14
Least Concern	44	111	118
Data Deficient	23	23	33
(taken from Miller/Morris 2001 and Miller/Morris 2004)			

Fauna

Present knowledge on the archipelago's fauna and conservation status of key species is relatively well documented for birds, and significantly less for other zoological groups. This is due to the fact that, compared to the Socotra's flora, the island's fauna has been studied far less and further research in this field is greatly desirable. While it is quite possible that new species of flora may yet be found on Socotra, a greater number of new discoveries is likely to belong to the island's fauna. The most comprehensive recent survey of the island's zoology in 1999 resulted in the identification of, among other taxa, four new species of endemic gecko and one of freshwater crab, along with hundred of new invertebrates, in all cases species that are unknown elsewhere in the world.

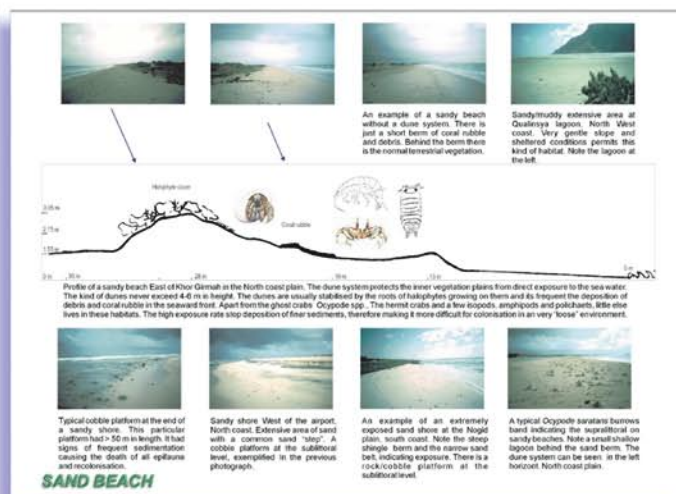
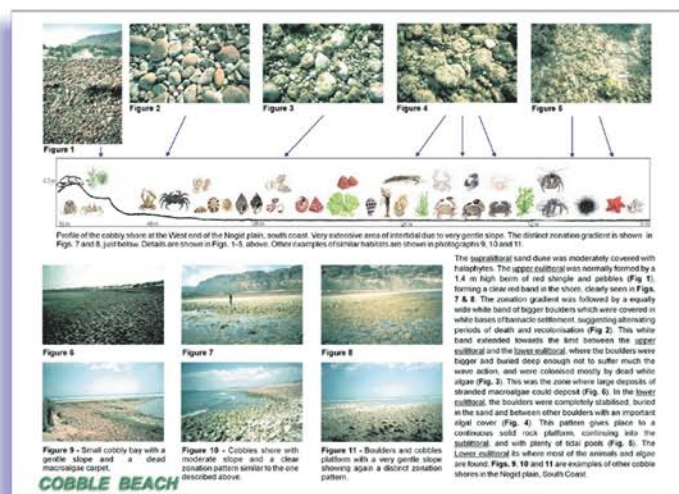
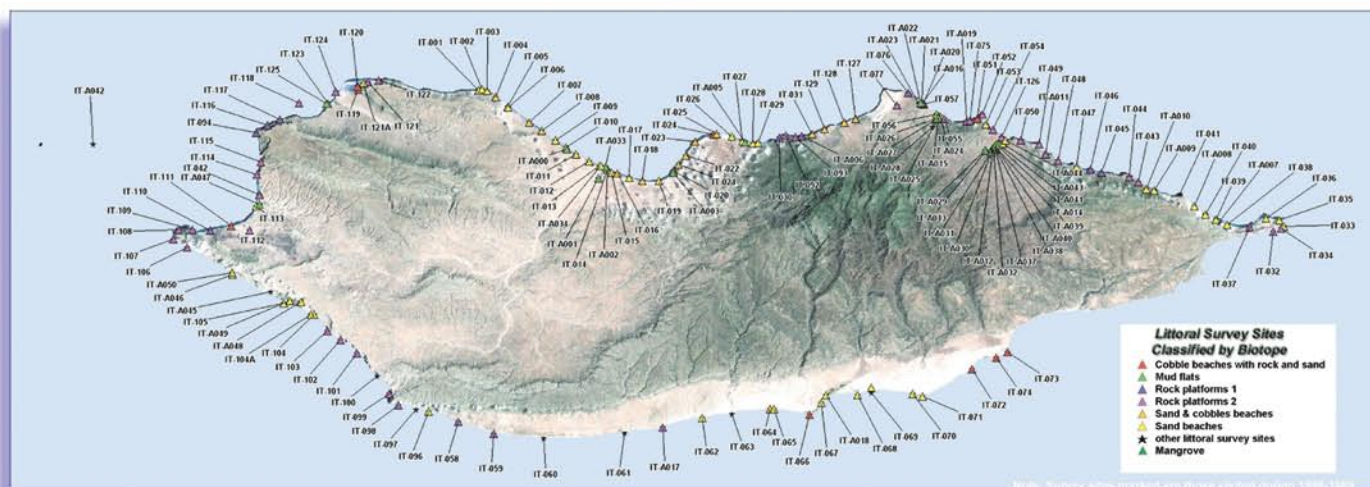
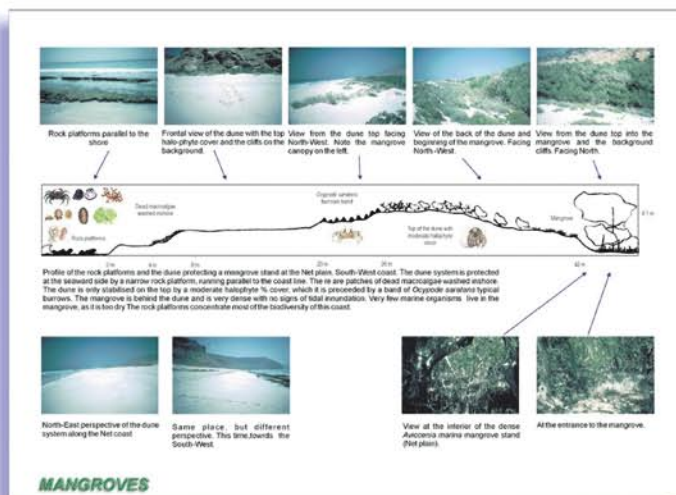
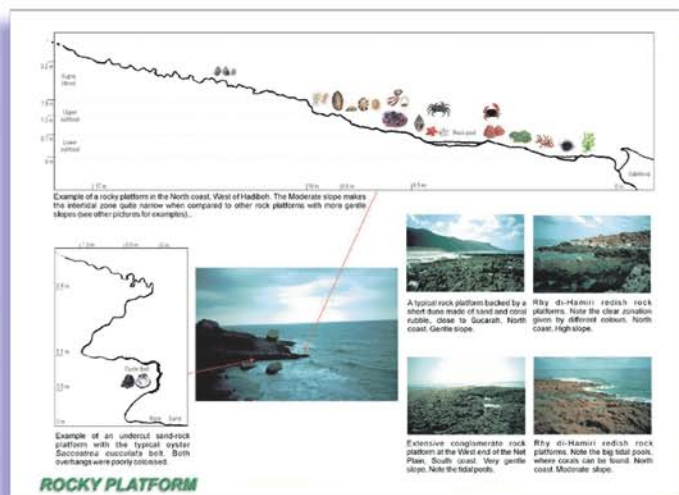
Further studies are therefore required to allow a much more precise evaluation of the number of species of fauna on the island and the degree to which they are endangered. Currently, endangered animals include three bird species (the Socotra Starling *Onychognathus frater*, Socotra Cisticola *Cisticola haesitatus* and Socotra Bunting, *Emberiza socotrana*) that are at risk of global extinction, and three species of turtles (Hawksbill Turtle *Eretmochelys imbricata*, Green Turtle *Chelonia mydas*, and Loggerhead Turtle *Caretta caretta*) that are globally threatened. The Socotra Conservation and Development Programme (SCDP) has made it a priority to educate both local residents and tourists as to the status of the turtles and the importance of conserving their habitat.

below

Socotra Starling

Photo by Richard Porter





LITTORAL BIOTOPES OF SOCOTRA



UNOPS



undp



The Socotra Archipelago



CONSERVATION AND THE SUSTAINABLE USE OF THE BIODIVERSITY OF SOCOTRA ARCHIPELAGO

Photographs and data presented in this poster were prepared by Nuno Simoes and Rebecca Klaus on behalf of UNDP-GEF, 1999 (c)

3. Marine Biotopes

The coral associated fish communities of Socotra are unique, representing an overlap between east Africa and Arabian assemblages and playing an important role in facilitating gene flow between the Red Sea, the Gulf of Aden and the Indian Ocean.

The littoral and sub-littoral biotopes and especially coral communities of the archipelago have so far suffered minimal disturbance by human impact, particularly on the outer islands of Abd al-Kuri, Samha, Darsa and Kal Farun. Indeed, recent surveys indicate that the highest biodiversity with regard to coral reef fishes is to be found in the waters around Abd al-Kuri island. The stark contrast between the excellent conservation status of coral communities of Socotra and many other tropical areas deserves mention, for coral reef ecosystems globally are suffering from destructive fishing, pollution, sedimentation, port development and heat-induced bleaching, among other harmful practices. Socotra thus represents a rare opportunity to researchers to study intact coral communities and fish assemblages as well as to evaluate the impact of local, regional, and global environmental changes.

As Socotra is increasingly subject to the pressures of development, its marine biotopes have also been affected. Reef fish are increasingly sought out by fishermen, due to both national and international demand. The rise in tourism and the development of infrastructure may likewise prove detrimental for both coral communities as well as fish assemblages. The establishment, therefore, of marine protected areas according to the Zoning Plan of 2000 and the UNESCO Man and Biosphere Reserve of 2003, work to protect both coral and fish from these pressures and to maintain their status as reservoirs of biodiversity and replenishment.

4. Cave Systems

Socotra possesses a number of sizable cave systems found within the limestone plateau that stretches over much of the island, averaging between 300-700m in elevation. These have only recently begun to be explored by a team of international scientists in coordination with Yemeni authorities and academics. While local inhabitants have made use of smaller caves for centuries, some of the most extensive systems have only been discovered in the last few years, and their importance has yet to be fully ascertained. A total of over 22km of caves has so far been explored for the first time and mapped in recent years, and therefore are not yet exposed to significant pressure from i.e. visitors (with the exception of the accessible Hoq cave).

As the exploration of the caves continues, it is vital that attention be paid to their conservation and that access to them be monitored and limited. Failure to adequately protect these cave systems may result in these delicate environments suffering irreversible damage in the coming years.



4b. Factors affecting the Property

(i). Development Pressures (e.g., encroachment, adaptation, agriculture, mining)

Precisely because of Socotra's isolation, the greatest danger the island will face in the near future is that of development and associated population increase and changes in traditional land management practices. The implementation of substantial additions to the island's infrastructure, including a road circling the island and a new expanded port will doubtlessly place increased stress on Socotra's environment. Following the opening of the expanded airport in 1999, the island has become accessible year round and while this has brought many welcome advantages, it has also increased the potential for immigration as well as external investment. It is the task of the Government of Yemen to manage the addition of infrastructure of Socotra in the coming years so as to minimize the negative effects of a process of development that is much desired by the local population.

The survival of the islands' wildlife and culture until now, doesn't imply there is any room for complacency. Even with built in safeguards, the balance between islanders and their environment is precarious. The problem is that Socotra's people are increasingly calling for the benefits that development would bring. Famine used to claim many lives during each summer drought-imports of milk powder, flour, cooking oil and rice, which began in the early 1970s, have largely put an end to that. But malaria and tuberculosis are still widespread and the infant mortality rate is 131 per 1000 (one of the highest in the world.)

In general, it can be stated that the more access is increased to different parts of the island (through improvements to roads, the building of a new port, the expansion of the airport), the more stress will be placed on the archipelago's environment. Development and construction projects could pose threats to the archipelago's indigenous and endemic species, if not carefully managed. In part to address this issue the Yemeni government approved the Conservation Zoning Plan for the Development of Socotra on the year 2000 (section 5.d).

The Environment Protection Authority (EPA) of the Ministry of Water and Environment, with support from the UN-led Socotra Conservation and Development Programme (SCDP) is mandated with overseeing and closely monitoring such dangers and working with developers to minimize the damage to the environment. Its current capacity does not however equate to the complex tasks that lie ahead, and recent UN assessments (SCDP project document YEM.03.004) indicate that the EPA and local government will require consistent improvement and international support over an extended period of time.

The main threatening processes identified for the islands include:



above

Socotra port

Photo by Mario Caruso

below

Treatment for prevention of malaria

Photo by Mark Jeffrey





above

Socotra Conservation and Development Programme (SCDP)
Hadibo Headquarter

Photo by Mario Caruso

1. Habitat destruction (road, housing and infrastructure construction)
2. Direct species loss (timber collection for housing and urban fuelwood demand, grazing, fishing, invasive species)
3. Habitat degradation (grazing pressure and changes to traditional rangeland management practices, over-exploitation of water resources, climate change, waste disposal, erosion, soil degradation)

Agents of change/Causes of threats

Development planning and investments

In July of 1999, a new airport opened on Socotra. This new facility has made the archipelago easily accessible after centuries of virtual isolation. Other recent developments include the first paved roads, a port jetty, fuel storage facilities, new schools, improved telecommunication facilities, limited power supply in the central village of Hadibu, and the opening of small rest-houses. These developments and others have already brought positive changes to the lives of local people. Uncontrolled or inappropriate construction and investments, however, especially threaten the coastal zone. Unplanned infrastructural development is closely linked to poor governance, such as in the case of the expansion of the island's road system without undertaking proper environment impact assessments, and in spite of EPA's consistent efforts to mitigate the damage to natural habitats.



of Hadibu, and the opening of small rest-houses. These developments and others have already brought positive changes to the lives of local people. Uncontrolled or inappropriate construction and investments, however, especially threaten the coastal zone. Unplanned infrastructural development is closely linked to poor governance, such as in the case of the expansion of the island's road system without undertaking proper environment impact assessments, and in spite of EPA's consistent efforts to mitigate the damage to natural habitats.

Population increase.

Determined by natural population growth, as well as by immigration, this is not a cause for immediate concern, but it represents an important factor to be kept in mind in all planning efforts and in future years .

The progression of development among local communities

Perhaps the most complex "agent of change" to appreciate in terms of its relationship to biodiversity conservation is the rising trajectory of human development on Socotra. This agent is driven by a multitude of factors: increased involvement with the outside world through



above

School and schoolchildren

Photos by Mario Caruso and Mark Jeffrey

political changes and development investments (particularly the airport); poverty alleviation support from national and donor interventions; improved education; globalization and improved communication (mobile telephone coverage of the island is in place as of mid 2005); migration of Socotris to the Gulf region; urban in-

migration; trade and interaction with coastal immigrants from the mainland – just to name a few.

Most Socotris still lag behind in most measures of human development. They live largely without access to safe drinking water, electricity, only rudimentary education, very limited health care, basic sanitation and means of transport. According to the UNDP Project Document Sustainable Development and Biodiversity Conservation for the People of Socotra Islands (YEM/03/004/A/01/99), Socotra is probably the poorest and most disadvantaged area in Yemen. Yet things are changing and Socotra's communities are opening up to new opportunities and new influences. While it is hoped this will bring sustainable human development, there is a risk that it could be achieved at the expense of globally significant biodiversity values, or even worse for Socotris – result in loss of ecosystem functions and services that will jeopardize any development gains.

The population of Hadibo – the main town – has increased significantly in the last decade.

Another example can be seen with communities that were traditionally cave-dwellers. Few of the upcoming generations wish to live in caves and are building new houses. The shift to urbanized, sedentary lifestyles bring new comforts but also erode traditional practices (including rangeland management) and place increased pressure on forest wood supplies for housing construction.

What is critical is the type of development brought to Socotra. The principal “development paradigm” (and source of development funding) for many local communities is the one they receive from relatives returning from the Gulf. This paradigm often translates into “big is better” – wider roads, larger constructions, more cleared areas – with engineered solutions for natural resource management and ecosystem services.

Changes in traditional rangeland management practices

Important reviews of rangeland practices on Socotra indicate that vegetation is still in quite good condition (Miller and Morris 2004). Socotra has been suggested as one of the best preserved semi-arid tropical islands in the world. This has led to the conclusion by some that islanders are managing the rangelands sustainably and that current levels of livestock (goats in particular) are not affecting flora composition of the limestone plateau and Hagghier mountains. However, it is becoming increasingly difficult to find seedlings and young trees of many important species, including *Dendrosychnus socotranus* and *Dracaena cinnabari*. Some endemic and endangered tree succulents are used as drought fodder. Although there is no information on how current livestock numbers compare to historical levels, with the growing population it can be assumed livestock numbers are historically high and therefore disrupting traditional equilibriums. In addition, many of the endemic tree succu-



above

One of the new roads

Photo by Mario Caruso

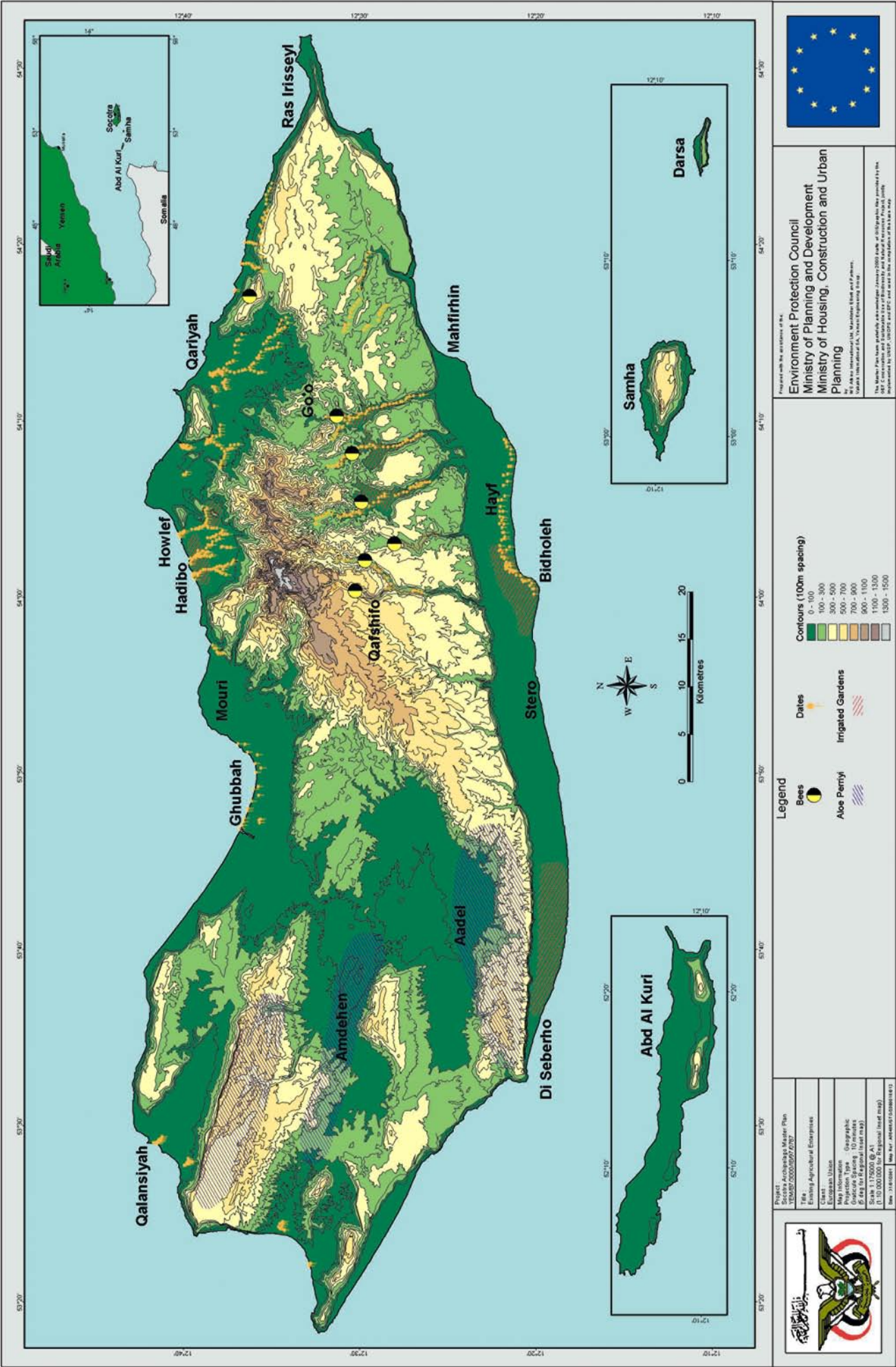
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Goats

Photo by Mark Jeffrey



SOCOTRA ARCHIPELAGO MASTER PLAN
Existing Agricultural Enterprises



The principal threats to the unique vegetation of Socotra have been identified as follows

(Adapted from Miller and Morris, 2004)

1. Development of infrastructures
 - Uncontrolled and unmonitored sinking of wells
 - Construction of rainwater catchments
 - Piping water from the springs
2. Breakdown of traditional land management practices
 - Timber and fuel extraction
 - Plant products
 - Livestock and water management
3. Introduction of exotic plants
4. Plant collecting

Discussion of some of the likely impacts of these threats on the vegetation of Socotra:

1. Development of infrastructures

The most obvious direct consequences of development are the immediate destruction of habitats, for instance by the clearance of vegetation for building, road construction, new date palm plantation and other cultivation.

There are more subtle (and difficult to predict) effects caused by changes in land use such as traditional areas of rangeland being denied to livestock and the widespread sinking of wells and installation of pumps to create new date gardens.

The effect of this new water management on the availability of water elsewhere and its possible effects on the vegetation should be carefully monitored. At present the direct effects of development are most evident on the coastal plains, particularly near large settlements, but they are spreading to other areas of the coast as people from the interior start to spend increasing amounts of time engaged fishing – currently the only profitable activity on the island. The adverse effects of development on vegetation are likely to be felt over a wider area and increasingly into the interior as new roads are constructed and older roads improved.

Another potential threat is likely to be destruction of the vegetation as direct consequence of new experiments in agriculture, which often involve heavy use of water, insecticides and chemical fertilizers and many introduce alien species that could pose a threat to the native vegetation. These are so far limited to the General Use Zones identified in the Conservation Zoning Plan (2000).

2. Breakdown of traditional land management practices

The traditional land-use management practices employed by the indigenous population play a vital role in protecting against the overexploitation of natural resources and the diminution of biodiversity.

However, as people increasingly cluster together in hamlets, villages and town, many traditional land management practices are being modified or abandoned altogether.

This, together with the higher concentration of population in the larger settlements, increases local pressure on timber, fuel, water and livestock grazing.

Grazing

Pastoralists have an intimate knowledge of the island's vegetation, and appreciate its crucial importance to their continued survival. Livestock are grazed within traditional tribal boundaries, alternating between lowland and upland grazing at different seasons and thus allowing exhausted pastures a period of recuperation. However, changes caused in part by changing expectations as regards standards of living, and in part by a decline in the economic importance of the livestock sector, are already happening. In some areas signs of overgrazing are apparent, especially around the larger coastal settlements but also in other areas of the coast, as more people from the interior spend increasing amount of time engaged in fishing.

In some areas of the island, and on the outer islands, as livestock decrease in importance, increasing numbers of sheep and goats are left unattended the year round. This could quickly lead to overgrazing and even the eradication of vulnerable species from all but the most inaccessible ledges.

Timber and fuel extraction

Traditional rules, supported by the government, exist about cutting the more valuable species of live trees for building and other purposes – genuine need must be proved to the local community, and permission is not always given. However, enforcement of such rules is patchy and lopped branches are in great demand for a variety of building purposes, and there is no doubt that this poses a serious threat to the vegetation. Imported wood is expensive and not always readily

available, and local woods command a good price. There has been a building boom on the island since the 1970s and consequent pressure on timber resources. Disputes over land ownership and consequent breakdown of traditional controls is likely to place an increasing pressure on all trees.

Most of the people on the islands rely to a lesser or greater extent on wood for their heating and cooking requirements. Pestoralists in addition burn certain wood for the abundant smoke they produce as livestock smudges. However, the lack of other form of fuel, the rapid growth of many coastal settlements and the rise of new ones poses an obvious threat to the vegetation. In some of the inland villages the inhabitants have to go further and further in their search for fuel wood.

Plant products

The commercial exploitation of the vegetation is limited to certain resins and gums for local sale, some fruits and roots, various lichens, dracaena products for export, products from *Boswellia* species, certain scented wood, aloes and wood for building and fuel. With the possible exception of aloes and wood for building and fuel, we do not consider the current rate of extraction for commercial purposes to pose any threat to the vegetation.

Bitter aloes – the juice of *Aloe pernyi* – has important pharmaceutical and medicinal uses. At present this species is widespread and abundant in places and is not threatened by the sustainable, small-scale traditional exploitation. However, there is a real threat of overexploitation leading to extinction if the market for it opened up further.

A potential threat to the long-term survival of *Dracaena cinnabari* is the overexploitation of “dragon’s blood” – a resin obtained from the bark of the tree. At present the demand is small but a major increase in demand could be very damaging. Another threat is from the use of the trunks to make beehives. There was recently a case when over 20 trees were felled to make beehives for export to mainland. This incident was generally condemned on the island but illustrates how a breakdown in traditional practices poses a very real threat to species on the island.

Livestock management

Livestock are currently carefully managed but if traditional controls are relaxed or lost there is a great risk to vegetation and environmental quality on the island.

The main threats are associated with :

- Uncontrolled breeding.
- Rises in livestock numbers due to supplementary cereal feed and rearing male young rather than slaughtering them.
- Livestock running free rather than being closely herded.
- Human population movements to larger settlements, where practice of keeping a household herd in addition to the main one increases the pressure on grazing around these settlements.

3. Introduction of exotic plants

At present introduced exotic plants pose no threat to the vegetation. However, with the opening up of the island, they could become a problem. Examples abound on other islands where introduced plants have invaded and outcompeted the native vegetation. The introduction of living plants (including seeds) should be closely monitored. There are already examples of an introduced species of legumes near the airport. This legume is a major problem on the near by mainland. A program to eradicate the species on the island has been undertaken.

4. Plant collecting

The uncontrolled collection of plants by amateur and professional collectors for private collections is a potential threat to certain succulent species.

The map displays the Di Seberho area, characterized by a complex topography with numerous peaks and valleys. The terrain is color-coded, with green representing lower elevations and yellow/brown representing higher elevations. A network of roads and paths is visible, connecting various settlements. The settlements are marked with purple dots and labeled with names such as Qalansiyah, Qaysoh, Sherubrub, Di Selmeho, Ghubbah, Mouri, Qadheh, Hadibo, Howlef, Qariyah, Diabelhan, Ras Irisseyl, Qademenoh, Ridahe, Dishas, Shifib, Mahfirhin, Hayf, Mahatta, Bidholeh, Stero, Aadel, and Mahdoh Sirihin. A scale bar at the bottom indicates distances from 0 to 20 Kilometres. A compass rose shows the cardinal directions (N, E, S, W). An inset map in the bottom right corner provides a broader geographical context, showing the Di Seberho area within the larger region of the Horn of Africa, with labels for various countries and regions.



Inspired by the activities of the
Environment Protection Council
Ministry of Planning and Development
Ministry of Housing, Construction and Urban
Planning

Legend

Census 1994

0 - 50
51 - 100
101 - 250
251 - 500
501*

Settlement Pattern

• Small settlement

Contours (100m spacing)

0 - 100
100 - 300
300 - 500
500 - 700
700 - 900
900 - 1100
1100 - 1300
1300 - 1500

*Note: Census 1994 data is displayed on all maps. Settlement Pattern data is only available on the 1:50,000 scale map.

Project:	Societa Archeologica Master Plan TEM05/20000897/2015
Title:	Settlement Pattern
Client:	European Union
	Map Information
	Projection Type Geographic
	Gridsize Spacing : 10 minutes
	Scale 1:175000 @ A1

doi:10.1017/S0022278X12000503

lents have very long life cycles and changes in ecosystem species composition may be slow to become evident. Grazing pressure are generally considered a threat.

Even if grazing is not directly causing the loss of globally significant species there is likely to be indirect effects, as Socotra's soils may be vulnerable to the degrading impacts of cloven-hoofed ruminants.

Records on the Impact of Livestock on Vegetation

Following the somewhat pessimistic reports of the Radcliffe-Smith and Lavranos expedition to the archipelago in 1967, it was feared that the vegetation was suffering from over-harvesting and the uncontrolled grazing of goats. Yet, in 1985 when Quentin Cronk of Cambridge University visited the island he estimated that the vegetation had changed little if at all since Balfour's expedition in 1880. Indeed, recent records (Miller & Morris, 2004) seem to indicated that the tendency of visitors newly arrived on the island to attribute a decline in the vegetation only to goats should be considered as overly hasty.

Marine biotopes

As Socotra is increasingly subject to the pressures of development, its marine biotopes have also been affected. Reef fish are increasingly sought out by fisherman, due to both national and international demand. The foreseen rise in tourism and the development of infrastructure may likewise prove detrimental for both coral communities as well as fish assemblages.

A detailed account on the principal identified threats to the vegetation of Socotra is provided by Miller and Morris (2004) and is summarised in the box at page 93.

below

Livestock

Photo by Mark Jeffrey





above

Socotri shepherd

Photo by Mark Jeffrey

Introduction of invasive species

Animals

A danger that is especially pertinent to islands such as the Socotra archipelago is that of the introduction of non-native species. It has been observed that the indigenous *Hemidactylus* gecko is no longer found in the capital Hadibo, due the presence of the non-native *H. flaviviridis* and *H. turcicus*, which have presumably filled the ecological niche of the native species. Additionally, in the 1990s the Indian House Crow (*Corvus splendens*), was found living near the airport. Efforts are currently underway to eradicate the crow as it could pose a threat to native wildlife.

Plants

Earlier attempts to eradicate introduced plants have been successful for the most part (i.e. *Prosopis juliflora*), although EPA/SCDP is still struggling with the invasive species *Argemone Mexicana*, *Calotropis procera*, *Leucaena Leucocephala* and *Parkinsonia aculeata*.

Control Measures

The threats here listed represent the main challenge faced by the various monitoring and education/awareness programs implemented by the EPA / SCDP, including a web of extension officers who work locally within communities over the entire island and report threats to the environment and changes in traditional customs to representatives of EPA / SCDP.

Traditional Socotri customs related to conservation are strongly tied to the non-urban lifestyles of the inhabitants with their ties to, on the one hand, the herding of sheep, cattle and goats, and on the other, to fishing. These customs have been observed to gradually disappear in the large settlements, suggesting that future conservation efforts within the archipelago will be negatively effected in two fashions by the rapid expansion of urban areas:

- (1) the direct damage caused to the ecology itself
- (2) the damage caused by the loss of traditional social values which functioned to conserve the environment

The Zoning Plan of the Archipelago foresees the ongoing participation of the local community in the island's conservation. To counter these threats to the environment, the Awareness and Education branch of the EPA holds local meetings in communities across the island and plans and carries out school visits to heighten the awareness of the next generation regarding the importance of the environment. Working with a network of 35 local extension officers, this branch is able to carry out over 70 meetings with local communities each month, imparting relevant information regarding the environment and ascertaining what threats or stresses may have arisen with regard to the community and its environment.

The Impact of introduced Indian House Crow (*Corvus splendens*)

By Richard Porter

The House Crow if not controlled could have adverse impact on Socotra native fauna, and even on agricultural practises and animal husbandry. It is good that EPA Socotra has an active control programme and this must be encouraged.

The House Crow is a noisy, aggressive omnivore and predator that feeds largely on human scraps, fish scraps, small reptiles, invertebrates, eggs, nestlings, grain and fruits. House Crows will take young domestic fowl and raid the nests of native birds.

If not controlled House Crows can reach high population densities in urban areas, especially where introduced (when they seem to breed more readily) and large groups may gather at sources of food. They are noisy and can be very aggressive over food or when defending breeding territory or young. If alarmed their cries will quickly attract other crows.

They will mob birds of prey relentlessly and thus could impact on the breeding success of the native Egyptian Vulture, Kestrel and endemic Buzzard.

House Crows' close association with man often leads to them achieving pest status. Their main impact in areas where they have been introduced is: human food theft, damage to crops, poultry and livestock, predation of native birds and their eggs, noise and also their potential health risk.

4b. Factors affecting the Property

(ii). Climate change

Long- and medium-term climatic change in the region leading to a gradual drying of the Archipelago is an unproven but likely scenario. The evidence for increasing aridity is indirect. No direct paleoclimatic data are available for Socotra, but there is strong evidence that the islands have been getting drier over the last few hundreds of years. In some areas of Socotra there are disused field systems with associated farmsteads, sophisticated irrigation networks and laboriously constructed thoroughfares linking the main region of the island. Archaeological activity is still in its infancy on the island but these structures suggest that there used to be farms with rain fed agriculture in these areas, which would have required more rain than falls at present. The impact of increasing aridity is lessened on Socotra by organic rainfall (caused by the mountains standing in the path of moisture-laden air) and the buffering effect of the surrounding seas. Furthermore, many plants on the islands are adapted to xerophytic condition. Extinctions caused by drying may not be on a catastrophic scale and are beyond control, however many species could experience a drastic reduction in the size and extent of their population. Such a decline for species such as *Dracaena cinnabari*, which characterize the vegetation, would have a major impact on the ecology of Socotra.

Pollution

At present there are no significant local or nearby sources of major environmental pollution. However the archipelago lies close to important shipping lines, and therefore the risk of pollution (i.e. oil spill) linked to a shipping accident is a possibility that should not be excluded. There are currently no specific risk preparedness measures put in place by the Government of Yemen in this respect.

brlow

Haggier Mountains

Photo by Nigel Pavitt



4b. Factors affecting the Property

(iii). Natural disasters and risk preparedness

(earthquakes, floods, fires, etc.)

At the present state of knowledge, Socotra does not stand at any significant risk from earthquakes and major natural disasters. The natural flash-flooding of dry river beds (wadi) that occurs seasonally is a natural reflection of Socotra's annual weather patterns. Seasonal flash-floodings have caused significant damage to man-made structures that were built along the dry wadi beds (last major flooding event recorded in Dec 1999)

brlow

Deksam

Photo by Nigel Pavitt

The south and south-western coasts of Socotra was affected by the recent Tsunami of December 26th, 2004, with severe damage to buildings along the coastline and and loss of boats and fishing equipment estimated at approx. \$170'000 (*See also National Rapid Environmental Assessment – The effects of the Tsunami on Yemen, UNDP, 2005*).



4b. Factors affecting the Property

(iv). Visitor/tourism pressures



above

Plate at Homil campsite

Photo by Mario Caruso

below

Homil campsite

Photos by Mario Caruso



An important pillar of the development strategy of Socotra is its consolidation as an ecotourism destination as a vehicle for job creation and poverty reduction on the island. Well-planned and properly managed eco-tourism is generally not looked at as a threat, but rather as an opportunity for supporting local livelihoods. A number of initiatives have been undertaken by the Government of Yemen with support from various donors, led by the UN SCDP, to develop the island as an ecotourism destination, these include:

- A number of baseline studies on tourism development issues (Ceballos-Lascurain H., 1999; WS Atkins International 2001; Ecotourism Development Strategy, P. Mackay, 2003; J. Jessamine, 2005)
- The construction of two tourist campsites, with funding support from the German and Japanese Embassy in Yemen
- The establishment of the Socotra Ecotourism Society, as an Ecotourism and conservation NGO based on Socotra
- The establishment of village tourism associations related to ecotourism sites
 - The construction of tourist information centres at the airport and in Hadibo
 - The training of ecotourism guides and drivers
 - The training of specialist diver guides for marine protected areas
 - Language training for tourism staff

At present visitor arrivals to Socotra are yet very low, numbering no more than 450 tourists in 2004. In addition the profile of the majority of arriving visitors does not yet correspond to the target ecotourist segment. Many of the tourists are general cultural or adventure tourists motivated by visiting a new destination and in particular the island's many fine and deserted beaches, they exhibit little interest in the specialised environmental aspects of Socotra.

Internationally it has been estimated by the WTO that nature tourism some generated 7% of all international travel expenditure. While, in 1997, tourism was enjoying global growth of 4% nature tourism was growing at a rate of between 10% and 30%. While these figures are global averages and identifying the market potential of Yemen, and Socotra in particular, will require detailed study they provide a broad measure of the potential for ecotourism in the country. With 154,000 arrivals in 2003 some 10,000 were potentially ecotourists, as the

4. State of Conservation and Factors affecting the Property

prime ecotourism attraction in Yemen one would expect Socotra to attract a higher proportion of these visitors.

The current slow pace of tourism development on the island is therefore not yet posing a significant threat to the environment of the island. However there is at present a great deal of uncertainty over the scale of eco-tourism development on Socotra. In the absence of clear development parameters there is evidence that coastal land speculation is now being experienced on the island in anticipation of large-scale development. At the same time there is growing concern amongst the local community that the tourism industry will overwhelm their traditional lifestyle and values.

The development of a proper ecotourism development strategy is therefore urgent and of paramount importance to prevent potential negative impacts on the islands' unique natural and cultural heritage. While an extensive series of studies have been undertaken to develop tourism infrastructure and train local guides, no marketing studies or initiatives have been undertaken for the island.

In many respects to situation on Socotra mirrors the national picture: little or no contribution is made by the Yemen Tourism Promotion Board to marketing Socotra as an exceptional ecotourism destination. In addition, the investment promotion

below

Dive guides

Photo by Mark Jeffrey



below

Erreher

Photo by Mario Caruso



activities of the General Tourism Development Authority appear to conflict with the objective of developing a sustainable ecotourism destination of Socotra.

Although Socotra has been identified as an ecotourism destination aimed at the highly specialised development of 'ecolodges' for limited, and possibly restricted, numbers of visitors the investment promotion agency, the Yemeni General Tourism Development Authority (GTDA), appears to promote the island as a resort destination to potential investors. This uncoordinated approach has led to some concern on the island about the possibility of it being developed as a mass tourism destination to the detriment of its unique environment and social structures.

Specific recommendations were recently made for the development of ecotourism on Socotra (Jessamine, J., 2005). Confirming that as a matter of some urgency a study should be undertaken to prepare a development strategy for ecotourism on the island. Key elements of this proposed study are:

- The identification of the tourism carrying capacity of the island, to determine the quantum of tourism development that should be permitted on Socotra.
- Ecotourism product identification and development
- Ecotourism marketing, to identify key source markets and operators
- The preparation of a short-term action plan for marketing the destination as well as a long-term marketing and communications strategy for the island.
- The preparation of a Human Resources Development Strategy for ecotourism on Socotra.

No additional legislation is required for environmental protection or tourism development as sufficient legal powers exist in the Environmental Protection Law and Presidential Decree 275 of the year 2000 declaring the island to be a special protected area. Enforcement of existing legislation and guidelines is however poor and efforts should be made to reinforce the capabilities of both the Environmental Protection Authority and the Ministry of Tourism on Socotra.

In order to generate income in support of ecotourism development activities it is also recommended that a Tourism Fee of \$50 per visitor be levied on tourist arrivals to Socotra. Income derived from this fee should be managed by the Socotra Conservation Fund and distributed to local environmental NGOs, such as the Socotra Ecotourism Society, as well as being used to fund local community development programmes.

It is further recommended that a Socotra Tourism Steering Committee be established to coordinate the activities of all agencies and liaise with local government. As, over the medium term, stronger and more coordinated national tourism structures are formed the need for this committee may be reviewed.

4b. Factors affecting the Property

(v). Number of inhabitants within the property and the buffer zone

Recent reliable estimates (WS Atkins International, 2001; UNDP, project YEM /03/004, 2003) placed the population of the archipelago at ca. 44.000, roughly half of which live in the two main settlements of Hadibo and Qalansiyya. Numbers from the 1994 census indicated approximately 36.000 and official figures from the 2004 census confirmed a population of approximately 43,000 (see table below).

Official Figures, Population Census 2004 (source: SCDP)					
Districts	N. houses	N. families	N male	N female	Total
Hadibu	5.663	4.410	16.953	15.332	32.285
Qalansia & AbdelKuri	942	1.125	5.748	4.809	10.557
TOTAL Archipelago	6.605	5.535	22.701	20.141	42.842

A variety of other (generally higher) figures for the population of the archipelago can be found in several documents, however none of these are based on reliable sources. The figures cited in this form are the only ones based on official censuses and well documented field work and associated findings or direct estimates, conducted in recent years by the Government of Yemen (EPA) with UN and EU technical support.

below

Village near Qalansiyyah

Photo by Nigel Pavitt



5.

Protection and Management of the Property

5a. Ownership

The Socotra Archipelago is territory of the Republic of Yemen. It is part of the Governorate of Hadramawt, and includes two Districts (Hadibo and Qalansiyya).

Outside the few urban areas of Hadibo, Qalansya and some other small centres, traditional land use rights apply (see recent letter from the Ministry of Land, ANNEX A.1). The absence of private ownership rights on land is common to most rural areas in Yemen, and implies that the land and its resources, are commonly owned by tribal groups, that manage them according to centuries old traditions.

5b. Protective designation

The basis for the conservation and management of the archipelago rests in the Zoning Plan (Presidential Decree 275, issued in September 2000 - *See 7.b*).

The implementing authorities for the measures outlined in the Conservation Zoning Plan are the Environment Protection Authority (EPA), of the Ministry of Water and Environment (MOWE). In collaboration with the Ministry of Housing and Public Works, the Local District Councils, and all other relevant government stakeholders.

The legal basis for the Zoning plan can be found in Yemen's Environmental Protection Law (no. 26) of 1995 (see annex A.2), which lays out the legal framework for

The Zoning Plan divides the archipelago into the following areas:

First:

(a) Resource Use Reserve:

The objectives of these areas are as follows:

- To protect and maintain the unique biological diversity of the Socotra islands, as well as other natural and cultural sites of interest.
- To maintain and, where appropriate, enhance the existing traditional management practices for the sustainable use of natural resources.
- To protect the natural resource base from being alienated for other land and resource use purposes and other development activities.

Areas:

- Approximate Total Area covered (terrestrial): 890 km²
- Percentage of Total Land Area: 23.5%
- Approximate Total Area Covered (marine): 16498 km²

(b) General Use Zone:

The objectives of these areas are as follows:

- To allow for the development of essential infrastructure required to improve the standard of living of the local community (i.e. roads, power lines, and commercial development) while doing the utmost to minimize negative impact of the environment.

Areas:

- Approximate total area covered (terrestrial): 55km²
- Percentage of total land area: 1.4%
- Approximate total area covered (marine): 1 km²

Second: National Parks

The objectives of these areas are as follows:

- To protect the unique natural habitats and landscapes of Socotra islands, which are of substantial national and international significance for scientific, educational, and ecotourism purposes.
- To perpetuate representative examples of the unique biotic communities, genetic resources, and endemic species, found in the Socotra islands, and to maintain biodiversity.
- To manage these areas in a sound environmental manner for educational, cultural and recreational purposes.

Areas:

- Approximate total area covered (terrestrial): 2748 km²
- Percentage of total land area: 72.6%
- Approximate total land area covered (marine): 1514 km²

Third: Nature Sanctuary

The objectives of these areas are:

- To preserve rare and fragile habitats, ecosystems, species and unique landscapes in as undisturbed a state as possible.
- To maintain the essential natural attributes and qualities of the environment over the long term for future generations.

Areas:

- Approximate total area covered (terrestrial): 95 km²
- Percentage of total land area: 2.5%
- Approximate total area covered (marine): 154 km².

Additional protective designation include:

1995 - ENVIRONMENT PROTECTION LAW No. (26) of the Republic of Yemen

2003 declaration of Socotra archipelago as a Man and Biosphere Reserve

2004 Cabinet Decree no 47, endorsing the archipelago development Masterplan (prepared by EPA with EU support, in consistency with the Conservation Zoning Plan)

A wide range of Local and central Government Decrees have been issued in support of the above general protective designations, including:

- land ownership and investment regulations (2005)
- restrictions on collection of dead coral (2004)
- regulation of lobster fishing (2004)
- regulation on Export and import of biological material from the archipelago of Socotra
- regulatory agreement for the implementation of applied biodiversity research in the archipelago (EPA, 2000)

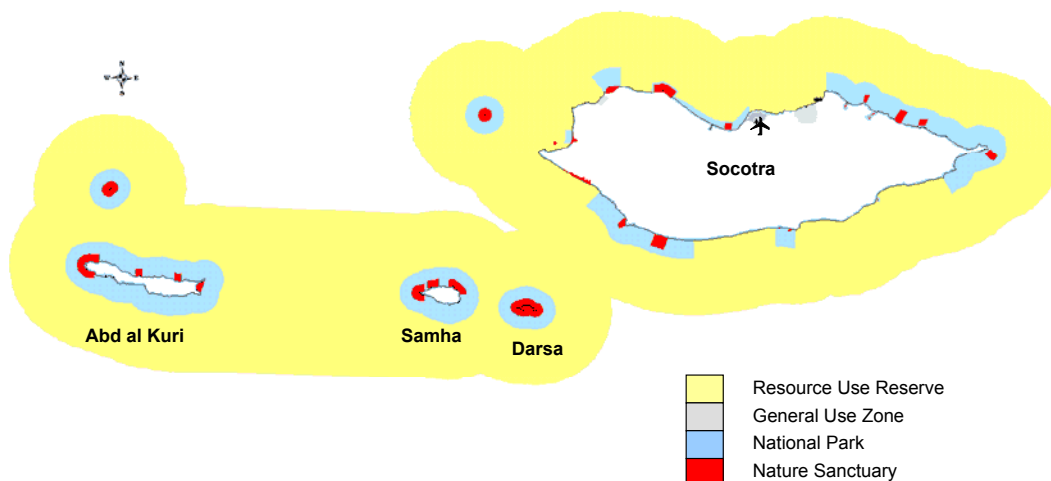
the establishment of protected areas and their administration. In light of this law, the Zoning plan gives EPA/MOWE the legal authority to administer the environment of the Socotra archipelago and requires that it be consulted for an Environmental Impact Assessment (EIA) with regard to any planned construction within the archipelago.

The Conservation Zoning Plan - *See annex A.8* (in effect since 2000 as per the Presidential Decree No. 275)

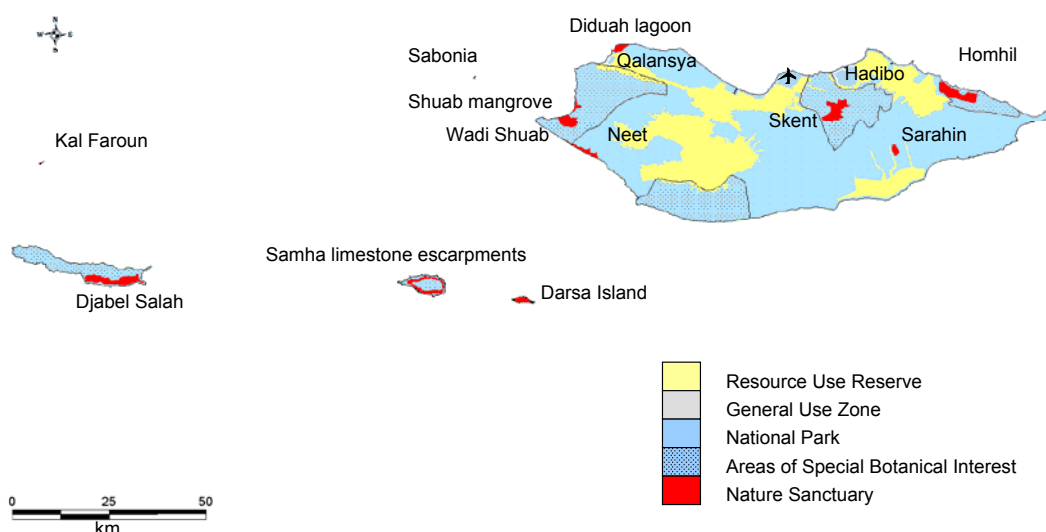
The Conservation Zoning Plan of Socotra Archipelago was prepared on the basis of (a) all previously existing studies on the archipelago, and (b) extensive fieldwork and data collection carried out on site by the EPA/UNDP/GEF Socotra Biodiversity Project. This was parallel to an extensive consultation process with the local community, throughout the archipelago.

A total of 31 Yemeni and 29 International experts from a wide range of regional and European institutions joined forces with the GEF project team and mapped the terrestrial and marine biodiversity of the archipelago into different zones: Resource Use Reserve, General Use Zone, National Park (including areas of special botanical interest for terrestrial areas) and Nature Sanctuaries.

Marine Conservation Zoning Plan for the Socotra Archipelago



Terrestrial Conservation Zoning Plan for the Socotra Archipelago



5c. Means of implementing protective measures.

As stated above, the EPA/MOWE are empowered through the Environmental Protection Law of 1995 and the Zoning Plan of 2000 to take every necessary step to protect and conserve the unique environment of Socotra.

In the event of an infringement of these laws, EPA / MOWE can order the activity in question to be stopped and bring it to the attention of local and national authorities (refer to articles 75 through 95 of Yemen's Environmental Protection Law). This has been confirmed in recent Government decrees of 2004, largely focusing on the procedures to be followed during the construction of new roads on the island.

The ongoing improved cooperation between EPA/MOWE, relevant line Ministries and on-site contractors responsible for the construction of Socotra's road network and port is a result of years of conflict and confrontation. However, the performance of appropriate EIA for development projects is a major issue in Yemen in general, and even more critical in the sensitive habitats of Socotra. The capacity of the EPA to supervise and enforce existing legislation on EIA is yet suboptimal, and several major development projects are yet being implemented by the government itself, without proper prior studies. It is only in the case of Socotra that some major road plans have been adapted to the conservation zoning plan (2003), and this has set an important precedent for other parts of the country.

The lack of EIA enforcement capacity within MOWE/EPA, and the poor project planning capacity of relevant Yemeni ministries (namely housing and construction), is resulting in adverse impacts on the habitats of Socotra related to the construction of new infrastructure. Major donors are supporting the strengthening of EIA capacity in Yemen (i.e. the World Bank), as part of their efforts to help Yemen develop a suitable network of infrastructure.

Article 75 of the Environmental Protection Law (no.26)

The environmental inspectors shall be entitled to perform the capacity of judicial apprehension.

Article 76 of the Environmental Protection Law (no.26)

Inspectors of all concerned environmental bodies who have the judicial capacity in accordance with the provision of the previous article shall undertake the checking of violations and crimes related to the environment, and shall write the minutes of apprehension specifying the type of violation or the crime and the offender of such, and the date of the apprehension and its findings including the place of its occurrence.

They shall also be entitled to inspect the establishments and installations if there are evidences that one of the following cases exists:

- Activity that will harm the environment.
- An establishment or project that is operating without obtaining the environmental license.
- Discharge in contravention to the law.
- Assault on marine and terrestrial life or terrestrial flora or the natural protected areas.
- Having not obtained the license, the documents and records that are related to the implementation of the rules of this law.

Addressing this issue will require significant improvement of EIA and law enforcement capacity, as well as strengthening of local and central governance. While Yemeni Government and donor efforts are now consistently focused in this areas, it is recognised that this capacity building process will require an extended period of time (10-20 years). During this period, the survival of the unique habitats of Socotra will yet largely rely on the combined efforts of the Yemeni Government and the international community.

Existing protective legislation represents a suitable basis for the sound development of the islands. However this is not yet matched by adequate professional capacity and financial resources within the Government of Yemen, to ensure appropriate implementation of the conservation plans.

The Government of Yemen has found difficulties in allocating sufficient financial resources for the long-term

conservation of the archipelago, due to its relatively limited population and peripheral location. This has resulted in the sub-optimal allocation of resources to the archipelago, which remains the poorest area with lowest development indicators in a very poor country like Yemen. In this context, the attention assigned by the international community and UNESCO to the preservation of the unique natural and cultural heritage of the islands play a critical role in supporting the mobilization of required financial resources (nationally and internationally) for the appropriate development of island.

The Environment Protection Agency and existing capacity to implement the Conservation Zoning Plan

Background

The EPA is part of the Ministry of Water and Environment and it is the national government body mandated with a wide range of tasks related to environmental protection.

The EPA first established a one-man branch in Socotra in 1996, and has since then received significant government and donor assistance to develop the essential capacity and infrastructure required for the long-term conservation of the archipelago. A significant effort was performed to build local professional capacity in the field of environmental conservation. The results have been strikingly positive, especially in consideration in the context of Yemen and Socotra in particular, where no such capacity existed before.

Staffing, Facilities & Equipment

At time of writing (2005) the EPA branch in Socotra includes over 80 qualified staff in the island, and this team is supported by a team of 5 staff in the capital Sanaa. The staff of EPA is posted throughout the archipelago (including all inhabited outer islands), and is almost entirely composed of local Socotri staff.

The EPA branch in the island has offices in Hadibu and Qalansya (district capitals) with well-equipped facilities including computers, email connections, laboratories, diving equipment, various research equipment, herbarium, education/training centre, library, communication equipment and 5 4WD vehicles.

The EPA therefore represents by far the best-equipped and staffed government entity on the island, with all other government bodies (with the notable exception of Health, Education and Agriculture) being represented by few staff, with very limited professional capacity.

Technical know-how

All professional staff of the EPA has been recruited and trained in the period 1998-2005 in the framework of donor-assisted conservation projects implemented by UNDP and funded by mainly by the GEF, Netherlands, and Italy (ongoing).

At the outset of such training and capacity building programmes, the professional capacity of islanders in general was extremely low, and a significant effort was performed in recent years to create a committed team of local professionals. This successful process is however yet ongoing, and it is expected that several years will be required before the local EPA team will be fully independent from external (largely international) technical support to perform the many critical tasks that lie ahead to steer the development of the island in the right direction.

Institutional issues

The EPA at national level is yet a relatively weak organization, struggling to gain political clout and recognition. The relatively recent (2001) incorporation into the Ministry of Water and Environment as somehow strengthened the institution. However the professional capacity and resources available within the EPA at national level are yet well below the minimum required to effectively perform their mandate.

This fact is widely recognised in all recent Government and Donor assessments, which all agree in the need to provide technical and financial support to this important however yet weak institution.

EPA Training Needs

A comprehensive training needs assessment for the EPA team of the Socotra Branch was conducted in 2004, and the EPA is going through a process of change to be able to cope with a new set of more complex tasks. To support this change the UN-led EPA/SCDP is implementing a comprehensive training programme, to consolidate the professional capacity of the EPA staff and local partners in their relevant fields.

It has been widely recognised that the EPA achieved an enormous amount in terms of staff development, considering the low staff educational baseline from which it started. The very existence of the ongoing donor assisted projects is itself the greatest testimony to what the EPA has achieved in recent years, in terms of human resources development. However, the upcoming challenges of the EPA raise the required skills bar much higher.

It is clear that the management skills and competencies required for the EPA to achieve its objectives are going to be very different and of a significantly higher level, than those developed during recent years and currently existing. Training to upgrade these skills will therefore be the management priority for the ongoing SCDP/EPA project (2003-2008).

The key identified priority training needs for the EPA team are to improve generic skills in management at all levels and particularly amongst programme management and section heads. It is also critical that EPA creates a professional capacity to grasp the complex and sometimes seemingly conflicting development issues in which the EPA Programme is engaged. In addition, an ongoing programme of more focussed English language development is of high priority.

This training should allow a proposed reorganisation of the EPA Socotra Branch and SCDP programme management to achieve its necessary objectives, of increased delegation, allowing more management effort to be directed to the new and challenging programme activity streams (community development and governance) whilst building protected area management and eco-tourism on the more established 'scientific' knowledge base. The proposed training will also create a greater capacity for coordination, programme monitoring and strategic planning, all pre-requisites to meeting the EPA/SCDP programme objectives.

5d. Existing plans related to municipality and region in which the proposed property is located (e.g., regional or local plan, conservation plan, tourism development plan)

In addition to the Conservation Zoning Plan, other important plans which relate to the future management and conservation of Socotra include:

1. The Socotra Archipelago Development Masterplan (2001)
2. The Socotra Archipelago nature-based Tourism Development Plan (2003)
3. The SCDP Project Support Document (2003)

1. The Socotra Archipelago Master Plan

The EU-sponsored SAMP project was implemented under the umbrella of the MOPD, by a consortium of national and international consultants, led by WS Atkins (UK). The project entailed a comprehensive planning process, which was implemented from October 1999 and final results were produced by mid 2001. The project entailed two distinct phases:

Phase 1

Comprehensive review and updating of existing information on the islands, resulting in a set of sector reports that present and analyse information gathered, and recommend a set of projects for future implementation. Sector reports covered the following areas:

- Agriculture and Livestock
- District Institutional Development
- Economic Development and Recommended Development Projects
- Education
- Fisheries
- Health
- Infrastructure and Utilities
- Land Use Planning
- Population and Community
- Tourism
- Water Resources
- Wildlife and Environment

Phase 2

Among the 69 possible projects recommended by the consultants in phase one, a set of projects were selected and full fledged proposals are being developed by the consultants. These are :

- Support to Local Authorities
- Arrangements for Environmental Management
- Preparation of Structure Plans and Regulations for the General Use Zones (GUZ)
- Roads Plan
- Fisheries Feasibility Studies

- Tourism
- Livestock Development

The GOY agreed to use the proposals as a basis to seek funding for their implementation, possibly from GOY funds, the EU and other donors (cabinet decree no. 47, march 2004).

It should be noted that the SAMP has been largely based on the findings, maps and reports produced by the EPA/UNDP-GEF Socotra Biodiversity Project, and that the development Master-planning process was entirely based on the Socotra Conservation Zoning Plan prepared by EPC/UNDP-GEF and approved by the GOY prior to the implementation of the SAMP. The SAMP consultant team worked very closely with the EPA / UNDP-GEF team in Socotra, and this provided a good basis for achieving the principal GOY goal of an environmentally sound development plan for Socotra archipelago.

2. The Nature-Based Tourism Development Program

This is an internal document adopted by the EPA/MOWE, covering the period 2003-2006 . It identifies Ecotourism, along with sustainable fishing, as one of the two engines of economic growth, which is likely to play a vital role in the future of the island. This document situates the possibilities for ecotourism on Socotra within a global context and provides a framework with which future development of tourism can take place.

This document has been recently supplemented by a review of the current status of Ecotourism development in Socotra, conducted by an independent international consultant for EPA.

See Annex A.7

3. The Socotra Conservation and Development Program (SCDP), project support document.

Prepared by UNDP and the Government of Yemen, the document charts the efforts of the Government of Yemen to support the appropriate management of the Archipelago in the period 2003-2008 , through the implementation of the Conservation Zoning Plan. The principal partners in this effort include the EPA/MOWE and the Local District Councils, for which a significant institutional strengthening component is foreseen. This document contains the work plan of SCDP over a five-year period, including background on development in Yemen and a detailed breakdown of SCDP's budget .

5e. Property management plan or other management system

1. Basis for property management:

The basis for the management of the Archipelago is to date essentially represented by the Conservation Zoning Plan and associated development Masterplan, and all supporting legislation.

The key documents listed above and included in Annex A.11 are fully adopted by the Government of Yemen and represent the legal and management base for the conservation and development of the Socotra Archipelago. It should be noted that no other areas in Yemen are equipped with such detailed and site-specific legal and planning instruments as Socotra is at present. The support received from the international community in recent years, and the political will of the Government of Yemen, have allowed this important achievement.

1. Responsibility for Site management

With over 97,5% of the archipelago's land and all its surrounding waters designated as a protected area, the principal responsibility of the Management of the Socotra Archipelago currently lies in the hands of the local Branch of the Environment Protection Authority, in combination with other key relevant government authorities.

However the capacity of the EPA to fulfil this complex task does not yet equate to the challenges that lie ahead. The consistent donor support received in recent years, and increased government commitments are key positive factors that allow room for optimism. In particular:

- The staff capacity of EPA increased from 1 to 85 staff over past 7 years
- EPA Budget allocations and implementation capacity increased from virtually zero in 1998, to over 1M US\$ per year (largely through donor and government support) over the past 7 years
- EPA essential equipment and technical capacity is now place as by far the strongest civilian government entity in the archipelago, and leading group in environmental conservation at national level.
- Several new environmental NGOs were established in the island and internationally, to significantly complement EPA work in environmental conservation through advocacy, fund-raising, conservation and ecotourism projects implementation, and protected areas management. These include i.e. the Socotra Conservation Fund (SCF), Friends of Socotra (FOS), the Socotra Ecotourism Society (SES), the Socotra Women's development Association (SWDA), various Protected Areas Associations, etc.
- Development of Site-specific Management Plans

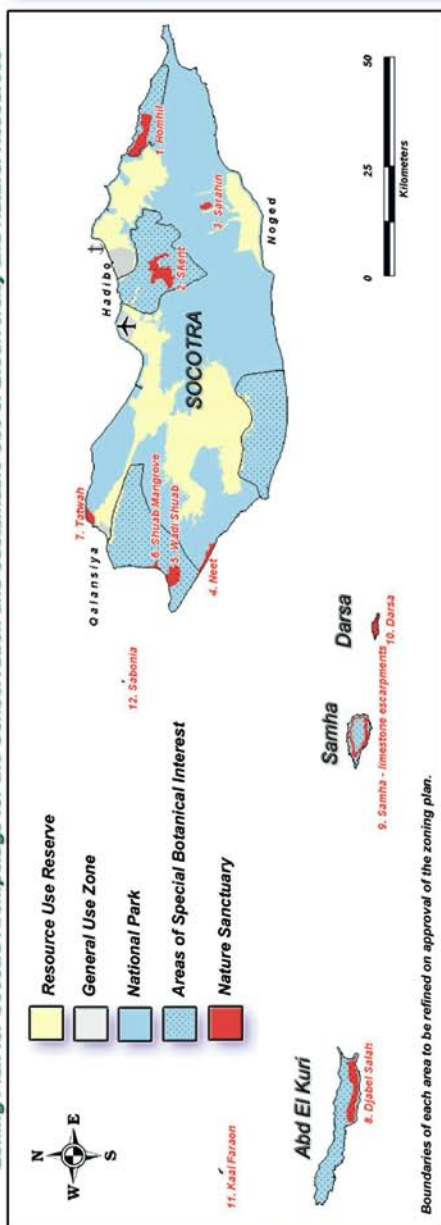
As part of the initial stage of the implementation of the Archipelago's Conservation Zoning Plan, a total of 4 detailed Management Plans have been developed by the



THE TERRESTRIAL ZONING PLAN



Zoning Plan for Socotra Archipelago for the Conservation and Sustainable Use of Biodiversity and Natural Resources



Resource Use Reserve

Definition

To ensure long-term protection of the unique biological diversity of Socotra Archipelago while providing services to meet community needs. Within the Resource Use Reserve, the community is allowed to use sustainable use of natural resources. Such practices are effectively implemented by the community itself, and will be supported by the establishment of the Reserves. These areas are large enough to absorb natural resource use without detriment to the natural resource base. For each Reserve, a management component, all waters within the 12 nautical miles around all the islands of the archipelago, form the Resource Use Zone.

Approximate area covered: 890 square km
Percentage of Total Land Area: 23.5%

Objectives

- To protect and maintain the unique biological diversity of Socotra Archipelago, its natural, cultural and landscape values of the area in the long term.
- To maintain and, where appropriate, enhance the existing natural resources.
- To protect the natural resource base from being alienated and from being degraded by inappropriate land use and the diversion of the unique biological diversity and to the subsistence of the local community who rely on it.

General Use Zone

Definition

Within the Resource Use Reserve, the General Use Zone is an area where the community is allowed to carry out modification and/or resource exploitation has already occurred, or is required to support some essential social and economic interests of the community of the archipelago.

Approximate Area Covered: 55 square km
Percentage of Resource Use Reserve: 6.14%
Percentage of Total Land Area: 1.4%

Objectives

- To allow for the development of essential infrastructure required to improve the standard of living of the local community (i.e. roads, power lines, transportation & health facilities etc.)
- To focus infrastructure & commercial development efforts to suitable areas, thus limiting damage to the environment to an acceptable level.
- To regulate and guide infrastructure and commercial development, so as to minimize environmental damage to neighboring protected areas and natural landscapes.
- To ensure that future generations have the opportunity to experience understanding and enjoyment of areas that have been largely undisturbed by human action over a long period of time.
- To maintain the essential natural attributes and qualities of the environment over the long term.
- To enable the existing local community living at low density and in balance with the available resources to maintain their lifestyle.

TERRESTRIAL CRITERIA FOR SELECTION

	Diversity	Rarity	Endemic plants	Endemic animals	Flagship species	Important Birds Areas	Intrinsic appeal/landscape	Naturalness	Typicalness	Research / Study	Possibility for effective management
N.S. Nature Sanctuary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1. Homhil	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Skent	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Sarahin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Neet	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5. Wadi Shuab	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. Shuab Mangrove	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7. Tatwah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8. Djabel Salah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9. Samha - limestone escarpment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10. Darsa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11. Kaal Faraon	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12. Sabonla	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

SUMMARY ACTIVITY GUIDE FOR THE TERRESTRIAL ZONING PLAN

Management guidelines will be developed specifically for each area on approval of the zoning plan.

	Resource Use Reserve	General Use Zone	Nature Sanctuary
Industrial development	✓	✓	✓
Airport	✓	✓	✓
Hospital	✓	✓	✓
Road construction	✓	✓	✓
Intensive agriculture	✓	✓	✓
Controlled grazing	✓	✓	✓
Traditional plant use	✓	✓	✓
Ecotourism infrastructure	✓	✓	✓
Research and education	✓	✓	✓

This poster was produced by Rebecca Klaus, on behalf of UNOP-GEF, October 1999 (c)

local EPA team in consultation with the local community groups resident within and around pilot designated Nature Sanctuaries in the island. These Management Plans have been developed on the basis of EPA field research and on an entirely community-led process, in which each protected area (and associated visitor services) is now essentially managed by a local community association. This community-led approach is being tested in a limited number of Pilot Protected Areas.

- Detailed conservation Plans are being developed for the island's Karstic system in collaboration with international specialised research institutions.

The above represent only the initial steps in the direction of achieving a comprehensive Management Plan for the entire archipelago. This will largely depend on a set of key issues that require significant improvement, as outlined the following section.

Issues that need improvement:

Existing key legal and planning documents are now supported by a strengthened EPA Branch in Socotra, and by a significantly increased awareness at central government level on the importance of the Archipelago. However, it is recognised that the existing situation is far from being ideal, and that such legal and planning instruments require further action to become fully operational. The key priority actions identified include:

1. Improving the current institutional set-up for the management of the archipelago.

The recommendation for the establishment of a centralized government body responsible for all conservation and development policy and programmes in the archipelago has been widely recognized and advocated in recent years (GEF-UNDP 1996, UNDP-MOWE 2001, UNESCO 2003, Aden Symposium 2004). At present the EPA has received a mandate to oversee the implementation of the Conservation Zoning Plan, however the institutional context calls for the involvement of several other government and non-government institutions, (i.e. local district governments, line ministries, island development authority, national and local NGOs, etc.) each having its own and sometimes conflicting objectives.

The creation of a central "Socotra Management" body is therefore identified as a vital step towards the safe implementation of the expressed Government vision for the archipelago. This however will entail a significant effort to integrate all national interests in such a new and important political entity, that should provide adequate representation for the local population of the island. This will be achieved through a gradual and long process, that should however not distract the Government from steering development in the island in the right direction over the coming years.

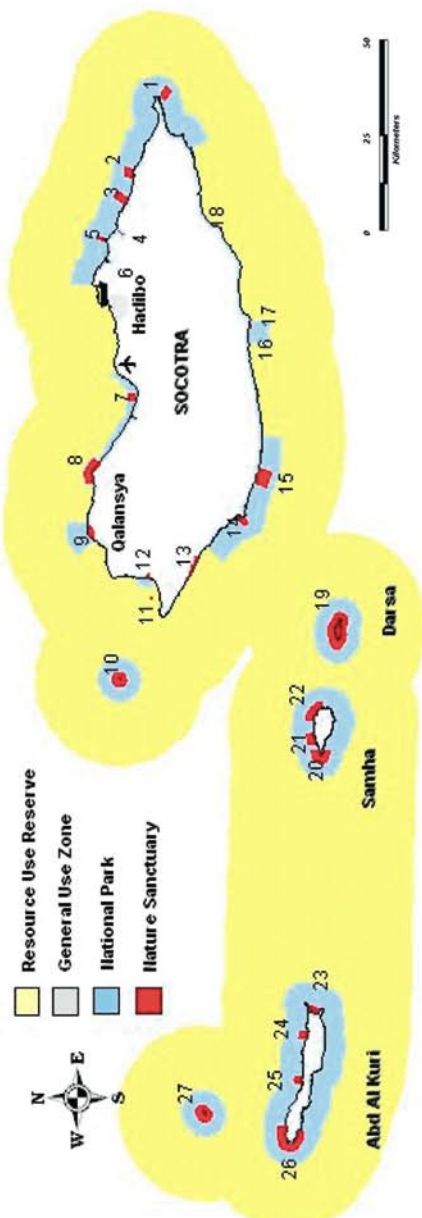
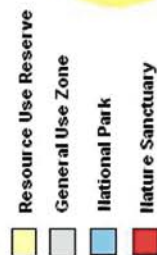
2. Improving the enforcement capacity of EPA and local government in the island

In combination with above centralized authority, the enforcement capacity of key bodies (i.e. EPA and such "Socotra Management" authority, combined with the local government) should be gradually however significantly strengthened to cope with the complex challenges that lie ahead.

This will require significant improvement of the financial allocation and Technical Advisory support for the local and central authorities charged with the management of the island. In the short and medium-term context of Yemen, this important objective can probably be achieved only with increased Government commitment, combined with international donor support.

THE MARINE ZONING PLAN

Zoning Plan for the Conservation and Sustainable Use of the Marine Biodiversity and Resources of the Socotra Archipelago



Resource Use Reserve

Definition
Areas managed to ensure long-term protection of the unique biological diversity of Socotra Archipelago while providing, at the same time, a sustainable flow of natural products and services to meet community needs. Within the Resource Use Reserve, the community is encouraged to practice sustainable use of natural resources. Such practices are effectively implemented by the community itself, and will be supported by the establishment of the Reserves. These areas are large enough to contain the full range of natural resources and to its overall long-term natural values. For the marine component, all waters within the 12 nautical miles around all the islands of the archipelago, form the Resource Use Zone.

Approximate area covered: 14698 square km

Objectives
To protect and maintain the unique biological diversity of Socotra Archipelago, as well as other natural, cultural and landscape values of the area in the long term.
To maintain and, where appropriate, enhance the existing natural resources.
To ensure that the management practices for the sustainable use of natural resources.
To protect the natural resource base from being alienated or degraded by unsustainable development, and to the detriment to the unique biological diversity, and to the subsistence of the local community who rely on it.

General Use Zone

Definition
Within the Resource Use Reserve, the General Use Zone is the area where a significant level of human activity is expected to occur, or is required to support some essential social and economic interests of the community of the archipelago.

Approximate Area Covered: 1 square km

Objectives
To develop and maintain essential infrastructure required to improve the standard of living of the local community (i.e. roads, power lines, transportation & health facilities etc.)
To focus infrastructure & commercial development efforts to suitable areas, thus limiting damage to the environment to an acceptable level.
To regulate and guide infrastructure and commercial development, so as to minimize environmental damage to neighboring protected areas and natural landscapes and to the minimize negative impact on natural animals and plants (e.g. through the implementation of an Impact Assessment, Coastal Zone development guidelines).

National Park

Definition
Natural areas of land and sea, designated to (a) protect the ecological integrity of the unique ecosystems and (b) exclude exploitation or occupation inimical to the objectives of conservation of biodiversity and of the preservation of natural landscapes, and (c) provide for scientific, educational, recreational and physical opportunities, all of which must be environmentally and culturally compatible.

Approximate Area Covered: 1514 square km

Objectives
To protect the unique natural habitats and landscapes of Socotra Archipelago, and to provide for scientific, educational, recreational and ecotourism development purposes.
To support the needs of the local community, and not adversely affect the objectives of biodiversity conservation.
To perpetuate, in as natural a state as possible, representative examples of the unique biotic communities, genetic resources, and species, found in the Socotra Archipelago, and to provide ecological stability and maintain biodiversity.
To manage visitor use for educational, cultural and recreational purposes, at a level which will maintain the area in the current natural or near-natural state.

Nature Sanctuary

Definition
These are areas of unmodified or slightly modified land, and sea, retaining their natural character and richness, without significant human interference, and are designated, identified and managed so as to preserve natural or near-natural condition. These areas are strategically located for the recruitment of plants and animals, into other areas, through the movement of seeds, pollen, larvae, and other organisms, and for important breeding areas. These areas are susceptible to degradation by natural events or activities of people, and the risk of irreversible environmental damage is high, unless the site is strictly protected.

Approximate Area Covered: 154 square km

Objectives
To protect and maintain the unique natural habitats, species and unique landscapes in as undisturbed a state as possible.
To ensure that future generations have the opportunity to enjoy and benefit from the natural resources of the area, which have been largely unaltered by human action over a long period of time.
To maintain the essential natural attributes and qualities of the environment over the long term.
To enable the existing local community living at low density and in balance with the available resources to maintain their lifestyle.



SUMMARY ACTIVITY GUIDE FOR THE MARINE ZONING PLAN					Main Features for Selection																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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This poster was prepared by Raboosa Khair in October 1999, and subsequently revised by the Project Team in September 2000.

Definition and application of regulatory tools

Contextually with the setting-up of a capable “Socotra management” authority, a comprehensive set of regulatory instruments and detailed management plans should be developed to support the actual implementation of the Conservation Zoning Plan of 2000.

3. Mobilizing adequate Financial resources

Yemen is one of the poorest and most disadvantaged countries in the Arab Region (human development index n. 144). In this context, the financial resources required to support the conservation and appropriate development of the Socotra Archipelago have so far largely relied on international support, mobilized by the Government of Yemen in recognition of the importance of the site.

It is however fully recognized that the government will gradually identify and develop ways to channel adequate resources to the island. Several options for ensuring the financial sustainability of ongoing conservation efforts are being investigated, including the setting-up of a visitor entry tax to the island. These measure will however largely depend on the appropriate development of the ecotourism sector in Yemen and in Socotra, and this is an ongoing challenge for the whole country.

5f. Sources and levels of finance

The Environmental Protection Authority (EPA) currently receives very limited annual budget allocation from the central Government, sufficient to cover staff salaries and some operational costs. However, since late 1997, the Government of Yemen has managed to mobilize significant additional support for the Socotra Branch of EPA, in recognition of the national and international conservation importance of the site.

Summary of funding in support of EPA for the period 1997-2008		
<i>Period</i>	<i>Source</i>	<i>Funding (Approx.)</i>
1997-2001	Global Environment Facility - UNDP	5,000,000\$
2001-2003	Netherlands, UNDP	1,350,000\$
2003-2008	GOY, Italy, UNDP	5,500,000\$

The table shows how international donor support has been consistent in recent years. Yemeni government direct support to the EPA has been gradually increasing, with all newly recruited EPA staff being gradually absorbed into the government budget, increased annual allocations, and the first direct in-cash government contribution being allocated to the ongoing SCDP programme in the island.

Following the end of the Government of Italy/UNDP funded Socotra Conservation and Development Program in 2008, it is envisioned that additional donor financing will be mobilized to support the ongoing capacity building effort of the EPA and other relevant government bodies involved in the development of the archipelago.

The Socotra Conservation Fund

The Socotra Conservation Fund (SCF) is an NGO registered in Yemen and the UK on a project by project basis. The SCF was incorporated in the UK in 2002 and formally registered as an NGO in Yemen in 2003. It is a flexible, democratic and participatory organisation, owned and controlled by the Full Members through the General Assembly, which is open to eligible individuals and representatives of properly constituted, non-statutory organisations and community groups, at the discretion of the management committee. The General Assembly holds most of the power for setting the direction and implementing the Objects of the organisation. Through the General Assembly, the Full members vote to elect the Management Committee, which administers the organisation's activities. Non-voting Associate Membership is open to other interested individuals and organisations, including relevant statutory agencies and corporate bodies. Advisory Status to the SCF may be offered at the discretion of the management committee.

The SCF was born as the result of work conducted in the first GEF project (1997-2001), and is currently entirely run with the generous support of private donations, work of volunteers who are also staff of the EPA and SCDP, and international advisors. The SCDP/EPA are providing the SCF with office space and equipment in Sanaa and Socotra, and are providing technical assistance to the extent possible. Additional details and full background information can be found in www.socotraisland.org/fund. Past donors include the Government of Japan, the Government of Holland, UK, the Government of Poland and HRH Charles, Prince of Wales. These private donations are directed towards the conservation of the island, based on projects that have been developed with local communities.

In parallel to the above Government effort, a network of local non-governmental organizations (NGOs) was established in recent years in the framework of the UN led programme. These NGOs, will play an important role in supporting EPA's ongoing development and conservation work on the island. The Socotra Ecotourism Society (SES), the Women's Association and the Socotra Conservation Fund (SCF) are currently provided with logistic and financial support by the UN project and other bilateral donors, however they aim at becoming financially independent. Of these, the Socotra Conservation Fund is the most important, when considering both current and future sources of finance for conservation and development efforts. Recent ecotourism development studies (Jessamnie 2005) identify the SCF as the most reliable vehicle for channeling funds to the island deriving from i.e. a visitor entry tax.

5g. Sources of expertise and training in conservation and management techniques

The Socotra Archipelago was the first Protected Area established in Yemen. This implied that effectively no prior experience nor national know-how in protected areas management existed in the country. Therefore, during the period 1998-2005, an intensive training effort for local staff of EPA in the island was carried out and is yet ongoing, mainly drawing from the following sources of expertise and training in conservation and management techniques:

International advisors: since 1997, a minimum of 2 to 4 full-time in UN international advisors were deployed in the island, to conduct on-the-job training and assist in the implementation of the UN programme with the EPA. These were assisted by a large number of additional short-term trainers and advisors (including consultants and volunteers) in various sectors (i.e computer use, English language, principles of ecology, herbarium preparation, birds identification and surveys, eco-tourism development, underwater research techniques, wildlife survey techniques, protected areas management, use of Geographical Information Systems, caving, etc.)

Regional Expertise: a significant source of expertise in all the above fields has been drawn regionally, especially from Jordan, where a partnership with the Royal Society for the Conservation of Nature has been established, with frequent exchanges of know-how.

IUCN:

The new regional office of the IUCN is also in close contact with the EPA branch in Socotra, providing consistent support through the new Protected Areas management section of IUCN Amman. Also, the IUCN is providing support to the EPA in the development of an integrated Decision Support System.

Socotra-Galapagos Partnership Initiative:

A partnership initiative between the Galapagos and Socotra national parks is active under the ongoing SCDP/EPA project. Funding is available for exchange of know how and training between technical staff from the two sites, as well as exchanges of visits between high-level decision makers responsible for the development of the two sites.

Scholarships:

The EPA/SCDP has been successful in mobilizing full-scholarships for key members of the EPA Socotra team: two Masters degrees in UK, two PhDs in Italy and one Master in Check Republic were assigned in recent years.

EPA Socotra as a source of Training for other PA project in Yemen:

It should be noted that selected members of the national team of EPA Socotra have provided training, participated in survey work and presented their original research work to other upcoming conservation projects in the country, as well as at several regional and international seminars in recent years.

5h. Visitor facilities and statistics

Source: J. Jessamine 2005

Visitor Facilities

Hotels:

There are currently four tourist hotels, with a total of 58 rooms, operating on Socotra, they are:

- Summerland Hotel, 12 rooms
- Taj Socotra Hotel, 24 rooms
- Hajef Hotel, 16 rooms
- Jazeera Hotel, 6 rooms

All the hotels are located in Hadibo, the island's administrative centre, and are of a basic standard of accommodation. The Summerland and Taj Socotra have restaurants, while only the Taj Socotra has air-conditioned rooms. In addition a new hotel is being constructed adjacent to the airport, although only four rooms are available.

General visitor facilities:

Though the three main hotels have their own generators, they do not offer 24-hour electricity, and it is not possible to make international phone calls from them. International and local calls can be made from telephone centers in the town's central market. Teleyemen mobile phones now work in the main centres of Hadibo and Qalansiyya. Email is available only at Summerland hotel. The restaurants available, with the possible exception of Summerland Hotel, offer basic local cuisine.

The city of Hadibo has a government hospital with very limited facilities, a bank where money can be exchanged, and a tourist information center run by the Socotra Ecotourism Society. Only Hadibo and Qalansiyya have electricity supplied to it by the local authorities for twelve hours a day, although some other major towns and villages own generators that they manage privately. Electricity and running water are not available in all the rest of the island.

In addition, the following services and facilities were recently developed, with the aim of improving the experience of visitors and helping the local communities:

The Socotra Ecotourism Society (SES)

The Socotra Ecotourism Society (SES) is a non-governmental organization, registered in Yemen, and created in Socotra in March 2003 on the initiative of the SCDP. It is managed independently entirely by Socotri staff with the objective of developing ecotourism as a means of sustainable development for the island. The SES maintains an office in the main street of Hadibo, the island's principal town, and an information centre at Socotra Airport. With the support of the SCDP and SCF,

the SES has trained ecotourism guides and drivers, as well as participating in language training. The society has professional field guides, trained naturalist guides, and drivers whose services it offers to tourists and tour operators. In addition the SES arranges for hotel accommodation on the island, campsites in protected areas, meals, and specialist tours in areas such as ornithology.

Visitor Information Centres:

Two Visitor Information Centres and local handicrafts/book shops are currently managed by the Socotra Ecotourism Society and located at the airport and in the centre of Hadibu.

The Socotran Women's Association (SWA)

The Socotra Women's Development Association (SWDA) was established in 2001 on the initiative of the SCDP. The SWDA organises training and education for women on the island as well as undertaking small development projects with the aid of the Socotra Conservation Fund (SCF). A core activity of the association has been the establishment of handicraft shops, in Hadibo and at the airport, to sell local craft items to tourists. A range of items including pottery, woven rugs, resins, and honey are produced by the association for this purpose.

The Protected Area (PA) associations:

in order to facilitate the experience of tourists and to ensure benefit for local communities, EPA/SCDP worked with the communities living in protected areas to establish associations that could manage campsites and provide guides to the surrounding areas

Tourist camps have been constructed in a two of protected areas, including the Di Hamri Marine Protected Area and Homhil PA. On completion these simple facilities, which include camping area, parking, toilets, kitchen and shaded eating were handed over to the local community. These communities have established village associations to run the ecotourism campsites and have received training from the SCDP/SCF to assist them. In the case of marine areas this training has extended to training local divers to accompany groups of tourists.

Ministry of Tourism:

The Ministry of Tourism and Culture is represented on Socotra by a single officer. This officer is charged with administering tourism on the island under the terms of the 1999 Law on Tourism; as such his functions are related to the licensing of tourist accommodation, tour operators, and guides. In practice however activities would appear to be limited to preparing monthly statistical returns of tourist arrivals based upon an arrival survey carried out by the Tourist Police at the airport.

Tour Operators:

Up to 10 tour operators on the Yemen mainland, acting as local agents for overseas outbound operators, are currently offering tours of Socotra to foreign tourists as an element of a Yemen holiday. Tourists are generally in groups and remain on the island for around five days. There is no evidence that the island is being promoted as an ecotourism destination but is attracting 'adventure' tourists whose interest in the environment is limited. Anecdotal evidence suggests that many of these groups are primarily interested in visiting the island's pristine beaches.

While some of these tour operators dispatch tour guides from the mainland to accompany tourists many now utilise the services of the Socotra Ecotourism Society (SES) to provide tour guides and vehicles, in addition the SES can look after hotel, catering and equipment arrangements for tour groups.

Visitor Statistics:

Yemen in General:

Tourism in Yemen is a relatively recent activity and has only emerged with the unification of the country in 1990, its growth however as been hampered by security concerns. The government approved a tourism policy in February 1997 setting out broad objectives for the development of tourism in Yemen. Table T.1, set out below clearly shows Yemen's relative position as a Middle East destination. In spite of its extensive resources, including a number of World Heritage sites, Yemen attracts only around 0.4% of tourists in the region. In 2002 it attracted a total of 98,000 visitors while Oman attracted 620,000 and Egypt 4.9 million. The leading position of Saudi Arabia, with 7.5 million arrivals, may to some extent be discounted due to its unique position as a pilgrimage destination for the Moslem world.

In recent years the Yemen tourist industry has been negatively impacted by the war in Iraq and a number of local security incidents. Concerns over security and travel advisories issued by a number of foreign governments and the country's resultant poor image in the western media led to a dramatic fall in arrivals for 2002-03. It has been reported that the industry staged a recovery in 2004 with arrivals in the first six months of the year exceeding 70,000 tourists.

Table T.1 - Middle East Tourist Arrivals 1990-2002							
	International Tourist arrivals (1000)					Regional Market Share (%)	
	1990	1995	2000	2001	2002	1995	2002
Bahrain	1376	1396	2420	2789	3167	10.2	11.5
Egypt	2411	2871	5116	4357	4906	21.1	17.8
Iraq	748	61	78	127	-	0.4	-
Jordan	572	1074	1427	1478	1622	7.9	5.9
Kuwait	15	72	78	73	-	0.5	-
Lebanon	-	450	742	837	956	3.3	3.5
Libya	96	56	174	-	-	0.4	-
Oman	149	279	571	562	602	2.0	2.2
Palestine	-	-	330	7	-	-	-
Qatar	136	294	-	-	-	2.2	-
Saudi Arabia	2209	3325	6585	6727	7511	24.4	27.2
Syria	562	815	1416	1318	2809	6.0	10.2
UAE	973	2315	3907	4134	5445	17.0	19.7
Yemen	52	61	75	76	98	0.4	0.4
TOTAL	9689	13663	23969	23646	27594		

Source: *Jessamine, 2005*

The major source regions for Yemen's tourism are Western Europe and the Middle East. In 2001 European visitors accounted for 34% of all arrivals. Recent years have seen a dramatic growth in tourist arrivals from the Middle East, rising from 46% of

the total in 2001 to 68% of all arrivals in 2003. During the same period, as set out below in Table T.2, European arrivals fell to 8% of arrivals.

Table T.2 - Tourist Arrivals by Region of Origin 2001-2003

Region	2001	2002	2003
Europe	25857	15826	13733
Asia	5763	10835	15589
N and S America	3509	4429	12932
Africa	4867	1573	6752
Australia	446	468	377
Middle East	34704	64887	105284
Total	75146	98020	154667

Source: Yemen Ministry of Tourism

The regional market is dominated by arrivals from Saudi Arabia, which in 2003 accounted for 57% of regional tourist arrivals, a growth of over 400% in the period 2001 to 2003. Regional arrivals by nationality are set out below in Table T.3. As a whole the regional market seen considerable growth aided by the waiving of visa requirements for citizens of the Gulf states.

Table T.3 - Arab Tourists by Nationality 2001-2003

Nationality	2001	2002	2003
Egyptian	2517	2509	3677
Jordanian	2569	2385	2689
Saudi	14404	38252	59669
Iraqi	3988	1691	2846
Syrian	3040	3727	6780
Sudanese	2009	1472	1875
Others	8186	14849	27748
Total	36713	64887	105284

Source: Yemen Ministry of Tourism

While less significant than it once was, due to security concerns, Europe remains a key market for Yemen's tourism industry and is the most significant in terms of generating demand for hotel accommodation and tourist facilities. Key source markets, as set out below in Table T.4, are the United Kingdom, France, Germany and Italy.

Table T.4 - European Tourists by Nationality 2001-2003

Nationality	2001	2002	2003
German	5721	2772	1894
French	4653	2793	1882
Italian	6073	2352	1731
British	1469	1951	1640
Swiss	619	654	229
Dutch	1317	654	229
Others	6005	4614	2556
Total	25857	15828	13733

Source: Yemen Ministry of Tourism

Socotra:

in spite of the extensive work undertaken over a six to seven year period and the unique nature of attractions on the island the level of tourism development remains very low. In 2004 a total of 450 foreign tourists visited Socotra. In addition it has been estimated that some 250 Yemeni nationals visited the island, although most of

these are believed to be business travellers. While it is recognised that the country has been experiencing difficulties in developing the tourism sector, due in large part to security concerns, arrivals on Socotra represent less than 0.5% of all visitors to Yemen.

Internationally it has been estimated by the WTO that nature tourism some generated 7% of all international travel expenditure. While, in 1997, tourism was enjoying global growth of 4% nature tourism was growing at a rate of between 10% and 30%. While these figures are global averages and identifying the market potential of Yemen, and Socotra in particular, will require detailed study they provide a broad measure of the potential for ecotourism in the country. With 154,000 arrivals in 2003 some 10,000 were potentially ecotourists, as the prime ecotourism attraction in Yemen one would expect Socotra to attract a higher proportion of these visitors.



left

View of Di-Hamri

Photo by Mario Caruso

5i. Policies and programmes related to the presentation and promotion of the property

The Government of Yemen has indeed yet very limited capacity and plans to present and promote the Socotra Archipelago at national, regional and international level. Ongoing initiatives are largely supported by the Socotra Conservation and Development Programme of UNDP in collaboration with the Environment Protection Authority of Yemen and other relevant ministries. It is envisaged that significant external advice will be required from UNESCO to the Government of Yemen in this field.

Tourism promotion (*Source: Jessamine 2005*)

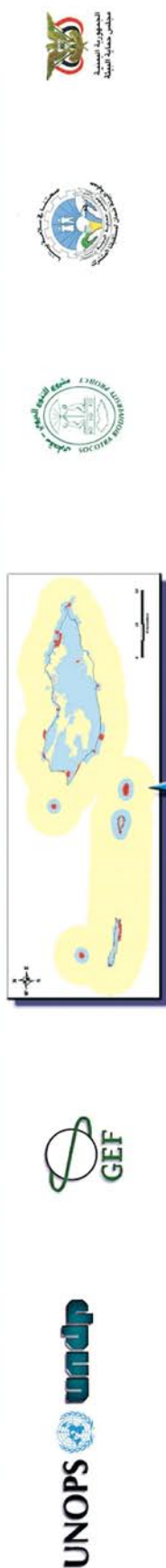
Under the current administrative arrangements for tourism promotion both marketing and investment promotion are the responsibility of autonomous agencies of the Ministry of Tourism. Marketing is undertaken by the Yemen Tourism Promotion Board (YTPB), while the General Tourism Development Authority (GTDA) is charged with attracting investment, and in particular foreign investment, into the tourism industry.

On examining the administration, promotion and development of Socotra levels of coordination among the Ministry of Tourism, the YTPB and the GTDA would appear to be very low. Although images of the island are frequently employed in promotional material no specific ecotourism products or campaigns have been developed by the YTPB to promote Socotra. The focus of most of the promotional effort undertaken appears to be towards cultural tourism, which is of little relevance to the island.

Although Socotra has been identified as an ecotourism destination aimed at the highly specialised development of 'ecolodges' for limited, and possibly restricted, numbers of visitors the investment promotion agency, the GTDA, appears to promote the island as a resort destination to potential investors. This uncoordinated approach has led to some concern on the island about the possibility of it being developed as a mass tourism destination to the detriment of its unique environment and social structures.

THE MAKING OF THE ZONING PLAN

THE ZONING PLAN FOR THE CONSERVATION AND SUSTAINABLE USE OF THE BIODIVERSITY AND NATURAL RESOURCES OF THE SOCOTRA ARCHIPELAGO



Scientific Biodiversity Inventory and Studies

- Terrestrial zoological surveys
- Seabird and landbird surveys
- Mapping marine and terrestrial habitats using satellite imagery and GIS
- Marine biodiversity and habitat surveys
- Coastal biodiversity and habitat surveys
- Terrestrial botanical surveys

Environmental Education and Awareness Campaigns

- Village meetings to promote biodiversity conservation and sustainable resource use concepts
- Training course on Zoning Plan for environmental extension officers
- Dialogues with high level government officials to seek understanding and support for the zoning plan process
- Expert visits to villages to raise awareness of specific issues (e.g. lobster fisheries)
- School visits to develop environmental awareness from a young age
- Regular directors meeting to brief and update local authorities on project activities
- Presentation on ecotourism and relevant guidelines

Documentation of Traditional Resource Uses and Development Needs

- Identifying ways to improvise water supply
- Planning road construction to minimise environmental impact
- Traditional plant use practices
- Recording of fisheries activities
- Management of livestock grazing
- Potential impact of port development and marine traffic
- Assessing the need to collect fire wood

This poster was prepared by Rebecca Klaus on behalf of UNDP-GEF, 1999 (c)

5j. Staffing levels (professional, technical, maintenance)

The current staffing levels of the Environment Protection Authority branch in Socotra is summarised below, based on data from end of 2004 (source SCDP/EPA project YEM.03.004):

17 Technical & Management Staff: the core technical team is based at EPA Socotra headquarters in Hadibu and at the new office in Qalansya. Professional skills existing on location include: terrestrial & marine research and surveys, (including management team and technical specialists in i.e. herbarium curation, bird, invertebrates, reptiles, sea turtles, lobster, shark coral, fisheries resources, Geographical Information Systems, water wells monitoring, meteorology, et. al.), protected areas management, environmental education and awareness (including i.e. capacity to develop and produce educational materials locally), community development (i.e. support to local NGOs, primary health care, water supply systems, renewable energy, handicrafts, ecotourism, etc.). This group of professionals is composed by 80% of local Socotri staff and the rest by Junior Yemenis from mainland, who were all recruited and trained in the framework of the ongoing Socotra Conservation and Development programme (1998-2005). Their professional skills started at a very low level, and have consistently improved in the above period. However in many fields, local staff does yet require external technical assistance.

Approx. 40 Environmental Education & Extension Officers of the EPA and Socotra Conservation Development Programme are stationed at their villages, located throughout the archipelago, including all inhabited outer islands.

10 meteorological stations Officers of the EPA and Socotra Conservation Development Programme are stationed throughout the archipelago at manual meteo-stations

20 support staff of the EPA and Socotra Conservation Development Programme are based in Socotra and in the capital Sana'a. These include: administration, logistics, drivers, guards, cleaners, mechanics etc.

below

Part of the EPA/UNDP-GEF Multi-disciplinary Baseline Biodiversity Research Team, Hadibu, Socotra 1998

Photo: courtesy of RBGE and EPA/SCDP



6.

Monitoring

6a. Key indicators for measuring state of conservation

The EPA branch in Socotra, in collaboration with major international research institutions and international UN and IUCN advisors, has developed and is consistently upgrading a research and monitoring plan to measure the state of conservation of key habitats in the archipelago. This effort was initiated as part of the baseline ecological assessments conducted in the period 1998-2001 with GEF-UNDP support, and is yet ongoing.

The research conducted in that period included the setting-up of permanent monitoring programmes on key marine and the terrestrial habitats, and included the provision of training for the local team of EPA on all associated monitoring techniques. The monitoring programmes are focused on key indicator.

Terrestrial habitats

Vegetation Monitoring: A comprehensive set of baseline research and inventories was conducted in recent years, representing a sound basis to monitor the state of conservation of the site. As integral part of the baseline

Baseline, a detailed vegetation survey was conducted by the Royal Botanic Gardens of Edinburgh, with support from EPA, UNDP-GEF and Darwin Initiative. This effort included:

- Network of permanent monitoring plots (marked with GPS) complemented with diagram description and 360° photo-panoramas to monitor the state of vegetation
- Socotra Herbarium including over 700 species of plants (gradually being completed by the local team)
- Guidelines for monitoring key and flagship plant species including Dragon Blood tree and *Dendrosyochos socotranum* – to be implemented by the EPA
- GIS Vegetation Map of the Archipelago and associated plant species database
- Production of the “Ethnoflora of Socotra”, with comprehensive records of plant species, vernacular names, distribution, ecology and traditional uses

Dragon Blood trees: Detailed survey on the status of *Dracaena cinnabari* was conducted in 1999-2000 by EPA team and international PhD student, providing important baseline information on the status of this flagship species. To be repeated periodically by EPA.

Grazing Enclosures: two permanent enclosures were established by EPA in collaboration with international researchers, and are currently maintained to monitor the effect of grazing exclusion on the vegetation of highlands.

Birds

Bird Atlas: the EPA with Birdlife International developed a bird atlas for the archipelago, in consistency with the Bird Atlas of the Middle East. A computer based mapping system is used to record the results of field surveys conducted across the archipelago to monitor the status of bird populations with special attention to all resident species and endangered endemics.

Meteorology

An essential network of automated and manual station for recording key meteorological data (rainfall, temperature, wind, clouds cover etc.) was established by the EPA during the period 2000-2005 with support from the SCDP and various international research institutions. The results of this effort provide only preliminary information, and will require upgrading and adjustments (especially the manual data collection systems). However this will represent the first reliable database for meteorological data in the islands.

Marine Biodiversity

Fixed underwater transects: a network of 18 permanent underwater transects was fixed in Socotra and all outer islands in 1998-1999 in collaboration with the Senckenberg Institute (Germany). This is now regularly monitored by the EPA marine team to assess change in the status of key marine habitats (i.e. focusing on fish species and coral cover).

Tidal and sub-tidal habitats: the baseline survey of tidal and sub-tidal habitats was conducted in by the EPA team in collaboration with the University of Wales (UK) and the Senckenberg Institute (Germany). The results of these surveys include detailed mapping and description of the status of marine habitats. These base maps represent the base for future ecological monitoring of the status of key habitats that will serve as indicators of the status of the underwater environment around the archipelago.

Turtle monitoring

A program for the monitoring and tagging of sea turtles at key nesting sites is ongoing since 1999. Initiated with assistance from the IUCN specialist group, the programme is now managed entirely by the local team, and results are regularly shared with the international network of turtle specialists.

Fishing effort

The EPA's island-side network of extension officers located along coastal areas has been collecting a significant amount of data on fishing efforts in the archipelago, since 1998. the database contains over 25,000 record sheets with information on the species of fish, quantity, size and other parameters of fishing effort that will allow a constant monitoring of the status of key fishing resources (i.e. lobster, shark, sea-cucumber, key species of reef-fish and other threatened marine species)

It should be noted that special measures are being taken by EPA is the establishment and monitoring of pilot protected areas in the island. The EPA there operates with local associations that act as registered local NGOs, holding joint responsibility with the EPA for the management and monitoring of their respective sites. Two sites are currently administered in this fashion (Homhil and DiHamri protected areas), and they represent a first pilot exercise for an innovative way of managing and monitoring protected areas in the region.

The local population is also currently actively involved in several biodiversity monitoring programmes conducted by the EPA, and namely i.e.: sea turtles monitoring and tagging, monitoring of fishing efforts, management of grazing exclosures and manual meteo-stations, control of invasive species.

6b. Administrative arrangements for monitoring property

The EPA is primarily responsible for establishing and maintaining an integrated program to monitor the state of the archipelago's environment, including its flora and fauna. This involves tracking the situation of vulnerable and endangered species, as well as working closely with infrastructure developers to mitigate the impact of construction on the island's ecology.

The local EPA branch is mandated to operate in collaboration with the local government and other relevant government bodies, towards the implementation of the Socotra Conservation Zoning Plan, which includes the monitoring of the site. Government funding for the activities of EPA is allocated in the annual budget, and channelled from the Central Bank of Yemen to the central account of the Ministry of Water Environment and then to EPA. However currently a large proportion of funds supporting the ongoing EPA programme (including the ecological monitoring programme) in Socotra is administered jointly by EPA and the UN Development Programme, through the "Socotra Conservation and Development Programme".



6c. Results of previous reporting exercises

In recent years the EPA (with support from UNDP, GEF and wide range of international research institutions) has led the preparation of a wide range of technical reports aiming at the inventory and mapping of the island's flora, fauna, marine life, potential for eco-tourism, etc. These reports are all available at the EPA library in Socotra. A list of the most relevant reports is provided below:

Date	Title
1999	SENKENBERG RESEARCH INSTITUTE. 1999a. <i>Marine Biotopes Classification Manual</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. Developed by the Senkenberg research Institute (Frankfurt, Germany) in collaboration with the EPA and with funding from the UNDP-GEF Socotra Biodiversity Project. The manual contains detailed mapping and description of marine biotopes of the entire archipelago developed with a combination of remote sensing and underwater survey techniques. Methodology and results have recently been published in Vol. 20 of "Fauna of Arabia" (see also below)
1999	ROYAL BOTANIC GARDENS. 1999. <i>Final Report on Multidisciplinary Expedition to the Soqatra Archipelago</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. The report outlines the preliminary findings of the first field expeditions conducted by the Royal Botanic Gardens of Edinburgh in collaboration with the EPA team and several international and national specialists in the botany and zoology of the archipelago. Final results published later in 2000 and as part of scientific articles published in volumes 19 and 20 of "Fauna of Arabia".
1999	SENKENBERG RESEARCH INSTITUTE. 1999b. <i>Marine Habitat, Biodiversity and Fisheries Surveys and Management (Report of Phase I)</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. The report outlines the findings and recommendations of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
1999	CEBALLOS-LASCURAIN, H. 1999. <i>Ecotourism Development Plan for Socotra Archipelago, Yemen</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. Developed by the international consultant Hector Ceballos-Lascurain, the reports the findings and recommendations of two successive missions to the island by the famous eco-tourism development expert who is known to have coined the term "ecotourism". The recommendations were however produced at a very early stage in the development history of the island (i.e. prior to the opening of the civilian airport), and therefore are now largely outdated.
1999-2000	PETRONCINI, S. 1999/2000. <i>Surveys and Monitoring of Dracaena cinnabari</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. The Italian PhD student Serene Petroncini worked with the EPA team to conduct a detailed assessment of the status of the population of the Dragon Blood tree (<i>Dracaena Cinnabari</i>), adapting the methodology developed by the Royal Botanic gardens of Edinburgh. The report outlines also the preliminary results of lab germination tests conducted for Dragon blood's seeds.
2000	ROYAL BOTANIC GARDENS. 2000. <i>Conservation and Sustainable use of the Biodiversity of Socotra Archipelago (Final Report: Target Areas)</i> . Unpublished Report, SCDP/EPA, Sana'a, Yemen. This is the final report produced by the Royal Botanical Gardens of Edinburgh as a result of their survey work in the island conducted with EPA in the framework of the UNDP-GEF Biodiversity project. It contains detailed description and mapping of the archipelago's vegetation, taxonomic review and updated list of plant species, detailed description of the permanent vegetation monitoring programme set-up in the island using 360° photos and standard methodology that can be repeated by the EPA team in the island.
2000	EVANS, M.I. 2000. <i>Royal Botanic Gardens of Edinburgh, UK. Multidisciplinary expedition final report – zoology</i> . UNDP-GEF-EPA Project YEM/96/G32. Unpublished Report, SCDP/EPA, Sana'a, Yemen. This reports was edited by M. Evans and summarises the preliminary findings of zoological surveys focusing mostly on birds, reptiles and some groups of invertebrates. The report includes preliminary list of animal species recorded in the archipelago. However, due to the fact that a great proportion of the species recorded during the surveys were new to science, the scientific results of the surveys have mostly been published later as scientific articles with detailed species descriptions (see "Fauna of Aarabia" Vols 19 and 20).

- 2000 SENKENBERG RESEARCH INSTITUTE. 2000a. *Marine Habitat, Biodiversity and Fisheries Surveys and Management (Report of Phase II)*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The report outlines the findings and recommendations of the second phase of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
- 2000 SENKENBERG RESEARCH INSTITUTE. 2000b. *Marine Habitat, Biodiversity and Fisheries Surveys and Management (Progress Report of Phase III)*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The report outlines the findings and recommendations of the final phase of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
- 2001 SENKENBERG RESEARCH INSTITUTE. 2001. *Marine Habitat, Biodiversity and Fisheries Surveys and Management (Final Report)*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The report outlines the proposal for a comprehensive Fisheries Management Plan for the Socotra Island Group. It forms integral part and builds upon the findings and recommendations of the final phases of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project.
- 2001 WS ATKINS INTERNATIONAL. 2001. *Socotra Archipelago Master Plan (SAMP). Phase I final reports*. EU Project YEM/B7-3000/IB97/0787. Sana'a, Yemen.
This report was produced as a first result of a major project sponsored by the EU and Government of Yemen (through the EPA). It contains a detailed and quantified assessment and mapping of the situation in the archipelago in all key development sectors, including: local governance, agriculture and livestock, tourism potential, socio-economic development, health, education, infrastructure and utilities, and fisheries. The report provides a comprehensive and updated picture of the development context of the island in all above fields, and it is developed on the basis of the archipelago's Conservation Zoning Plan (presidential decree 275, 2000). A list and brief description of 76 proposed development projects is provided.
- 2002 CHRISTIE, S. ET AL. 2002. *An Ecological Survey of Aloe perryi on Socotra island*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The report outlines the conservation status, traditional uses and conservation issues of this important succulent species of potentially significant development potential for the islanders.
- 2002 WS ATKINS INTERNATIONAL. 2002. *Socotra Archipelago Master Plan (SAMP). Phase II final reports*. EU Project YEM/B7-3000/IB97/0787. Sana'a, Yemen.
These reports were produced as a final result of a major project sponsored by the EU and Government of Yemen (through the EPA). It contains a detailed and quantified description of six proposed priority development projects for the archipelago, focusing on key development sectors: including: local governance, agriculture and livestock, tourism, roads, and fisheries. The report provides a comprehensive and updated evaluation of development options in the above fields, and it is developed on the basis of the archipelago's Conservation Zoning Plan (presidential decree 275, 2000). The report does also contain a series of maps summarizing key findings of the masterplan (i.e. population distribution, mapping of health, education and fisheries facilities, proposed roads plan, proposed tourism development plan, topographic map of the island).
- 2003 MACKAY, P. 2003. *Nature-Based Tourism Development Program 2003-2006*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The UNDP short-term consultant Peter Mackay spent four months with the EPA team and the Socotra Ecotourism Society in the island. In this report he outlines the strategy for the nature-based tourism development, that is currently being implemented in the framework of the EPA and SES programmes.
- 2003 ENVIRONMENTAL PROTECTION AUTHORITY. 2003. *Homhil Protected Area – Management Plan (English)*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The first Management Plan for a protected Area produced entirely by the local EPA team with minor external support. It includes a detailed survey of the site, and identification of priority management actions.
- 2003 GOVERNMENT OF YEMEN. 2003. *Socotra Archipelago: UNESCO – MAB Biosphere Reserve Nomination Form*. UNESCO.
The UNESCO MAB nomination file was prepared by the Government of Yemen on the basis of draft produced by the EPA and SCDP team in Socotra, and containing all available and updated information on the wildlife and people of the islands, as of 2002. Socotra was nominated a MAB Reserve by UNESCO in July 2003.

- 2003 UNDP, PROJECT YEM/03/004. 2003. *Sustainable Development and Biodiversity Conservation for the People of Socotra Islands, Yemen: 2003-2008*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
This technical programme support document outlines the general conservation and development strategy for the period 2003-2008 that is being implemented by the EPA in the island.
- 2004 ABDELAZIZ, M. 2003. *Qalansiyah Coastal Road: Socotra Island, Yemen: Environmental Impact Statement*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The first EIA conducted for a road in the island, by an EPA Trainees (Master student in UK). The road project analysed in this report has been subject to intense debate that resulted in the diversion of the road to avoid environmentally sensitive areas in 2003.
- 2004 LEWLLIN, P. AND AL SAGHIR O. 2004. *Training Needs Assessment and Development of a Staff Training Plan*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
A comprehensive account on the current professional capacity and training needs for the EPA team in the island.
- 2004 SCDP/EPA. 2004. *The effects of the Tsunami on Yemen*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
Includes an account of Tsunami-related damage occurred in Socotra in Dec 2004.
- 2004 MILLER, T. AND MORRIS, M. 2004. *The Ethnobotany of Soqatra*, Edinburgh.
This 759 pages fully illustrated volume contains the most comprehensive account on the vegetation of and unique flora of the island, its traditional uses and a fully illustrated plant identification manual. This work represents the results of decades of work conducted by the authors in the island, supported in its final stages by the UNDP-GEF Socotra Biodiversity project and Darwin Initiative. It constitutes a unique and very detailed documentation of traditional plant names, ancient land uses and practices maintained by the population of Socotra until present.
- 2005 SOCOTRA KARST PROJECT. 2005. *Soqatra Karst Project 2000-2004: Speleologische expedities naar het eiland Soqatra, Jemen*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The Socotra Karst project started in 2000 under the leadership of Peter De Geest, who was the first to explore and initiate the mapping of the extensive Karstic system of Socotra, which is now known to be one of the most impressive in the region. The results of the cave explorations are consistently reported and updated on the SKP website <http://www.speleo.be/socotra/>
- 2005 JESSAMINE, J. 2005. *Tourism development in Socotra. WTO (World Tourism Organization)*. Unpublished Report, SCDP/EPA, Sana'a, Yemen.
The report was prepared by WTO (World Tourism Organization) consultant J. Jessamine, who assesses the eco-tourism development potential for Socotra and for Yemen in general and provides most recent data on visitor numbers and facilities.

7.

Documentation

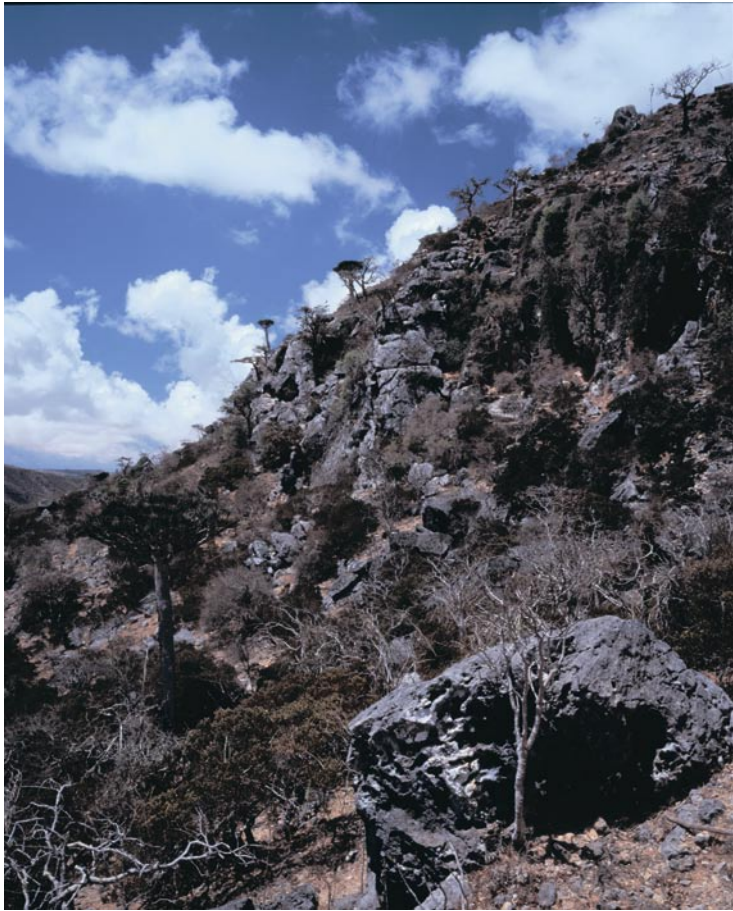
7a. Photographs, slides, image inventory and authorization table and other audiovisual materials

Id. No.	Format	Caption	Date of Photo (mo/yr)	Photographer	Contact Detail	Non exclusive cession of rights
1	Slide	Landscape near Deksam	04/2005	Mario Caruso	Mario Caruso Via Rua S. Antonio, 18 95030 Pedara CT ITA m.caruso@mariocaruso.it Phone: +39 095 7801077 Fax: +39 095 7805467 M. Ph.: +39 338 5975715	YES
2	" "	Wadi Hayaft	" "	" "	" "	" "
3	" "	View of Haggier Mountains	" "	" "	" "	" "
4	" "	Wadi Dahero	" "	" "	" "	" "
5	" "	Landscape near Di-Lishah	" "	" "	" "	" "
6	" "	Socotran Desert Rose <i>Adenium obesum sokotranun</i>	" "	" "	" "	" "
7	" "	Socotran Desert Rose <i>Adenium obesum sokotranun</i>	" "	" "	" "	" "
8	" "	Homil Protected Area	" "	" "	" "	" "
9	" "	Landscape near Hadibo Port	" "	" "	" "	" "
10	" "	Dragon's Blood Trees <i>Dracaena cinnabari</i>	" "	" "	" "	" "
11	" "	Dragon's Blood Tree <i>Dracaena cinnabari</i>	" "	" "	" "	" "
12	" "	Landscape near Di-Hamri Protected Area	" "	" "	" "	" "
13	" "	Di-Hamri Protected Area	" "	" "	" "	" "
14	" "	Qalansiyah lagoon	" "	" "	" "	" "
15	" "	Homil Protected Area	" "	" "	" "	" "

1

Landscape near Deksam

Photo by Mario Caruso



2

Wadi Hayaft

Photo by Mario Caruso





3

View of Haggier Mountains

Photo by Mario Caruso



4

Wadi Dahero

Photo by Mario Caruso

5

Landscape near
Di-Lishah

Photo by Mario Caruso

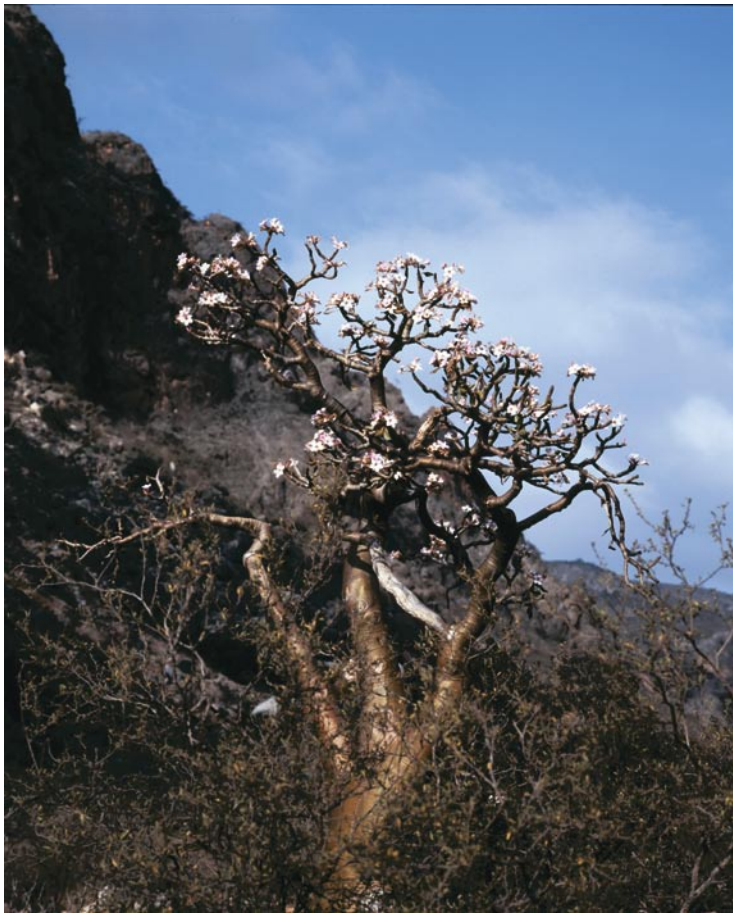


6

Socotran Desert Rose
Adenium obesum sokotranum

Photo by Mario Caruso





7

Socotran Desert Rose
Adenium obesum sokotranum

Photo by Mario Caruso



8

Homil Protected Area

Photo by Mario Caruso

9

Landscape near
Hadibo Port

Photo by Mario Caruso



10

Dragon's Blood Trees
Dracaena cinnabari

Photo by Mario Caruso





11

Dragon's Blood Tree

Dracaena cinnabari

Photo by Mario Caruso



12

Landscape near
Di-Hamri Protected
Area

Photo by Mario Caruso

13

Di-Hamri Protected
Area

Photo by Mario Caruso



14

Qalansiyah lagoon

Photo by Mario Caruso





15

Homil Protected Area

Photo by Mario Caruso



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Pedara - CT - ITA, January 9th 2006

7b. Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

The Conservation Zoning Plan for the Socotra Presidential Decree 275 of year 2000

THE REPUBLIC OF YEMEN
PRESIDENTIAL DECREE
NUMBER 275 OF YEAR 2000

Regarding the conservation zoning plan for Socotra Islands (Socotra, Samha, Darsa, Abd Al-Kuri and the associated small islands, rocks and rock outcrops) into areas for conservation and development.

DECREE

PART ONE

Names and Definitions

Article (1)

This decree is called the conservation zoning plan for Socotra islands (Socotra, Samha,, Darsa, Abd Al-Kori, and the associated small islands, rocks and rock outcrops) into areas for conservation and development.

Article (2)

For the purpose of executing this law, the following words and phrases are assigned the meanings indicated in front of each of them unless otherwise expressed by the text:

The republic: The Yemeni Republic

The responsible authority: ministries or departments or public institutions and Environment Protection Council

The council: The Environment Protection Council

Socotra islands: Socotra group of islands including the islands of Socotra, Samha, Darsa, Abd Al-Kori, and the associated small islands, rocks and rock outcrops

Resource Use Reserve: An area managed to ensure long-term protection of the unique biological diversity of Socotra islands while providing, at the same time a sustainable flow of natural products and services to meet community needs and appropriate development activities.

General Use Zone: it is located within the resource use reserve and includes sites where a significant level of habitat modification has occurred and is designated for appropriate general development purposes.

National Park: natural areas of land or sea designated to protect the ecological integrity of the unique ecosystems of Socotra islands for present and future generations to provide a foundation for scientific, educational, and recreational opportunities, beside the appropriate development activities for ecotourism.

Nature Sanctuaries: these are areas of land or sea characterized by rare plant or animal species still retaining their natural character set aside for scientific research.

PART TWO

Objectives

Article (3)

The purpose of this law is to fulfil the following objectives:

1. Protect the biodiversity of Socotra islands.
2. Achieve a balance between the population needs in development and the available natural resources such that they are not negatively impacted.
3. Preserve the traditional practices in management of natural resources.
4. Protect the nature sanctuaries of national and international importance in Socotra islands.
5. Protect the genetic material of rare and endemic species in Socotra islands.
6. Exercise a sound environmental management in these areas to protect natural resources from negative impact of development activities.

PART THREE

The Zoning of Socotra Islands

Article (4)

Socotra islands are divided into three main areas as follows:

First:

(a) Resource Use Reserve

The objectives of these areas are as follows:

- To protect and maintain the unique biological diversity of Socotra islands, as well as other natural, cultural and landscape values of the area in the long term.
- To maintain and, where appropriate, enhance the existing traditional management practices for the sustainable use of natural resources.
- To protect the natural resource base from being alienated for other land and resource use purposes and other development activities.

Areas:

- Approximate Total Area Covered (terrestrial): 890 km²
- Percentage of Total Land Area: 23.5%
- Approximate Total Area Covered (marine): 16498 km²

(b) General Use Zone:

The objectives of these areas are as follows:

To allow for the development of essential infrastructure required to improve the standard of living of the local community (i.e. roads, power lines, and commercial development) to minimize negative impact on the environment to an acceptable level.

Areas:

- Approximate total area covered (terrestrial): 55 km²
- Percentage of Resource Use Reserve (terrestrial): 6.14%
- Percentage of total land area: 1.4%
- Approximate total area covered (marine): 1 km²

Second: National Parks

The objectives of these areas are as follows:

- To protect the unique natural habitats and landscapes of Socotra islands, which are of high national and international significance for scientific, educational, recreational or ecotourism development purposes.
- To perpetuate representative examples of the unique biotic communities, genetic resources, and endemic species, found in the Socotra islands, and maintain biodiversity.
- To manage these areas in a sound environmental manner for educational, cultural and recreational purposes.

Areas:

- Approximate total area covered (terrestrial): 2748 km²
- Percentage of total land area: 72.6%
- Approximate total area covered (marine): 1514 km²

Third: Nature Sanctuary

The objectives of these areas are:

- To preserve rare and fragile habitats, ecosystems, species and unique landscapes in as undisturbed a state as possible.
- To maintain the essential natural attributes and qualities of the environment over the long term for future generations.

Areas:

- Approximate total area covered (terrestrial): 95 km²
- Percentage of total land area: 2.5%
- Approximate total area covered (marine): 154 km²

Article (5)

The boundaries of the areas in article (4) of this law are determined according to the following attached maps:

- (a) Map number (1) of the terrestrial protected areas in Socotra islands.
- (b) Map number (2) of the marine protected areas in Socotra islands.

PART FOUR

Management and Implementation

Article (6)

Environment Protection Council and the Ministry of Construction and Housing and Urban Planning oversee the implementation of the conservation zoning plan for primary and secondary areas included in this law and send regular periodical reports to the Council of Ministers on the achieved results.

Article (7)

The Environment Protection Council and the responsible authorities must develop plans and guidelines necessary to manage these areas and organize activities within them each within its jurisdiction according to the provisions of this law.

Article (8)

Travel to and from the Socotra islands should be regulated according to the capacity of these islands.

PART FIVE

Concluding Provisions

Article (9)

Every citizen or any person is prohibited from hunting with firearms or any other means without permit from the responsible authorities; or cause any harm to the environment in the areas determined by this law according to the attached maps.

Article (10)

Importing seeds, seedlings, pesticides or fertilizers into the Socotra islands is prohibited unless the responsible authorities have conducted the necessary analysis and examination and issued permits in coordination with the council.

Article (11)

It is prohibited to import qat seedlings to cultivate in all parts of Socotra islands.

Article (12)

Socotra conservation zoning plan becomes part of the master plan for the development of Socotra islands under preparation.

Article (13)

New protected areas can be declared, or the borders of existing ones be expanded, by a decree from the Council of Ministers as needed for environmental management

and development, on a recommendation from the Environment Protection Council.

Article (14)

All ministries, departments, public and private institutions must conduct an environmental impact assessment for all projects and activities they implement or supervise their implementation according to environment protection act number (26) for the year 1995.

Article (15)

The government should provide sufficient financial resources to allow the implementation of the plan and fulfil the objectives of this law within the budget of the council.

Article (16)

The council will issue the necessary regulations to implement this law in coordination with the responsible authorities.

Article (17)

All ministries and institutions involved in the development of Socotra islands adhere to the implementation of the conservation zoning plan each in their areas of specialization.

Article (18)

All ministries and concerned institutions develop plans and programs for the development of Socotra islands according to the conservation zoning plan.

Article (19)

The conservation zoning plan is the prerequisite for the declaration of Socotra islands as a biosphere reserve.

Article (20)

Socotra conservation zoning plan is part of the master plan for the social and economic development of Socotra islands.

Article (21)

This law goes into effect starting on 18/4/2000 and be published on the official paper.

Issued at the presidency in Sana'a

Date: 29 Jumada Thani /1421, 28 September 2000

Ali Abd-Allah Salih
The President

Dr. Abd Al-Karim Al-Iriany
The Prime Minister

7c. Form and date of most recent records or inventory of property

The most recent records and inventory of the biodiversity of the archipelago are summarised in a series of unpublished reports by the Environment Protection Authority and Socotra Conservation and Development Programme, as well as in authoritative international scientific publications. A list of key documentation is provided below, in reverse chronological order:

INVENTORY OF TERRESTRIAL HABITATS

Date	Title
2005	SOCOTRA KARST PROJECT, 2005. <i>Socotra Karst Project 2000-2004: Speleologische expedities naar het eiland Soqatra, Jemen</i>. Unpublished Report, SCDP/EPA, Sana'a, Yemen. The Socotra Karst project started in 2000 under the leadership of Peter De Geest, who was the first to explore and initiate the mapping of the extensive Karstic system of Socotra, which is now known to be one of the most impressive in the region. The results of the cave explorations are consistently
2004	MILLER, T. AND MORRIS, M., 2004. <i>The Ethnobotany of the Socotra Archipelago</i>. Royal Botanic Garden of Edinburgh. This 759 pages fully illustrated volume contains the most comprehensive account on the vegetation of and unique flora of the island, its traditional uses and a fully illustrated plant identification manual. This work represents the results of decades of work conducted by the authors in the island, supported in its final stages by the UNDP-GEF Socotra Biodiversity project and Darwin Initiative. It constitutes a unique and very detailed documentation of traditional plant names, ancient land uses and practices maintained by the population of Socotra until present.
2004	A.A.V.V. "Fauna of Arabia" Vol 20 This 548 pages fully illustrated volume is entirely dedicated to Socotra, and contains 25 scientific articles with the findings of recent studies on the terrestrial and marine fauna of the island, resulting from several expeditions conducted mostly in the framework of the UNDP-GEF Socotra Biodiversity Project.
2002	CHRISTIE, S. ET AL., 2002. <i>An Ecological Survey of Aloe perryi on Socotra island</i>. Unpublished Report, SCDP/EPA, Sana'a, Yemen. The report outlines the conservation status, traditional uses and conservation issues of this important succulent species of potentially significant development potential for the islanders.
2000	ROYAL BOTANIC GARDENS., 2000. <i>Conservation and Sustainable use of the Biodiversity of Socotra Archipelago (Final Report: Target Areas)</i>. Unpublished Report, SCDP/EPA, Sana'a, Yemen. This is the final report produced by the Royal Botanical Gardens of Edinburgh as a result of their survey work in the island conducted with EPA in the framework of the UNDP-GEF Biodiversity project. It contains detailed description and mapping of the archipelago's vegetation, taxonomic review and updated list of plant species, detailed description of the permanent vegetation monitoring programme set-up in the island using 360° photos and standard methodology that can be repeated by the EPA team in the island.
2000	EVANS, M.I., 2000. <i>Royal Botanic Gardens of Edinburgh, UK. Multidisciplinary expedition final report – zoology</i>. UNDP-GEF-EPA Project YEM/96?G32 Unpublished Report. Sana'a, Yemen. This reports was edited by M. Evans and summarises the preliminary findings of zoological surveys focusing mostly on birds, reptiles and some groups of invertebrates. the report includes preliminary list of animal species recorded in the archipelago. However, due to the fact that a great proportion of the species recorded during the surveys were new to science, the scientific results of the surveys have mostly been published later as scientific articles with detailed species descriptions (see "Fauna of Aarabia" Vols 19 and 20).
1999/2000	PETRONCINI, S., 1999/2000. <i>Surveys and Monitoring of Dracaena cinnabari</i>. Unpublished Report, SCDP/EPA, Sana'a, Yemen. The Italian PhD student Serene Petroncini worked with the EPA team to conduct a detailed assessment of the status of the population of the Dragon Blood tree (<i>Dracaena Cinnabari</i>), adapting the methodology developed by the Royal Botanic gardens of Edinburgh. The report outlines also the preliminary lab germination tests conducted for Dragon blood's seeds.

INVENTORY OF MARINE HABITATS

Date	Title
2004	A.A.V.V. “Fauna of Arabia” Vol 20 This 548 pages fully illustrated volume is entirely dedicated to Socotra, and contains 25 scientific articles with the findings of recent studies on the terrestrial and marine fauna of the island, including the description of marine biotopes, resulting from several expeditions conducted mostly in the framework of the UNDP-GEF Socotra Biodiversity Project.
2000	SENKENBERG RESEARCH INSTITUTE, 2000b. <i>Marine Habitat, Biodiversity and Fisheries Surveys and Management (Progress Report of Phase III)</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. The report outlines the findings and recommendations of the final phase of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
2000	SENKENBERG RESEARCH INSTITUTE, 2000a. <i>Marine Habitat, Biodiversity and Fisheries Surveys and Management (Progress Report of Phase II)</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. The report outlines the findings and recommendations of the second phase of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
1999	SENKENBERG RESEARCH INSTITUTE, 1999b. <i>Marine Habitat, Biodiversity and Fisheries Surveys and Management (Progress Report of Phase I)</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. The report outlines the findings and recommendations of a wide range of marine biodiversity conservation activities conducted by the Senkenberg Institute (Frankfurt, Germany) in collaboration with the EPA as well as national and international scientists, with funding from the UNDP-GEF Project. These include i.e.: baseline survey of coral distribution and reef fish diversity, establishment of the permanent underwater monitoring transects, mapping of tidal and sub-tidal habitats, sea turtles monitoring programme, fisheries development studies, and training on marine biodiversity conservation and fisheries improvement, etc.
1999	SENKENBERG RESEARCH INSTITUTE, 1999a. <i>Marine Biotopes Classification Manual</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. Developed by the Senkenberg research Institute (Frankfurt, Germany) in collaboration with the EPA and with funding from the UNDP-GEF Socotra Biodiversity Project. The manual contains detailed mapping and description of marine biotopes of the entire archipelago developed with a combination of remote sensing and underwater survey techniques. Methodology and results have recently been published in Vol. 20 of “Fauna of Arabia” (see also below)

INVENTORY OF DEVELOPMENT PARAMETERS

Date	Title
2005	JESSAMINE, J., 2005. <i>Tourism development in Socotra</i>. WTO (World Tourism Organization). Unpublished Report, SCDP/EPA, Sana’a, Yemen. This report provides the most updated picture of the tourism development context in the island, providing recent visitor numbers, assessment of present and likely impacts, and priority actions.
2003	GOVERNMENT OF YEMEN, 2003. <i>Socotra Archipelago: UNESCO – MAB Biosphere Reserve Nomination Form</i>. UNESCO. The UNESCO MAB nomination file was prepared by the Government of Yemen on the basis of draft produced by the EPA and SCDP team in Socotra, and containing all available and updated information on the wildlife and people of the islands, as of 2002. UNESCO nominated Socotra a MAB Reserve in July 2003.
2003	MACKAY, P., 2003. <i>Nature-Based Tourism Development Program 2003-2006</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. The UNDP short-term consultant Peter Mackay spent four months with the EPA team and the Socotra Ecotourism Society in the island. In this report he outlines the strategy for the nature-based tourism development that is currently being implemented in the framework of the EPA and SES programmes.
2003	ENVIRONMENTAL PROTECTION AUTHORITY, 2003. <i>Homhil Protected Area – Management Plan (English)</i>. Unpublished Report, SCDP/EPA, Sana’a, Yemen. The first Management Plans for Protected Areas produced entirely by the local EPA team with minor external support. They include a detailed wildlife inventory of the sites, and identification of priority

management actions.

- 2002** **WS ATKINS INTERNATIONAL, 2002. *Socotra Archipelago Master Plan (SAMP). Phase II final reports.* EU Project YEM/B7-3000/IB97/0787. Sana'a, Yemen.**
 These reports were produced as a final result of a major project sponsored by the EU and Government of Yemen (through the EPA). It contains a detailed and quantified description of six proposed priority development projects for the archipelago, focusing on key development sectors: including: local governance, agriculture and livestock, tourism, roads, and fisheries. The report provides a comprehensive and updated evaluation of development options in the above fields, and it is developed on the basis of the archipelago's Conservation Zoning Plan (presidential decree 275, 2000). The report does also contain a series of maps summarizing key findings of the masterplan (i.e. population distribution, mapping of health, education and fisheries facilities, proposed roads plan, propose tourism development plan, topographic map of the island).
- 2001** **WS ATKINS INTERNATIONAL, 2001. *Socotra Archipelago Master Plan (SAMP). Phase I final reports.* EU Project YEM/B7-3000/IB97/0787. Sana'a, Yemen.**
 This report was produced as a first result of a major project sponsored by the EU and Government of Yemen (through the EPA). It contains a detailed and quantified assessment and mapping of the situation in the archipelago in all key development sectors, including: local governance, agriculture and livestock, tourism potential, socio-economic development, health, education, infrastructure and utilities, and fisheries. The report provides a comprehensive and updated picture of the development context of the island in all above fields, and it is developed on the basis of the archipelago's Conservation Zoning Plan (presidential decree 275, 2000). A list and brief description of 76 proposed development projects is provided.

7d. Address where inventory, records and archives are held

All inventory and records, herbarium, specimens' collection and Geographical Information System maps are held at the offices and library of the Environmental Protection Authority in Hadibu, Socotra, Yemen.

The coordination office of the EPA/Socotra Conservation and Development Programme (SCDP) in the capital Sana'a (Yemen), also holds copy of most recent records and reports. For up to date contacts and address: www.socotraisland.org

Most Important original records of the Flora and Fauna of the archipelago are also held at:

- Royal Botanic Gardens of Edinburgh, UK (flora)
- Senkenberg Museum, Germany (marine life)

Various other research institutes and universities in Europe contain specialistic collections of selected taxonomic zoological groups (mostly invertebrates). These include:

- Rostok University, Germany
- La Specola Museum, Florence, Italy
- University of Prague, Czech Republic

7e. Bibliography

A complete bibliography on Socotra, was recently published by the Royal Botanic Gardens of Edinburgh, (lead authors M. Gwyne) in the framework of the GEF Socotra Biodiversity Project and Darwin Initiative. The Bibliography (115pp, 681 records), was pulished in 2001, and therefore does not contain most recent scientific publications, which have added significantly to the amount of knowledge on the archipelago. However it represents a comprehensive account on all publications concerning the island, and it includes the following main sections (a full version of the Bibliography is provided in Annex A.16)

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8c. Other Local Institutions

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Ministry of Tourism (MOT)

Yemen Tourism Promotion Board (YTPB),

General Tourism Development Authority (GTDA)

Island Promotion and Development Authority (IPDA)

Governorate of Hadramawt (GOH)

District Governments of Hadibu and Qalansiya

Socotra Conservation Fund (SC)

Socotra Ecotourism Society (SES)

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9.

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on behalf
of the
State Party

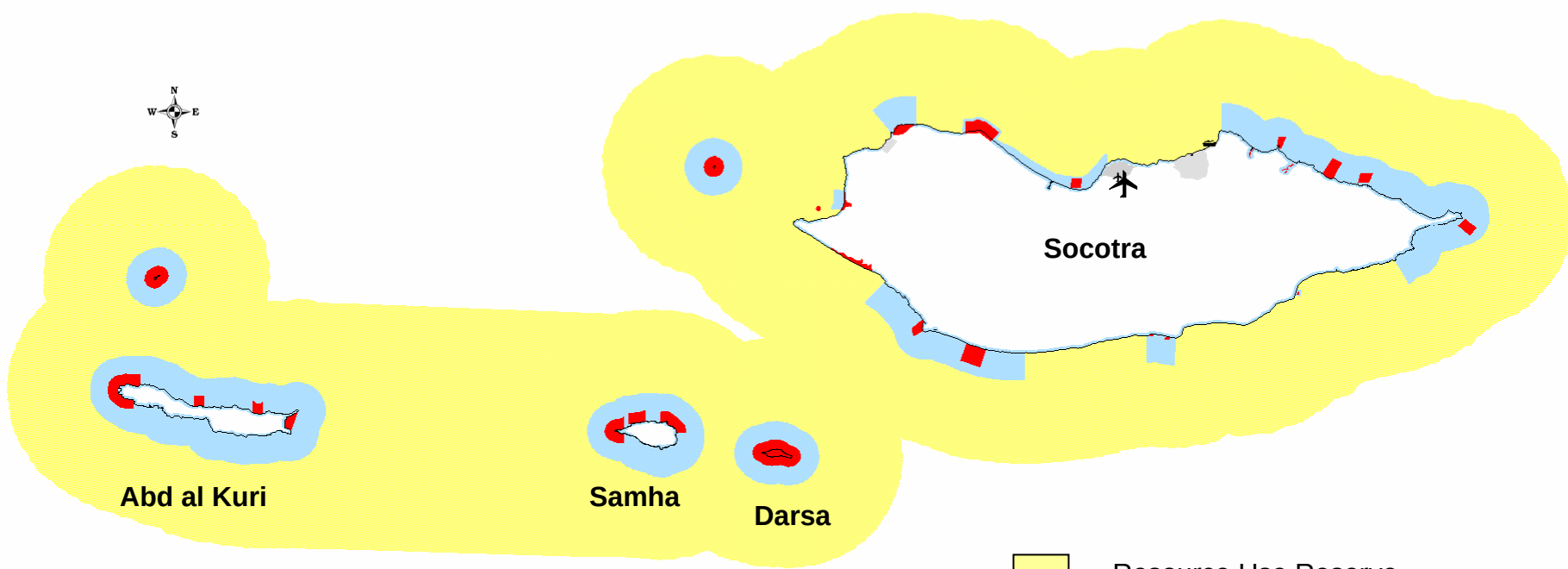
List of annexes available in PDF format in the CD-ROM

- A.1** Letter form the Ministry of Land
April 23rd 2005
- A.2** Environment Protection Law
No. 26 of 1995
- A.3** Socotra Archipelago Master Plan - Projects No. 1, 2, 5, 6
April 2001
- A.4** SRI Final Reposrt Phase III
Marine habitat, Biodiversity and fisheries surveys and management
July 2002
- A.5** Biotope manual
Sublittoral and littoral biotope manual for the Socotra Archipelago
July 2002
- A.6** Man and biosphere reserve - Nomination File
- A.7** The Socotra Island Nature-based Tourism Development Programme
- A.8** Zoning Plan - Terrestrial and Marine Protected Areas
- A.9** Endemic Taxa
- A.10** Solid Waste Management Project
June 2004
- A.11** Management Plan - 2003-2008
- A.12** SCDP - Progress Report
May 2003
- A.13** SCDP - Final Report
December 2003
- A.14** SCDP (second phase) - 1st Progress Report
July 2004
- A.15** The Birds and Plants of Socotra - by Kenobi Productions
May 1999
- A.16** Annex A.16 - Socotra Bibliography
by the Royal Botanic Gardens Edinburgh



ANNEXES

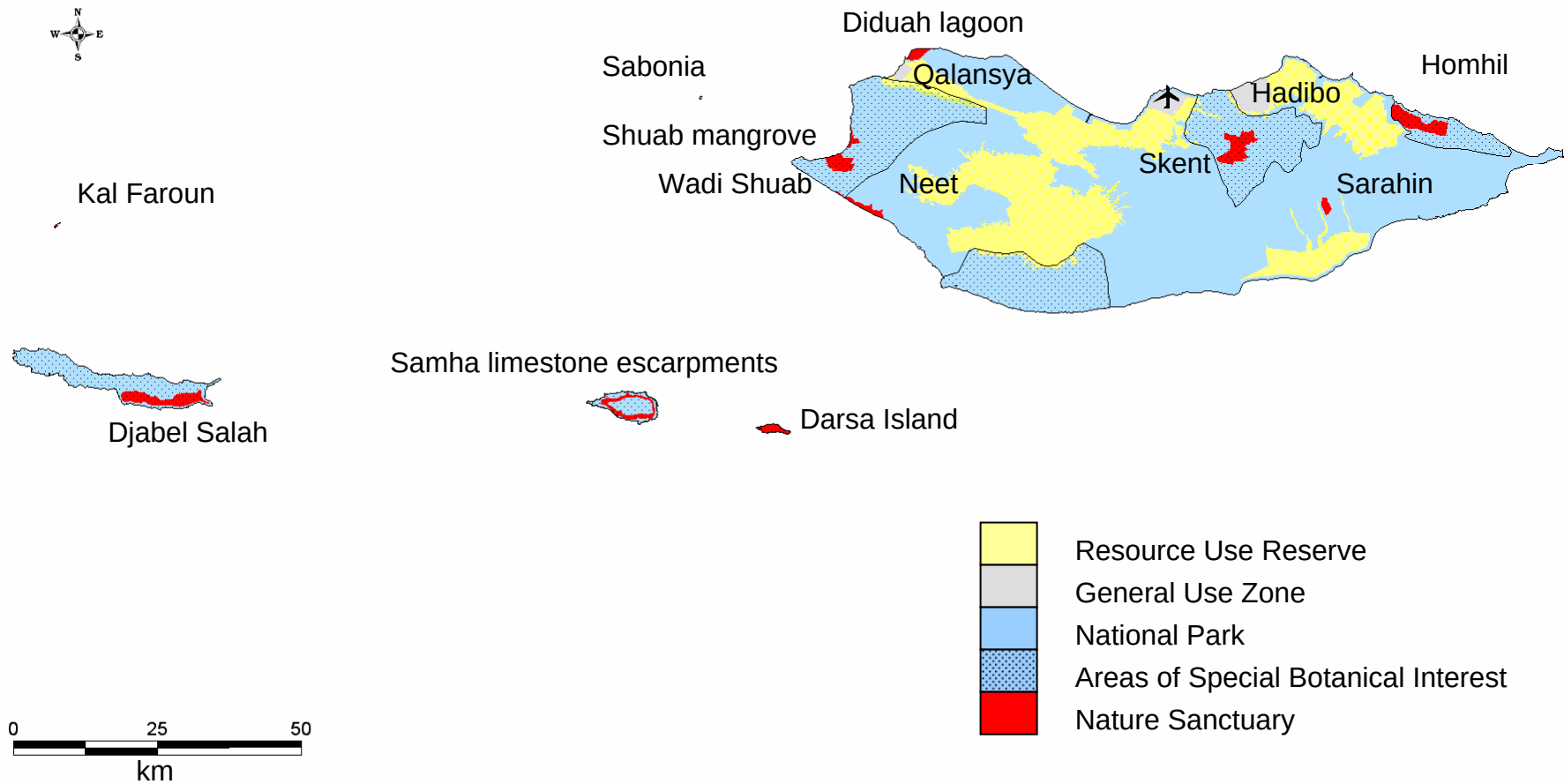
Marine Conservation Zoning Plan for the Socotra Archipelago



- Resource Use Reserve
- General Use Zone
- National Park
- Nature Sanctuary

0 20 40
km

Terrestrial Conservation Zoning Plan for the Socotra Archipelago



Important Birds Areas

Socotra Archipelago contains 22 important bird areas (IBAs).

IBA name	Coordinates	Selection Criteria
Qalansia Lagoon	N 12.42 E 53.30	4
Jabal Ma'al escarpement	N12.38 E53.29	5
Ras Hebag	N12.39 E53.58	4
Airoport Dunes	N12.37 E53.58	1,4
Maqadirhon Pass	N12.37 E53.01	5
Shidahan	N12.37 E53.09	4
Wadi Ayhaft	N12.37 E53.59	4
Rewgid & Regid Plateaux	N12.36 E53.59	5
Rookib Hills	N12.36 E54.06	4
Jabel Jef	N12.36 E54.09	4
Hamaderon Plateaux	N12.36 E54.17	4
Coast of Bindar Dish'ab	N12.35 E54.23	5
Hajihir mountains	N12.34 E54.03	1,3,4
Firijih / Central Socotra	N12.32 E54.05	5
Di-ishal Foothills	N12.31 E54.10	4
Diksam	N12.30 E54.00	5
Ras Momi & Fikah	N12.32 E54.29	3,4
Firminhin Nr Jabal Keselah	N12.33 E54.03	5
Noged Plains	N12.19 E53.53	1,4
Sabuniyah & Ka'l Farawn	N12.33 E52.42	2,3,4
Abdel kuri	N12.11 E53.13	4
Al-Ikhwani	N12.08 E53.09	3,4,5

Criteria

- 1- Regularly holds a significant number of globally threatened species
- 2- Regularly holds 1% or more of a species biographical or flyway, or Middle Eastern Population (Water birds and seabirds only)
- 3- Regularly holds a significant number of a species, which is threatened of declining in the Middle East.
- 4- Regularly holds a significant number of a species whose world population is wholly or largely restricted to the Middle East.
- 5- Selected for other reasons(e.g breeding seabirds, unique habitats etc).

List of endemic birds species

Socotra is a home of 6 endemic birds species and 11 endemic birds sub-species not found else in the world.

List of the six endemic birds species:

Socotra Cisticola	(<i>Cisticola haesitatus</i>)
Socotra Sunbird	(<i>Nectarina Balfouri</i>)
Socotra Warblar	(<i>Incana incana</i>)
Socotra Bunting	(<i>Emberiza socotrana</i>)
Socotra Sparrow	(<i>Passer insularis</i>)
Socotra starling	(<i>Onychgnathus socotranus</i>)

List of the eleven endemic birds sub-species:

Long-billed Pipit	(<i>Anthus similis</i>)
White-breasted White-eye	(<i>Zosterops abyssinicus</i>)
Golden-winged Gross-beak	(<i>Rhynchostruthus Socotranus</i>)
Socotra Buzzard	(<i>Buteo buteo</i>)
Kestrel	
African Scops Owl	
Nubian Nightjar	
Black-crowned Finch Lark	
Great Grey Shrike	
Osprey	

Checklist of important plant species

Table comparing the application of IUCN status using current (1994) version and changes proposed in 2000

<i>IUCN Status</i>	<i>1994 Verson</i>	<i>2000 Review</i>
Extinct	0	0
Critically Endangered (CR)	4	4
Endangered (EN)	15	15
Vulnerable (VU)	203	138
Near Threatened (NT)	8	8
Least Concern (LC)	44	111
Data Deficient (DD)	23	23

Table of threatened IUCN Threatened status of all endemic taxa

IUCN Category for Socotran Endemic Plant Taxa	IUCN Status
Total	
Acacia pennivenia Schweinf.	NT
Acridocarpus socotranus subs. Sokotranum. Lavranos	LC
Aerva microphylla Moq	LC
Aerva revoluta Balf.f.	LC
Aerva forbesii Balf.f	LC
Aloe perryi Baker	NT
Aloe squarrosa Balf.f	NT
Andropogon bentii Balf.f	EN C2a
Angkalanthus	DD

oligophylla Balf.f	
Anisotes diversifolius Balf.f.	EN C2a
Anthericum graptophyllum Baker	VU D2
Aristida anaclasta Balf.f	DD
Asplenium schweinfurthii Baker	VU D2
Babiana socotrana Balf.f.	LC
Ballochia amoena Balf.f	LC
Ballochia altro-virgata	DD
Ballochia rotundifolia	DD
Barleria argentea Balf.f.	DD
Barleria popovii Verdc.	EN C2a
Barleria Tetracantha Balf.f.	DD
Begonia samhanensis	VU B1 2c

ined.	
Begonia socotrana Hook.f.	LC
Boswellia ameero balf.f.	VU B1 2c
Boswellia bullata Thulin ined.	VU D2
Boswellia discorides Thulin ined.	VU D2
Boswellia elongata Balf.f.	VU B1 2c
Boswellia nana Hepper	VU D2
Boswellia popoviana Hepper	VU D2
Boswellia socotrana Balf.f	VU D2
Cadaba sp.nov (Zahr & Killesen)	CR B1 2c, D
Campanulla balfouri Wargner & Vierh	LC
Carphalea abovata (Balf.f)	LC
Cephalocroton socotranus balf.f.	VU D2
Chapmannia gracilis (Balf.f) Thulin ined.	VU D2
Capmannia reghidensis Thulin & McKean ined	VU D2
Chapmannia sericea Thulin 6 McKean	VU D2
Chapmannia tinireana Thulin ined	VU D2
Chrisochora tirineana Thulin ined	VU D2
Chrisochora minor (Balf.f)	VU D2
Chrisochora stricta (Balf.f)	VU D2
Cissus hamaderoensis Radcl-Sm	LC
Cissus paniculata	LC
Cissus subaphylla	LC
Cleoma socotrana balf.f.	LC
Clerodendrum galeatum balf.f.	VU D2
Clerodendron leucophloeum Balf.f.	VU D2
Coelocarpum haggierensis A.G Mill ined.	VU D2
Coelocarpum	LC

socotranum Balf.f.	
Commicapus heimerii (Vierh.)	LC
Commicarpus simonyi (heimerl. & Vierh Meickle)	LC
Commiphora ornifolia (Balf.f.)	NT
Commiphora parvifolia (Balf.f.)	NT
Commiphora planifrons (Balf.f.)	VU D2
Commiphora socotrana (Balf.f.)	NT
Convolvulus grantii Balf.f.	VU D2
Convolvulus sarmentosus Balf.f.	LC
Crochus erodiodes Balf.f.	LC
Crinum balfouri balker	DD
Crotalaria socotrana (Balf.f)	VU D2
Crotalaria strigulosa Balf.f.	LC
Croton elaeagnoides balf.f.	DD
Croton socotranus Balf.f.	VU D2
Croton sarcocarpus balf.f.	LC
Croton sulcifructus Balf.f	VU D2
Curroria macrophylla radcl.sm	VU D2
Curroria sp.nov (abdelkuri)	EN B1 2a C2b
Cuscuta kuriensis Vierh	VU D2
Cynanchum linifolium (Balf.f.)	LC
Cystostemon socotranua balf.f.	LC
Dactyloctenium hackelii	DD
Dendrosicyous socotrana balf.f.	VU B1 2C ,e
Dichrostachys dehiscens balf.f.	VU D2
Dicliptera effusa Balf.f	LC
Docioma cana balf.f	LC
Dioscorea lanata Balf.f	LC

Dipcadi guichardii Radcl-Sm	VU D2
Dirachma socotrana Schweinf	VU D2
Distephanus sp	VU B1 2c
Dorstenia gigas Schweinf	LC
Dorstenia socotrana A.G Mill	LC
Draceana cinnabari Balf.f.	VU D2
Marsdenia robusta Balf.f.	VU B1 2°,C
Drimia porphyrostachys baker	VU D2
Duvaliandra dioscoridi (lavranos)	DD
Dyerophytum pendulum (balf,f) Kuntze	CR D
Dyerothytum socotrana J.R Edm	VU D2
Echidnopsis insularis Lavranos	VU D2
Chidnopsis sp.nov (hagg)	VU D2
Echidnopsis nov.(J.maalih)	VU D2
Echidnopsis Nov. (Wadi Ayek)	VU D2
Ectadiopsis brevifolia Balf.f.	VU D2
Erythroxyllum socotranum Thulin	VU D2
Euphorbia abdelkuri Balf.f	EN B1 2° C2b
Euphorbia arbuscula Balf.f.	NT
Euphorbia hajhiresisi Vierh	VU D2
Euphorbia kuriensisi Vierh	VU D2
Euphorbia leptoclada Balf.f.	VU D2
Euphorbia oblanceolata Balf.f.	VU D2
Euphorbia spiralis balf.f	VU D2
Eureiandra balfouri balf.f.	VU D2
Exacum affine balf.f.	VU D2
Exacum caeruleum	VU D2

balf.f.	
Exacum gracilepes Balf.f.	DD
Exacum socotranum Balf.f.	VU D2
Farsetia socotrana B.L Burt	EN B1 2c
Farsettia sp.nov	VU D2
Gaillonia peburela Balf.f.	LC
Gaillonia putorioides (A.R Smith)	VU D2
Gaillonia thymoides Balf.f	VU D2
Gaillonia tinctoria Balf.f	VU D2
Umbellieria genus Nova	VU D2
Gnidia socotrana (Balf.f.)	LC
Graderia fruticosa Balf.f	VU D2
Grewia turbinata Balf.f.	VU D2
Gymnocarpus bracteatus (Balf.f)	VU D2
Gymnocarpus kuriensis	VU D2
Haya abovata Balf.f	LC
Helichrysum acuculare Balf.f.	LC
Helichrysum arachnoids Balf.f	LC
Helichrysum balfouri Vierh.	LC
Helichrysum nimmoanum Oliv & Hiern	VU D2
Helichrysum paulayanum Vierh.	LC
Helichrysum rosulatum Oliv.& Hiern.	VU D2
Helichrysum sp.nov A	VU D2
Helichrysum sp.Nov. aff.aciculare (Samha)	ENC 2b
Helichrysum sp.nov. (Nogad)	VU D2
Helichrysum sphaerocephalum Balf.f	LC
Helichrysum suffruticosum Balf.	LC
Heliotropium cimalense Vierh	DD
Heliotropium dentatum Balf.f	ENB1 2c

Heliotropium kuriense Vierh.	VU D2
Heliotropium nigricans Balf.f.	EN B1 2b,c
Heliotropium odorum Balf.f.	LC
Heliotropium paulayanum Vierh	VU D2
Heliotropium riebeckii Schweinf. & Vierh	VU D2
Heliotropium shoabense Vierh.	DD
Heliotropium socotranum Vierh.	LC
Heliotropium sp.nov.	VU D2
Heliotropium wagneri Vierh.	VU D2
Hemicrambe towsendii Gomez Pompa.	VU D2
Hibiscus hopmhilensis ined.	VU D2
Hibiscus macropodos wagner & Vierh	LC
Hibiscus malacophyllus Balf.f.	VU D2
Hibiscus quattenensis ined	LC
Hibiscus scotti Balf.f	VU D2
Hibiscus stenanthus Balf.f	LC
Hirshfeldia rostrata (Balf.f) O.E Schulz	VU D2
Holothrix socotrana Rolfe	LC
Hypericum balfouri N.Robson	VU D2
Hypericum fierense N.Robson	VU D2
Hypericum Kichnense N.Robson	VU D2
Hypericum scopulorum Balf.f	LC
Hypericum socotranum Good subsp. Socotranum	LC
Hypericum tortuosom Balf.f	LC
Indigofera marmorata Balf.f	LC
Indigofera	LC

nephrocarpoides J.B.Gillet	
Indigofera socotrana Vierh	LC
Iphigenia socotrana Thulin	LC
Ischmaeum sp.no	VU D2
Jasminum fluminense Vell.subsp.socotranum	LC
Jatropha unicastata Balf.f	LC
Justicia rigida Balf.f	LC
Justicia sp.nov	VU D2
Kalanchoe farinacea Balf.f	LC
Kalanchoe robusta Balf.f	VU D2
Kickxia kuriensis Radcl.Sm	VU D2
Kleinia scotti (balf.f)	VU D2
Kohautia socotrana (Bremek)	DD
Kraussia socotrana Bremek	VU D2
Kraussia socotrana Bridson	VU D2
Lachnocapsa spathulata Balf.f	VU D2
Launea transulta Bridson	VU D2
Lachnocapsa spathulata balf.f	VU D2
Lannea transulata (balf.f)	VU D2
Launaea crepoides Balf.f	LC
Launea socotrana N.Kilian	LC
Launaea sp.nov	VUD2
Lavandula nimmoi Balf.f	LC
Ledebouria grandifolia (Balf.f)	LC
Ledebouria sp.nov (Samha)	EN B1 C2Bd
Lepturus calcareous	DD
Lepturus pulchellus	DD
Lepturus sp.nov	VU D2
Lepturus tenuis	DD
Leucas flagellifolia (balf.f)	LC
Laucas haggierensis	LC

(Radcl-Sm)	
<i>Leucas kischenensis</i> Miller ined	LC
<i>Leucas penduliflora</i>	VU D2
<i>Leucas</i> sp.nov	VU D2
<i>Leucas spiculifolia</i>	LC
<i>Leucas virgata</i> Balf.f	LC
<i>Limonium sokotranum</i>	LC
<i>Limonium paulayanum</i>	LC
<i>Lindenburgia socotrana</i> Vierh	LC
<i>Lotus moliis</i> Balf.f	VU D2
<i>Lotus ononopsis</i> Balf.f	LC
<i>Lycium sokotranum</i> Wagner & Vierh	LC
<i>Maerua angolensis</i> DC,subsp socotrana	NT
<i>Meineckia filipes</i> (Balf.f)	DD
<i>Melhania miller</i> Abedin	DD
<i>Metaporana obtuse</i> (Balf.f)	VU D2
<i>Micromeria microphylla</i> var.remota Balf.f	LC
<i>Mitolepis arbuscula</i> Radcl-Sm	LC
<i>Mitolepis intricata</i> Balf.f	LC
<i>Neuracanthus aculeatus</i> Balf.f	EN B1 2c
<i>Neuracanthus</i> sp.nov	EN B1 2c
<i>Nirarathamnos</i> asarifolius Balf.f	VU D2
<i>Nirarathamnos</i> sp.nov	VU D2
<i>Oldenlandia aretioides</i> Vierh	VU D2
<i>Oldenlandia balfouri</i> Bremek	DD
<i>Oldenlandia bicornuta</i> (balf.f)	LC
<i>Oldenlandia ocellata</i> (balf.f)	LC
<i>Oldenlandia pulvinata</i> (balf.f)	VU D2
<i>Ormocarpum cearuleum</i> Balf.f	LC
<i>Orthosiphon ferrugineus</i> Balf.f	LC
<i>Panicum rigidum</i>	LC
<i>Panicum socotranum</i>	VU D2
<i>Paracalyx belfouri</i>	VU D2

(vierh)Ali	
<i>Pelargonium</i> sp.nov (Samha)	CRB1 2°-e
<i>Peucedanum cordatum</i> Balf.f	LC
<i>Placopoda virgata</i> Balf.f	LC
<i>Plectranthus socotranus</i> Radcl-Sm	LC
<i>Placopoda virgata</i> Balf.f	VU D2
<i>Plectranthus socotranus</i> Radcl-Sm	VU D2
<i>Pluchea glutinosa</i> balf.f	LC
<i>Pluchea obovata</i> Balf.f	LC
<i>Polycarpaea balfouri</i> brig	VUD2
<i>Polycarpaea caespitose</i> Balf.f	VU D2
<i>Polycarpaea hassalensis</i> D.f.Chamb.	LC
<i>Polycarpaea hayoides</i> D.F.chamb	LC
<i>Polycarpaea kuriensis</i> Wagner	VU D2
<i>Polycarpaea paulayana</i> Wagner	VU D2
<i>Polycarpaea spicta</i> var.capillaries Balf.f	LC
<i>Polygala paulayana</i> Vierh	LC
<i>Portulaca</i> sp.nov (AbdelKuri)	VU D2
<i>Portulaca socotrana</i> (Balf.f)	VU D2
<i>Poskea socotrana</i> (Balf.f)	VU D2
<i>Prenanthes amabilis</i> Balf.f	LC
<i>Priva socotrana</i> Moldenke	LC
<i>Psiadia schweinfurthii</i> Balf.f	DD
<i>Psilotrichum aphyllum</i> C.C Townsend	VU D2
<i>Pulicaria aromatica</i> Balf.f	VU D2
<i>Pulicaria diversifolia</i> Balf.f	LC
<i>Pulicaria elegans</i> E.Gamal-El Din	LC

Pulicaria stephanocarpa Balf.f	LC
Pulicaria vieraoides Balf.f	LC
Punica protopunica Balf.f	VU D2
Pyrostria socotrana	VU D2
Reseda veridis Balf.f	VU D2
Rhinacanthus scoparius Balf.f	LC
Rhus sp	LC
Rhus thyrsoflora Balf.f	VU D2
Ruellia insignis Balf.f	LC
Ruellia patula subsp. kuriensis Vierh.	LC
Ruellia paulayana Vierh	LC
Sarcostemma socotranus Lavranos	VU D2
Scaevola socotraensis St John	VU D2
Secamone socotrana Balf.f	VU D2
Secamone socotrana va, glauca	DD
Seddera fastigiata (Balf.f)	DD
Seddera semhahensis R.R Mill ined	VU D2
Seddera spinosa (Vierh) Verdc	ENB1 2c
Senna socotrana (serrata)	LC
Sideroxylon discolor Radcl-Sm	VU D2
Sideroxylon fimbriatum Balf.f	VU D2
Socotranthus socotranus (Balf.f)	VU D2
Sterculia africana (Balf.f)	NT
Symphochlamys socotranus (G.Lucas)	VU D2
Tamrinda capsulifera (balf.f)	LC
Taverniera sericophylla	CRB1 2°

Balf.f	
Tephrosia odorata Balf.f	LC
Tephrosia socotrana Thulin	VU D2
Teucrium balfourii Vierh	LC
Teucrium sokotranum Vierh	LC
Thamnosma socotrana Balf.f	VU D2
Trachyspermum sp.nov	VU D2
Tragia balfouriana J.B.Gillet	LC
Trichocalyx obovatus Balf.f	DD
Trichocalyx orbiculatus Balf.f	DD
Trichodesma atrichum Vierh	VU D2
Trichodesma laxiflorum Balf.f	LC
Trichodesma microcalyx Balf.f	LC
Trichodesma scottii Balf.f	LC
Trigonella falcata Balf.f	LC
Turraea socotrana	VU D2
Valerianella affinis Balf.f	VU D2
Vernonia cockburniana Balf.f	LC
Vernonia unicata C.Jeffrey	VU D2
Wellstedtia socotrana Balf.f	VU D2
Withania adunensis Vierh	LC
Withania riebeckii Schweinf.	LC
Xylocalyx aculeatus S.carter	LC
Xylocalyx asper Balf.f	LC

IMPORTANT MARINE SPECIES OF SOCOTRA ARCHIPELAGO

Corals

<i>Family</i>	<i>Species</i>
<i>Pocilloporidae</i>	<i>Pocillopora damicornis</i> <i>Pocillopora verrucosa</i> <i>Stylophora danae</i>
<i>Acroporidae</i>	<i>Montipora cf. digitata</i> <i>Montipora spongiosa</i> <i>Acropora arabensis</i> <i>Acropora palifera</i> <i>Acropora valida</i> <i>Acropora expansa</i> <i>Astreopora myriophthalma</i>
<i>Poritidae</i>	<i>Porites cf. columnaris</i> <i>Porites nodifera</i> <i>Porites solida</i> <i>Goniopora cf. burgosi</i> <i>Goniopora djiboutiensis</i> <i>Goniopora minor</i>
<i>Siderastreidae</i>	<i>Psammocora contigua</i> <i>Psammocora haimeana</i> <i>Siderastra savignyana</i> <i>Coscinaraea columna</i> <i>Coscinaraea monile</i>
<i>Agaiciidae</i>	<i>Pavona explanulata</i> <i>Pavona frondifera</i> <i>Pavona maldivernsis</i> <i>Leptoseris hawaiiensis</i> <i>Gardineroseris planulata</i>
<i>Fungiidae</i>	<i>Cycloseris cyclolites</i> <i>Fungia fralinae</i> <i>Fungia fungites</i> <i>Herpolitha limax</i>
<i>Oculinidae</i>	<i>Galaxea astreata</i> <i>Galaxea fascicularis</i>
<i>Pectiniidae</i>	<i>Echinophyllia aspera</i> <i>Oxypora lacera</i>
<i>Mussidae</i>	<i>Acanthastrea amakusensis</i> <i>Acanthastrea brevis</i> <i>Acanthastrea echinata</i> <i>Acanthastrea hemprichii</i> <i>Acanthastrea ishigakiensis</i> <i>Acanthastrea n. sp.</i> <i>Blastomussa merleti</i> <i>Lobophyllia hataii</i> <i>Lobophyllia hemprichii</i>

Symphyllia valencennesi

Merulinidae

Hydnophora exesa
Hydnophora pilosa

Faviidae

Parasimplastrea simplicitexta
Favia favius
Favia maxima
Favia veroni
Favites abdita
Favites complanata
Favites flexuosa
Favites pentagona
Favites peresi
Goniastrea aspera
Goniastrea australensis
Goniastrea columella
Goniastrea deformis
Goniastrea retiformis
Platygyra daedalea
Platygyra lamellina
Leptoria phrygia
Oulophyllia crispa
Plesiastrea versipora
Montastraea curta
Montastraea cf. magnistellata
Leptastrea pruinosa
Leptastrea purpurea
Leptastrea transversa
Cyphastrea chalcidicum
Cyphastrea microphthalma
Cyphastrea serailia
Echinopora gemmacea

Dendrophylliidae

Tubastraea micranthus
Turbinaria frondens
Turbinaria reniformis

Milleporridae

Millepora cf. platyphylla
Millepora sp.

Fishes

Family	Species
<i>Acanthurida</i>	<i>Acanthurus dussumieri</i> <i>Acanthurus gahhm</i> <i>Acanthurus leucosternon</i> <i>Acanthurus lineatus</i> <i>Acanthurus sohal</i> <i>Acanthurus tennentii</i> <i>Acanthurus triostegus</i> <i>Ctenochaetus striatus</i> <i>Naso hexacanthus</i> <i>Naso lituratus</i> <i>Naso unicornis</i> <i>Zebrasoma xanthurum</i>
<i>Apogonidae</i>	<i>Archamia fucata</i> <i>Cheilodipterus quinquelineatus</i> <i>Siphamia versicolor</i>
<i>Balistidae</i>	<i>Balistapus undulatus</i> <i>Melichthys indicus</i> <i>Odonus niger</i> <i>Rhinecanthus assasi</i> <i>Sufflamen chrysopterus</i> <i>Sufflamen fraenatus</i>
<i>Blenniidae</i>	<i>Aspinodontus dussumieri</i> <i>Aspinodontus taeniatus taeniatus</i> <i>Ecsenius nalolo</i> <i>Meiacanthus nigrolineatus</i> <i>Plagiotremus rhinorhynchus</i> <i>Plagiotremus townsendi</i>
<i>Caesionidae</i>	<i>Caesio lunaris</i> Cuvier <i>Pterocaesio marri</i>
<i>Carcharhinidae</i>	<i>Carcharhinus amblyrhynchus</i> <i>Carcharhinus Dussumieri</i> <i>Carcharhinus limbatus</i> <i>Carcharhinus longimanus</i> <i>Carcharhinus melanopterus</i> <i>Carcharhinus plumbeus</i>

	<i>Carcharhinus sealei</i> <i>Carcharhinus sorrah</i> <i>Galeocerdo cuvier</i>
<i>Chaetodontidae</i>	<i>Chaetodon collare</i> <i>Chaetodon auriga</i> <i>Chaetodon gardineri</i> <i>Chaetodon kleinii</i> <i>Chaetodon leucopleura</i> <i>Chaetodon lunula</i> <i>Chaetodon melannotus</i> <i>Chaetodon melapterus</i> <i>Chaetodon trifascialis</i> <i>Chaetodon vagabundus</i> <i>Heniochus acuminatus</i>
<i>Cirrhitidae</i>	<i>Cirrhitichthys oxycephalus</i>
<i>Diodontidae</i>	<i>Diodon holacanthus</i>
<i>Gobiidae</i>	<i>Eviota guttata</i> <i>Istigobius decoratus</i> <i>Istigobius ornatus</i> <i>Valenciennesia puellaris</i>
<i>Haemulidae</i>	<i>Plectorhinchus gaterinus</i> <i>Plectorhinchus schotaf</i>
<i>Holocentridae</i>	<i>Myripristis murdjan</i> <i>Sargocentron caudimaculata</i> <i>Sargocentron diadema</i>
<i>Kyphosidae</i>	<i>Kyphosus cinerascens</i>
<i>Labridae</i>	<i>Anampses cf. melanurus</i> <i>Anampses meleagrides</i> <i>Bodianus axillaris</i> <i>Bodianus macrognathos</i> <i>Cheilinus fasciatus</i> <i>Cheilinus lunulatus</i> <i>Coris caudimaculata</i> <i>Coris frerei</i> Günther <i>Coris gaimard cuvieri</i> <i>Epibulus insidiator</i> <i>Gomphosus caeruleus</i> <i>Halichoeres dussumieri</i> <i>Halichoeres hortulanus</i> <i>Halichoeres marginatus</i>

	<i>Halichoeres nebulosus</i>
	<i>Halichoeres scapularis</i>
	<i>Hemigymnus fasciatus</i>
	<i>Hemigymnus melapterus</i>
	<i>Hologymnosus annulatus</i>
	<i>Hologymnosus diolatus</i>
	<i>Labroides dimidiatus</i>
	<i>Larabicus quadrilinaetus</i>
	<i>Macropharyngodon bipartitus</i>
	<i>Pseudocheilinus hexataenia</i>
	<i>Stethojulis albovittata</i>
	<i>Stethojulis interrupta</i>
	<i>Thalassoma lunare</i>
	<i>Thalassoma lutescens</i>
<i>Lethrinidae</i>	<i>Monotaxis grandoculis</i>
<i>Lutjanidae</i>	<i>Lutjanus bohar</i>
	<i>Lutjanus gibbus</i>
	<i>Lutjanus monostigma</i>
<i>Malacanthidae</i>	<i>Malacanthus latovittatus</i>
<i>Monacanthidae</i>	<i>Cantherines pardalis</i>
<i>Mullidae</i>	<i>Mulloidichthys flavolineatus</i>
	<i>Parupeneus bifasciatus</i>
	<i>Parupeneus cyclostomus</i>
	<i>Parupeneus forrskali</i>
	<i>Parupeneus macronema</i>
<i>Muraenidae</i>	<i>Gymnothorax favagineus</i>
<i>Ostraciidae</i>	<i>Ostracion cubicus</i>
<i>Pempheridae</i>	<i>Parapriacanthus ransonneti</i>
<i>Pomacanthidae</i>	<i>Apolemichthys xanhotis</i>
	<i>Centropyge multispinnis</i>
	<i>Pomacanthus imperator</i>
<i>Pomacentridae</i>	<i>Abudefduf vaigiensis</i>
	<i>Chromis flavaxilla</i>
	<i>Chromis weberi</i>
	<i>Dascyllus trimaculatus</i>
	<i>Neopomacentrus cyanomos</i>
	<i>Neopomacentrus miryae</i>
	<i>Pomacentrus caeruleus</i>
	<i>Pomacentrus leptus</i>

	<i>Pomacentrus trichourus</i>
<i>Pseudochromidae</i>	<i>Pseudochromis nigrovittatus</i> <i>Pseudochromis springeri</i>
<i>Scaridae</i>	<i>Chlorurus sordidus</i> <i>Scarus ferrugineus</i> <i>Scarus fuscopurpureus</i> <i>Scarus niger</i>
<i>Scorpaenidae</i>	<i>Pterois radiata</i>
<i>Serranidae</i>	<i>Aethaloperca rogaa</i> <i>Cephalopholis argus</i> <i>Cephalopholis hemistiktos</i> <i>Cephalopholis miniata</i> <i>Epinephelus fasciatus</i> <i>Epinephelus flavocaeruleus</i> <i>Pseudanthias squamipinnis</i> <i>Variola louti</i>
<i>Tetraodontidae</i>	<i>Arothron meleagris</i> <i>Canthigaster coronata</i> <i>Canthigaster solandri</i> <i>Canthigaster valentini</i>

Crustacea

<i>Family</i>	<i>Species</i>
<i>Penaeidae</i>	<i>Fenneropenaeus indicus</i>
<i>Stenopodidea</i>	<i>Stenopus hispidus</i>
<i>Alpheidae</i>	<i>Athanas djiboutensis</i>
	<i>Alpheopsis aequalis</i>
	<i>Alpheus deuteropus</i>
	<i>Alpheus djeddensis</i>
	<i>Alpheus edwardsii</i>
	<i>Alpheus frontalis</i>
	<i>Alpheus lobidens</i>
	<i>Alpheus lottini</i>
	<i>Alpheus strenuous</i>
	<i>Aretopsis amabilis</i>
	<i>Racilius comprissus</i>
	<i>Synalpheus charon</i>
	<i>Synalpheus noemeris</i>
	<i>Synalpheus tumidomanus</i>
<i>Hippolytidae</i>	<i>Hippolyte leptocerus</i>
<i>Rhynchocinetidae</i>	<i>Rhynchocinetes durbanensiss</i>
<i>Palaemonidae</i>	<i>Conchodytes meleagrinae</i>
	<i>Coralliocaris superba</i>
	<i>Jocaste lucina</i>
<i>Axiidae</i>	<i>Axiposis serratifrons</i>
<i>Palinuridae</i>	<i>Panulirus homarus</i>
	<i>Panulirus longipes</i>
	<i>Panulirus ornatus</i>
	<i>Panulirus versicolor</i>
<i>Albuneidae</i>	<i>Albunea steinitzi</i>
<i>Hippidae</i>	<i>Hippa pacifica</i>
	<i>Emerita holthuisi</i>
<i>Diogenidae</i>	<i>Aniculus erythraeus</i>
	<i>Aniculus retipes</i>

Calcinus gaimardii
Calcinus guamensis
Calcinus laevimanus
Calcinus latens
Calcinus rosaceus
Calcinus tropidomanus
Ciliopagurus striatus
Ciliopagurus eurysternus
Ciliopagurus signatus
Ciliopagurus virescens
Dardanus tinctor
Diogenes avarus
Diogenes jousseamei
Paguristes jousseamei

Coenobitidae

Coenobita rugosa
Coenpbita scaevola

Galatheidae

Allogalathea elegans
Galathea aegyptiaca
Galathea longirarna

Porcellanidae

Aliaporcellana pygmaea
Pachycheles natalensis
Petrolisthes boscii
Petrolisthes lamarckii
Petrolisthes ornatus
Petrolisthes unilobatus
Pisidia inaequalis

Dromiidae

Crptodromia fallax
Cyptodromia hilgenorfi

Calappidae

Ashtoret lunaris
Calappa dumortieri
Calappa gallus
Calappa hepatica
Matuta victor

Leucosiidae

Alox glene
Leucisca sima
Preophorus horridus
Philyra cancella

Philyra globus

Majedae

Acanthonyx limbatus

Cyclax spinicinctus

Cyphocarcinus minutus

Hueniagrandidierii

Menaethius contiguicornis

Menaethius orientalis

Micippa platipes

Schizophrys dahalak

Tylocarcinus styx

Parthenopidae

Aethra scruposa

Daldorfia spinosissima

Heterocrypta petrosa

Portunidae

Caphyra rotundifrons

Charybdis orientalis

Charybdis smithii

Portunus hastatoides

Portunus orbitosinus

Scylla serrata

Sphaerocarcinus bedoti

Thalamita admete

Thalamita prymna

Xanthidae

Acaea savignyi

Actaeodes semoni

Chlorodiella laevissima

Cymo quadrilobatus

Gaillardiellus rueppeli

Trapeziidae

Tetralia cavimana

Quadrella serenei

Potamidae

Potamon socotensis

Turtles

Chelonia mydas

Eretmochelys imbricata

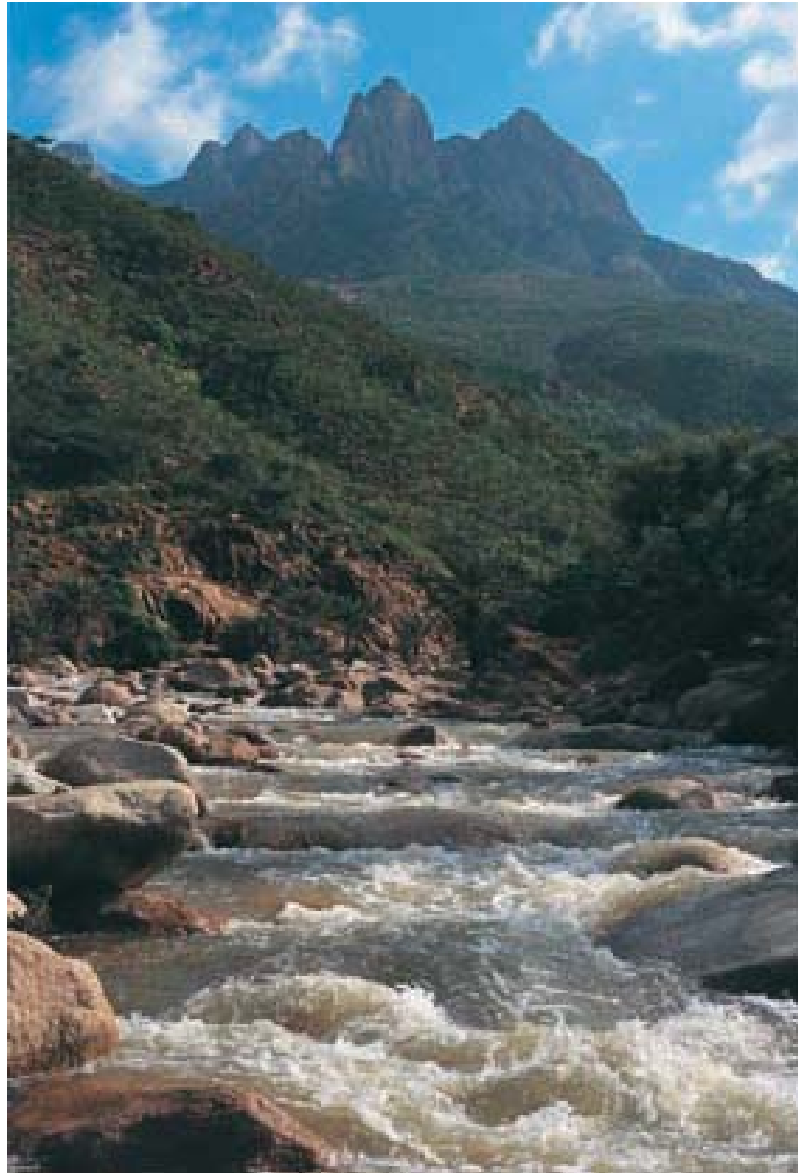
Caretta caretta

Dermochelys coriacea

Lepidochelys olivacea

References

THE REPUBLIC OF YEMEN:
SOCOTRA ARCHIPELAGO



MANAGEMENT PLAN 2003-2008

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List of Acronyms and Initials

CBO Community Based Organization
 CCF Country Cooperation Framework
 UNDP-Government of Yemen
 CZP Conservation Zoning Plan
 DDC UN Drylands Development Centre (Nairobi)
 DGCS Direttorato Generale per la Cooperazione allo Sviluppo, Ministry of Foreign Affairs, Rome, Italy
 DLDSP Decentralization and Local Development Support Program (UNDP-GOY)
 EIA Environmental Impact Assessment
 EO Extension Officer (EPA)
 EPA Environment Protection Authority
 EU European Union
 GEF Global Environment Facility
 GIS Geographic Information System
 GOH Governor of Hadramawt
 GOY Government of Yemen
 IUCN World Conservation Union
 LADF Local Administration Development Fund
 MOA Ministry of Agriculture
 MOTC Ministry of Tourism and Culture
 MOPW&UD Ministry of Public Works and Urban Development
 MOFW Ministry of Fish Wealth
 MOH Ministry of Health
 MOLA Ministry of Local Administration
 MPIC Ministry of Planning and International Cooperation
 MOWE Ministry of Water and Environment
 MSRC Marine Science Research Centre (Yemen)
 NGO Non-Government Organization
 NIAS National Institute for Administrative Sciences
 PERSGA Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden
 PRSP Poverty Reduction Strategy Paper – Government of Yemen, 2002
 RBGE Royal Botanic Gardens of Edinburgh, UK
 RNE Royal Netherlands Embassy in Yemen
 SAMP Socotra Archipelago Master Plan, MPIC-EU
 SCDP Socotra Conservation and Development Program
 SCF Socotra Conservation Fund
 SES Socotra Ecotourism Society
 SRF Strategic Resources Framework, UNDP Country Office in Yemen
 TA Technical Assistance
 TBI To Be Identified
 UNDP United Nations Development Program
 UNESCO United Nations Education Study and Cultural Organization
 UNV United Nations Volunteer
 WHO World Health Organization
 WWF World Fund for Nature
 YIPDA (IDA) Yemeni Islands Promotion and Development Authority (also called Island Development Authority)

Introduction

This Management Plan for the Socotra Archipelago has been established on the occasion of the application for the nomination of UNESCO as a World Heritage site. It is largely based on the SCDP Program Document, which details the management of the archipelago from 2003-8.

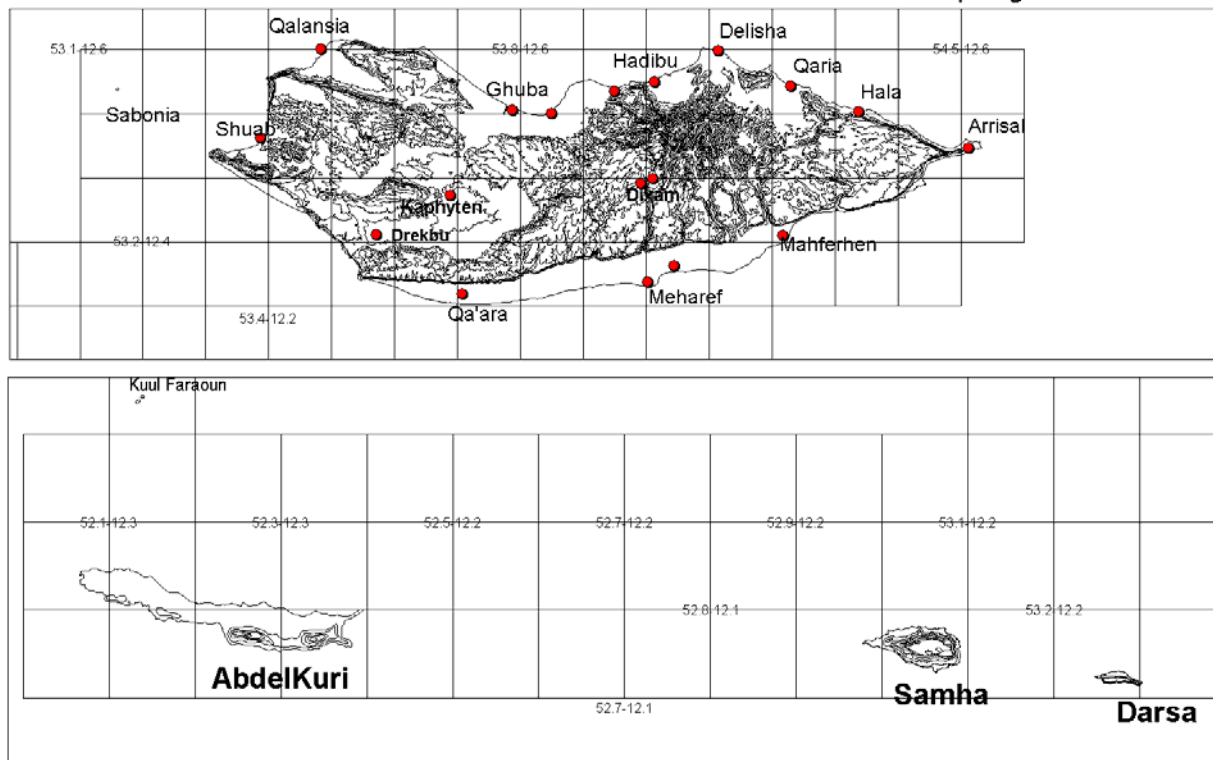
The aim of the plan is to present the reader with a clear overview of the efforts currently being undertaken by the EPA / SCDP to protect, conserve and manage the archipelago in order to ensure its ongoing integrity and authenticity. The mandate of EPA / SCDP additionally covers the responsible development of the archipelago's resources as Socotra is further opened to the pressures of economic growth and tourism. In the past years Socotra has benefited tremendously from the conservation efforts of both the GOY and the international community, and it currently enjoys the presence of a team of well-trained local conservationists and managers who are devoted to preserving the archipelago's natural and archaeological heritage. In the coming years as the archipelago, it will be of the utmost importance to manage this transitional period with care and wisdom. This is the goal of the efforts detailed in this plan.

The Socotra Archipelago possesses a rich and unique ecology with an extraordinarily high level of endemism in both flora and fauna. Over the past two millennia of human habitation a careful balance has been established between man and environment, making the archipelago a showcase for responsible conservation management.

The survival of the equilibrium of the needs of man and environment enjoyed by Socotra has been aided by the archipelago being cut off from the mainland for half the year due to the powerful winds of the monsoon. With the expansion of Socotra's airport in 1999 the island was opened to visitors year round and the pressures on the archipelago's environmental and archaeological heritage increased accordingly. The efforts of EPA / SCDP in managing the development and conservation of the islands is vital for the archipelago's continued integrity, and for the preservation of this unique part of humankind's natural heritage.

SOCOTRA ARCHIPELAGO

Conservation and the sustainable use of the Socotra archipelago



I. Situation Analysis

The Archipelago of Socotra is probably the poorest and most disadvantaged area of the country, where human development efforts and support from the international community, have only started in recent years. At the same time, Socotra is one of the ten most important islands in the world, in terms of biodiversity conservation importance. Nationwide, Yemen is taking important steps towards the preservation of its environment and natural resources, compatibly with the limited financial resources available. The need to address poverty alleviation issues is the national top priority, as spelled out in the recent Poverty Reduction Strategy Paper of the Republic of Yemen (2002).

This Management Plan will support the gradual establishment of a clear institutional and management framework for the "Socotra Conservation and Development Program", in the context of national efforts towards decentralization, the implementation of the PRSP and the achievement of the Millennium Development Goals. The SCDP will provide an important vehicle for the GOY to carefully and gradually channel additional resources to the archipelago, as funding becomes available.



(Satellite Image of Socotra Island. Image processing: R. Klaus)

1.1 National Context

Yemen's natural resources are the basis of the national economy. The depletion or degradation of these resources presents not only a loss of the country's national capital but also undermines the sustainability of its economy. Despite all ongoing efforts, Yemen is facing a significant water crisis, arable land, forests, biodiversity and unique habitats are being lost at an alarming pace. Weak waste management system and environmental pollution are negatively affecting population health, and hampering poverty alleviation and human development efforts of the country. A higher level of investment in sustainable environmental management is therefore a high priority for the country as a whole.

The Government of Yemen has recently restructured environmental institutions and created the MOWE and the EPA (formerly the Environment Protection Council). An important constitutional amendment was also ratified in the year 2001. The new article 35 states: "The protection of the environment is the responsibility of the state and society, and it is a national and religious obligation of every citizen." The Executive Regulation of the Environment Protection Law 26/1995 has been approved in 2001.

Both the Poverty Reduction Strategy Paper (PRSP) and the Vision 2025 document¹ support the need for environmental protection, as the loss of natural resources negatively affects primarily the poorest sections of society, and hampers human development.

In the context of Socotra islands, the environmental conservation represents the only viable basis for any future economic development, and it therefore has even higher importance as a means to sustain - directly and indirectly - the human development of the inhabitants of the archipelago. In MOWE's national investment plan (2002), the conservation of biodiversity and sustainable use of national resources in the archipelago of Socotra is the top priority for habitat conservation in the country. The importance of supporting biodiversity

¹ Vision 2025 document, Government of Yemen.

conservation in the Socotra archipelago, as a primary means of supporting sustainable human development for the people of these islands, and of creating positive spin-off effects nation-wide, are highlighted in the following chapters.

a. Environment and Development in Yemen

The Poverty Reduction Strategy Paper of the Government of Yemen (2002) sets out four main goals and axes of government intervention (a) Achieving Economic Growth, (b) Developing Human Resources, (c) Improving Infrastructure and (d) Ensuring Social Protection. It also stresses one cross-cutting area where action is needed to support the implementation of the strategy along the four above axes. This is (e) Improving Governance, understood as the combination of prudent public sector fiscal management and effective administrative performance, increased people's participation and expanded partnership between government, private sector and civil society.

The present Management Plan addresses both sector-specific and governance issues prioritized in the PRSP. The Implementation of the Conservation and Development Plan for the Socotra Archipelago is listed among the National Priority Programs and Projects identified in the PRSP. This is in recognition of the close links between human development and environmental protection in the specific context of Socotra. The Management Plan also contributes to the implementation of the PRS with sector-specific interventions in the , water, health, agriculture, education and tourism sectors. Gender Equality and Institutions Strengthening are addressed in the design of all the plan's sector-specific interventions.

With respect to Governance issues, the PRS paper clearly recognizes the need to improve governance to achieve the PRS objectives. Along all the above four axes of intervention. Improving governance is therefore treated as a virtual "fifth axis", within which, multiple policies programs and projects are identified in six sub-areas: (a) Civil Service Modernization (b) Enhancing and strengthening Democracy (c) Implementation and enforcement of laws and regulations (d) Strengthening Local Authorities and Decentralization (e) Support for pro-poor and National Institutions (f) Participation and cooperation.

Of direct relevance to this project is the sub-area "Strengthening Local Authorities and Decentralization". The PRSP calls for a greater and more active role of local authorities in addressing the basic needs of local communities. It also rightly points at the need for a system to monitor the performance of local authorities and provide them with the incentives and technical assistance needed for the adoption of improved local governance practices and local pro-poor policies.

Given the early stage of decentralization reforms in Yemen, there seems to be a strong rationale for piloting a number of institutional and financial arrangements enabling Local Authorities, particularly District Councils and Administrations, to

play a meaningful role in both the implementation of national pro-poor policies and, eventually, the articulation of their own and complementary local policies for poverty reduction.

Vision 2025 and the Environment

In the Vision 2025 document of the Government of Yemen, it is clearly stated that the increase in population has a negative impact on the situation of the natural resources and environment of the country. Especially water resources are threatened by over exploitation and pollution. Land degradation and desertification is increasing due to deforestation, unsustainable livestock management and irrigation practices. Costal and marine environments are affected by over-fishing as well as by land based industrial activities and associated waste management problems. Vision 2025 identifies the following priority areas of intervention or objectives:

- To develop and implement sustainable management and monitoring programs for water resources, land resources and agriculture, costal zones, biodiversity and waste.
- To develop a desertification combating Program.
- To provide energy substitutions.
- To use environment friendly technology and enhancement of renewable energy resources.
- To implement environmental impact assessments for projects.
- To increase public awareness in all environmental fields.

The present management plan takes all the above issues into account, and aims at providing a useful pilot and model for their implementation across the rest of Yemen.



(Hagghier mountains. Photo courtesy of John Farrar)

Poverty and the Environment – the PRSP

Also the PRSP² reflects the critical role of environmental protection to sustain the improvement of living standards for the people in Yemen. The poor are primarily reliant on natural resources for their livelihood. They are directly affected by the methods by which environmental resources are exploited. While poverty does not necessarily lead to environmental deterioration, there are clear effects of poverty on the environmental situation of Yemen today. For example scarcity and pollution of water affects especially the aged, children and women, besides leading to a loss of agricultural land and the loss of livestock when severe droughts occur. Since women are providers of water for domestic use, they have to cross long distances for this purpose. Water pollution affects the health condition of their families, and thus decreases their productivity, and exposes them to severe poverty.

At the same time poverty increases the pressure on the natural resources. Especially the poor depend on the natural resources and add by unsustainable woodcutting and livestock management to deforestation, loss of vegetation cover, soil erosion, desertification and land degradation. The deterioration of natural sanctuaries and loss of biodiversity occurs due to poor environmental awareness and control.

Coastal biodiversity is threatened through bottom dragnets in fishing or the use of explosives, by landfills in costal areas, expanded construction, pollutions from

² Poverty Reduction Strategy Paper (PRSP) 2003-2005, 31.05.2002 page 44ff.

chemicals and waste from electric power generating stations. These problems also affect the poor leading to environmental damage and depriving fishing communities from income and thus exacerbating their poverty.

The gradually increasing temperatures, due to the global and regional climate change leave their impacts on agricultural production e.g. through the displacement of current climatic zones changing plant types and vital ecological systems. The productivity of the current agricultural crops will go down, besides the fact that presents irrigation systems can not control flooding and thus the risks of land erosion.



(Children in Hadibo, courtesy of Kurt Garrez)

The government has declared the reinforcement of environmental management of natural resources, enabling and involvement of beneficiaries and supporting the role of women and youth in environmental conservation as a national goal.³ The PRSP identifies a set of priority interventions aimed at strengthening existing environmental policies and capabilities of relevant institutions. These include:

- Enhancing technical capacities of relevant institutions to develop comprehensive environment and development projects and programs relying on community participation
- Developing appropriate legal framework
- Fostering the institutional empowerment of local organisations

³ Poverty Reduction Strategy Paper (PRSP) 2003-2005, 31.05.2002 page 71f.

- Carrying out field studies to assess the status of the environmental and natural resources •
- Identifying incentives for environmental protection measures and matching them with awareness programs
- Providing direct job opportunities through environmental projects
- •Undertaking environmental impact assessments for planned development projects
- Support/finance initiatives that provide soft loans for the poor

In the above framework, National Priority Programs and Projects identified in the PRSP for the environment sector include:

- National Sustainable Environmental Management
- Updating and activating the Environmental Protection Law
- Monitoring the Environmental Impact of Agriculture
- Implementing the Conservation and Development Plan for the Socotra Archipelago

Although Yemen is experiencing numerous environmental problems, the Environmental Program of the MOWE and EPA focuses on those issues that are of national importance by posing immediate threats to health and sustainable economic and social development and which can effectively be tackled over the coming 5 years. The MOWE and the EPA reviewed in a consultative process the major national environmental concerns as defined during the NEAP preparation process⁴. Main criteria used to determine priority environmental issues were: (1) Urgency, (2) Irreversibility, (3) Effects on human health, (4) Effects on economic productivity, (5) Number of people effected, (6) Loss of Amenities and (7) Effects on the poor. Based on the above criteria, five critical problem and opportunity areas were defined during the Program preparation in the EPA/ MOWE.

Key environmental Issues MOWE/EPA SubProgram Area

- Water depletion and pollution Sustainable Water Management
- Waste Sustainable Waste Management
- Land degradation Sustainable Land Management
- Habitat and biodiversity loss Habitat and Biodiversity Conservation
- Climate Change/ Energy Sustainable Energy Management

The present program will take into account all the above issues, and will directly support the implementation of the Socotra Conservation and Development Plan, while providing the essential platform on site for addressing all human development issues in the archipelago in an integrated fashion, and in harmony with biodiversity conservation objectives.

⁴ NEAP= National Environment Action Program, 1996



(Photo courtesy of John Farrar)

b. Local Governance & Decentralization

The integration of development and environmental concerns will require a significant, consistent and long-term investment by the GOY, both at central and local level. Increased civic and environmental awareness, improved professional capacity of government employees and institutions involved, and a higher level of public involvement will all be critical to the success of this effort.

On February 10, 2000, the Local Authority Law (no.4/2000) was approved by Parliament. The Law provides a clear and comprehensive legislative framework for decentralization based on the following principles: (a) broadened popular participation through elected local councils; (b) financial decentralization; (c) decentralization of administrative and services delivery functions. Undoubtedly, the law is a major step towards further democratization, and has a great potential for the improvement of local public service delivery and the address the Millennium Development Goals in Yemen.

A number of important developments have taken place since the Law was passed three years ago:

- Local elections were successfully held in April 2001 in 332 districts and 20 Governorates.
- A first Conference of Local Councils was held in May 2002 and resulted, among other things, in the extension of the term of local councilors from two to five years (The next LA elections will take place in 2006, in conjunction with the presidential elections).
- The government-in collaboration with the National Institute for Administrative Sciences (NIAS) and a number of local and international

NGOs- has launched a major awareness raising campaign and training Program which resulted in training of over 4000 councilors and local administration staff.

- A comprehensive assessment of infrastructure and personnel needs at the district level has been completed and submitted to the Cabinet.
- Accounting units have been established to serve a (still limited) number of districts.
- Budgets have been transferred to all Governorates and to a (still limited) number of districts.

Nevertheless, decentralization reforms are not yet felt on the ground in Yemen. Three years after their election, most District Councils do not yet function as the Law intended them to. They neither plan their jurisdictions' development nor budget their resources (this is still done at governorate level), and, in many places, it is difficult for local people to see the added value of the District Councils with respect to pre-existing, and often well functioning, traditional/tribal authorities.

In summary Yemen seems to face a situation not uncommon in many recently decentralizing countries. Decentralization reforms were essentially born out of political necessity. Once enacted however, they raised formidable implementation challenges of administrative and fiscal nature. The chances that the reforms result in more political participation and better allocation and use of public sector resources, and that Local Authorities articulate local pro-poor policies and contribute to implement the national Poverty Reduction Strategy, depend on how such challenges are addressed.

1.2 National and International Importance of Socotra

The archipelago consists of the main island of Socotra (3625 km²) and three smaller islands, Abd Al Kuri, Samha and Darsa. The long geological isolation of the island from mainland has resulted in very high levels of endemism, which make the archipelago a site of global importance for biodiversity conservation. The island has in fact been historically known for its unique vegetation. The population is estimated at 44,000⁵, mostly living in the rural areas are semi-nomadic pastoralists, living from goats, sheep, cattle breeding and date palm cultivation. Main economic activities on which the population of Socotra relies on are largely based on livestock production, fishing, date palm plantations, and primitive household gardens, with some minor forms of primarily opportunistic trade. An estimated number of 8,000 Socotri live and work in the Emirates, probably contributing considerably to the income of related families on the island. Due to the insufficient provision of basic human needs, such as access to sustainable livelihoods, safe water, health services, education etc., a majority of the population of Socotra Archipelago are considered to live below the absolute poverty line.

⁵ Population estimate, EU/MPIC/EPA Socotra Archipelago Master plan Project (SAMP).

The scenically beautiful archipelago was successfully nominated as a Man and Biosphere reserve by UNESCO (recognized in 2003), and has very high potential for the development of nature and culture – based tourism. The fishery sector is also currently under-exploited, and has significant potential for expansion if managed carefully and in a sustainable fashion.

According to all prior studies and planning efforts, the two sectors of ecotourism and sustainable fisheries represent the prime “engines of growth” for the local economy. These strategic economic development areas are entirely based upon, and closely interlinked, with the conservation of biodiversity, natural resources, and intact landscapes.

With the very recent opening to the outside world, the archipelago is at a historic “crossroads”, where choices made today will affect the very basis for its future development. In the year 2000, the people of the islands and the Government of Yemen have chosen to endorse a community-based Conservation Zoning Plan (Presidential Decree no. 275, 2000). This plan, if timely and consistently implemented, will support human development and sustainable economic growth for generations to come. However, the capacity of all key stakeholders to fully understand and implement the zoning plan in a participatory way is not yet in place. The communities, which will be the key players in the implementation of the plan, yet have to address their primary human development needs, after centuries of isolation.

The international importance of the Archipelago is recognized and highlighted in all relevant national priorities, action plans and programs developed by the Republic of Yemen in recent years. In particular, the Socotra Archipelago is the top national conservation priority in the Country Study on Biological Diversity as well as the National Biodiversity Strategy and Action Plan (NBSAP). Its sound development is advocated in the Poverty Reduction Strategy paper and in the Socotra Archipelago Development Master plan (MPIC/EU).

The present project will support the consolidation of the ongoing GOY/UNDP “Socotra Conservation and Development Program” (SCDP), which aims at fostering human development for the people of the Archipelago, while supporting community-based conservation and sustainable use of biodiversity and natural resources. The SCDP aims at fostering the vision and technical guidelines set in the two main planning instruments developed by the GOY in recent years for the conservation and development of the Socotra Archipelago. These are:

- The Socotra Archipelago’s Conservation Zoning Plan, which sets the basis for long-term protection of biodiversity and strengthening of the traditional role played by local communities in maintaining the ecological balance required to achieve sustainable development. The Government of Yemen, Presidential Decree No. 275, endorsed the CZP September 2000.

- The Socotra Archipelago Master Plan (SAMP – MPIC/EPA/EU), which outlines the baseline scenario and technical framework for sustainable human development.

The present management plan will be instrumental in supporting the community-based implementation of the Conservation Zoning Plan. It builds upon the successful implementation of the first GEF-UNDP Socotra Biodiversity Project (1997-2001), and ongoing Projects YEM/01/003 (Netherlands-UNDP) and YEM/01/001 (Italy-UNDP-Poland). The management plan complements ongoing and planned GOY-Donor assistance towards the conservation and sustainable development of the Archipelago.

Global Biodiversity Conservation Values

The Socotra Archipelago is a globally significant centre of biodiversity, featuring almost 300 endemic plants (34% of total), over 30 endemic vertebrates, more than 300 species of endemic invertebrates (among those so far described). Botanists rank it among the top ten islands in the world in terms of botanical diversity (Miller et al., 1996). The WWF: (the island of Socotra is listed in the Global 200 Ecoregions). The IUCN also recognizes Socotra as an important centre of endemism and hosting hundreds of rare plant species. The archipelago contains 22 Important Bird Areas (Birdlife International, “Important Bird Areas in the Middle East”, 1994), and has been recognized as a Man and Biosphere Reserve (UNESCO, 2003). The Archipelago is also included in the regional network of Important Marine Protected Areas (PERSGA, 2000).



(Chameleon. What kind?? Photo courtesy of Richard

Porter)

These unique characteristics represent significant comparative advantages of this island in terms of nature-based tourism development, versus other areas in the region and globally.

1.3 Description of the Socotra Archipelago

Physiographic features

The Socotra Archipelago is part of the Republic of Yemen, and is located in the northwestern Indian Ocean, some 400km south of the Arabian Peninsula. The archipelago consists of the main island of Socotra (3625 km²) and three smaller islands, Abd Al-Kuri, Samha and Darsa. The long geological isolation of the island from the main land has resulted in very high levels of endemism, which make the archipelago a site of global importance for biodiversity conservation. The island has in fact been historically known for its unique vegetation.

Socotra is distinguished by the Haghier Mountains, reaching 1526m, and located in the north-western part of the island. The eastern and central parts of the island receive some rain during fall and winter, while the western part of the island is arid. In spring, from March to May, temperatures usually raise above 40°C. the climate is characterised by the seasonal Monsoon winds, blowing from the northeast during the period October-May and from southwest during the period June-September. From June to September the island is accessible only by plane, because of exceedingly strong monsoon winds, and access by sea is virtually impossible due to high seas and strong winds all around the island. During this time, fishing is impossible and many people move from the northern coast to the mountains to escape the winds, and to harvest their date palms.

The other 3 main islands of Socotra archipelago are situated to the west of the island of Socotra. The small island of Samha (10x5 km), home of ca. 140 people, is reached in 4 hours by boat from Qualansya. Abd Al-Kuri is larger (25x5 km) with about 200 inhabitants and reachable in approximately 10 hours. Both islands are barren with very little vegetation and drinking water is of poor quality. No schools or health facilities exist. The people of these islands depend on fishing and occasionally come to Socotra for medical help or trade, but in general they are extremely isolated. The island of Darsa is not inhabited.

Cave Systems

In the past few years a series of expeditions have revealed a series of extended cave complexes running through the limestone plateau that stretches over most of the island. Of special importance is the Hoq cave, which has been found to contain pottery, a tablet from the 3rd century AD and inscriptions in early Indian, pre-Arabian and Ethiopian languages.

The caves of Socotra are worthy of study and conservation for multiple reasons: first, because they are often ecosystems in their own right and contain endemic species not found elsewhere. In addition, the study of the mineral deposits in the caves promises to add greatly to our understanding of weather patterns in the Gulf of Aden and Indian Ocean during the past half million years. Second, they can contain, as is the case with the Hoq cave, archeological remnants of great importance. And third, is the beauty of many of the caves themselves which renders select caves worthy of inclusion as sites for ecotourism. Finally, some of the caves function as fresh water catchments that if responsibly exploited will be able to supply local communities with a much needed water supply (as has successfully been implemented with the Erher cave).



(Inside Hoq Cave. Courtesy of Peter de Geest)

Population and livelihoods

The population of the Socotra archipelago is estimated at 44.000⁶, mostly living on Socotra, and concentrated in the capital town of Hadibo and of the eastern town of Qalansiyya. Main economic activities on which the population of Socotra relies on are largely based on livestock production, fishing, date palm plantations, and primitive household gardens, with some minor forms of primarily opportunistic trade. The Socotri language spoken in the island is an ancient unwritten language, of pre-Islamic origin, related to the Mahri language.

⁶ Population estimate, EU/MPIC/EPA Socotra Archipelago Master plan Project (SAMP).

The main part of the Socotri population living in the rural areas are semi-nomadic pastoralists, living from goats, sheep, cattle breeding and date palm cultivation. Along the coasts fishing from small boats is the main source of income. In the major villages a considerable number of people are employed in government jobs or are involved in small scale trade, building and manufacturing for local demands. Except for modest gardening, agriculture is unknown. Therefore food consists mainly of local fish, meat, goat's milk and dates, substituted by imported rice and flour. Only a few people occasionally eat locally grown vegetables and fruits. Imported food products are not affordable for the vast majority of population.

Socotra is much poorer and less developed than the mainland of Yemen. No industry or large-scale manufacturing exists. Except for dried fish, very little is being exported from the island. An estimated number of 8,000 Socotri live and work in the Emirates, probably contributing considerably to the income of related families on the island. Due to the insufficient provision of basic human needs, such as access to sustainable livelihoods, safe water, health services, education etc., a majority of the population of Socotra Archipelago are considered to live below the absolute poverty line.

Gender Issues

As in the rest of Yemen, women suffer more from the influence of poverty than men (findings of "Voices of the Poor" study). In the context of Socotra, women play a vital role in determining the pattern of use of natural resources (especially terrestrial resources) as they are the holders of most of the traditional knowledge and they are the main responsible party within the family for livestock herding, home-gardening, fuel wood collection, water harvesting, use of medicinal plants and other critical tasks.

Wood Harvesting

Socotra dwellers rely, to a great extent, on trees whose wood is used for heating, cooking and as construction material. Dead and live timber is widely used for building, roofing and fencing. As the supply of dead wood is no longer sufficient to meet growing demands, live trees are now being increasingly cut, thus posing a serious threat to the survival of important species (i.e. *Maerua Angolensis*). Wood is also burned for the manufacturing of lime, which is used in traditional buildings. In addition, herders burn certain woody species i.e. *Cephalocroton Socotranus* (Ta'an) for their scented smoke.

Non-timber products

The highland forest trees have always provided the islanders with useful resins, gums, tannins, dyes, medicines, juices, scented woods, such as the famous cinnabar, and some of the above materials are still traded outside Socotra in the present times. Certain non-wood products (i.e. fruits, roots) are collected by the

Islanders and are used as valuable nutritional supplement. E.g. fruits of *Cordia Obovata* and *Ziziphus spina-christi* are edible and appreciated by the population.

Fisheries

The coastal population of Socotra is almost entirely dependent upon fishing as the principal source of livelihood. Along the Socotran coasts, the majority of working males are fishermen. The main stocks targeted are shark, kingfish and tuna, which are salted or dried and sold on the mainland. Reef fish and lobsters represent also an important source of income, and the latter is sold to visiting fishing vessels from neighboring countries.



(Photo courtesy of Kay Vandamme)

1.4 Threats, Opportunities & Risks

Main threats for the preservation of the existing delicate balance between natural resources and population needs are mostly associated to external pressures, as well as to the foreseen –and inevitable– population increase (determined by internal population growth, as well as by immigration). Unless proper mitigation measures are timely put in place, these threats will negatively affect the unique biodiversity values of the archipelago, irreversibly undermining its potential for long-term sustainable economic development.

Main threats identified are (1) unplanned infrastructural development (linked to poor governance), (2) overcutting of timber and fuel wood tree species, (3) localised overgrazing, (4) over-exploitation of marine resources (shark, lobster,

reef fish), (5) careless exploitation of water (i.e. sinking of unplanned wells), (6) breakdown in traditional land management and (7) significant changes in livestock management procedures (use of supplemental feeds and breeding of large number of males for the market have led to a substantial increase in herd animals).

Well-planned and properly managed eco-tourism has never been looked at as a threat but rather as an opportunity supporting local livelihoods. The EPA taking into account the results of the GEF project and the Development Master plan for the archipelago has developed an eco-tourism management strategy.

In the specific context of Socotra, with its extreme poverty and poor governance framework, the GOY may not be able to implement the Conservation Zoning Plan and appropriately coordinate development interventions without further external assistance. The GOY repeatedly expressed high-level political commitment to human development and conservation of Socotra's biodiversity. However, the poor texture of the general socio-economic structure of the country -and of Socotra in particular-, limited financial resources, and the expected population increase (caused by natural growth and immigration to the island from mainland), are major causes of concern.

This situation is expected to cause a rapid increase in exploitation of natural resources, and unplanned development of infrastructure. This would result in the loss of important habitats and species, and of potentially valuable eco-tourism areas, with associated significant decrease of the overall sustainable development potential of the islands. In the present situation, external pressures might easily find means to ignore conservation and sustainable management objectives. This scenario would jeopardize the primary resource base for the local population, and irreversibly undermine opportunities for improving their living standards in the long term.

1.5 Overview of Ongoing Development and Conservation Efforts

The first GEF Socotra Biodiversity Project (1997-2001) was extended with support from the Government of the Netherlands and UNDP and was completed in 2003. Its main objectives were (1) to support the implementation of the Conservation Zoning Plan through establishing a pilot system of community-based protected areas, (2) setting the stage for initiating the Socotra Conservation Fund, and (3) supporting the creation of the Socotra Conservation and Development Program (see following section).

The European Union assisted the GOY in the preparation of a comprehensive Development Master plan for the Archipelago (1999-2001). A number of bilateral donors and national development funds are supporting a limited number of small-scale development projects in the archipelago, which vary greatly in size-scope and relevance to the GOY development vision for the archipelago.

There is an urgent need to ensure the proper coordination and integration of the above initiatives, so as to ensure they are not in conflict with the overall development vision for the archipelago, and compatible with the conservation objectives set-out by the GOY. Initial steps towards the achievement of this broad objective are being taken by the GOY with the establishment of the Socotra Conservation and Development Program Coordination Unit, within the Ministry of Planning and Development.

The “Socotra Conservation and Development Program” (SCDP)

The SCDP began (2001-2003) as an GOY initiative, supported by a pool of donors led by the UNDP and including the Netherlands, Italy and Poland. In 2003-4 the funding for the program was taken up by the UNDP and the Government of Italy, as detailed in this management plan. The SCDP aims at steering and supporting the implementation of GOY plans for addressing the archipelago’s human development, governance and environmental conservation issues in an integrated manner. The timely implementation of the community-based Conservation Zoning Plan is a principal objective of the SCDP. Recent studies and concerted GOY-donors planning efforts, highlight the unique opportunity for improving the livelihood of local population, on the basis of a sound preservation of the island’s unique environment and landscapes. The SCDP aims at fostering the implementation of such plans.

1.6 Capacity Assessment EPA Branch and Local Government

As illustrated above, the lack of an appropriate and well-integrated governance structure for the archipelago at local and central level is a critical factor that has to be taken into account for the design and implementation of any type of intervention on the islands.

The local team of the Environment Protection Authority (Ministry of Tourism and Environment) does not yet have adequate resources and technical capacity to lead and oversee the timely implementation of the complex network of protected areas and their community-based management. The capacity assessment of the EPA branch in Socotra reveals the continued dependency (even after 6 years of UN support and capacity building effort) from external assistance. This applies in particular to the areas of: planning, management and administration, technical skills related the various aspects to Protected Areas Management, EIA performance, Eco-tourism development, fisheries and marine biodiversity conservation, bio-prospecting, alien species control, etc. This is explained by the very low initial level of professional capacity of local staff, which entails significant and extended period of training and capacity building to achieve adequate professional capacity among local staff. It is therefore envisaged that extended support for the local team will be required for at least 10 additional years, in order to build a nucleus of EPA staff of islanders which is fully capable of: (a) managing all aspects of EPA operations, and (b) providing the necessary leadership, support, training and know-how transfer for other, newly recruited EPA staff from the island.

Local communities in Socotra –which are extremely supportive of the establishment of a system of protected areas- are not yet fully engaged in the implementation of the Conservation Zoning Plan. In the baseline scenario (i.e. without the present management plan), no tangible benefits would be deriving to the communities from the establishment of the network of protected areas. The CZP would probably remain a “paper exercise”. The close link between biodiversity conservation and human and economic development in the archipelago is not yet clear to most stakeholders at local and central level, and needs to be demonstrated by closely assisting and leading the CZP implementation in its infancy.

The critical role of Local Councils and local administration in support of the Conservation Zoning Plan cannot be overemphasized. Better local governance and improved services to the local population are essential pre-conditions for the successful implementation of the CZP. As described above, the Local Councils are facing significant difficulties in assuming their functions due to lack of administrative capacity as well as financial and operational constraints. However, these constraints represent also significant opportunities for the management plan to foster local authorities’ capacity , by enabling them, through both financial and technical assistance, to assume a central role in managing local development processes and generating tangible impacts. In doing so the management plan would take advantage of a number of enabling factors including the existence of a new and relatively progressive legal framework of decentralization reforms, the high expectations surrounding the decentralization process, the existence in Socotra of a vital network of traditional community structures, the presence of an experienced UNDP/EPA team on the island over the past 6 years and its acute awareness of the critical role of good governance arrangements, both central and local, for the success of the Socotra environmental conservation efforts.

1.7 Community Mobilization

The term “Community Mobilization” indicates the effort by local communities to organize themselves into effective legal entities, and acquire the basic professional skills necessary to become active partners of local and central authorities in ongoing development and conservation efforts.

The role of Local Communities as major players in the development and conservation of Socotra cannot be overemphasized. Local people have always been and are the guardians of their territory, throughout the history of the island. The complex physiography and remote location of the archipelago, with its network of marine and terrestrial protected areas, makes the role of the communities even more critical. No development or conservation effort can be effectively conceived nor implemented by local and central authorities without the full support and collaboration of local people.

The importance of community involvement was reaffirmed during the recent formulation of the island's conservation and development plans, in which the communities were actively involved through their community leaders (*Sheikh*) and through several meetings open to all community members. A positive relationship between key GOY agencies (namely the EPA/UNDP Program on the island) and local community leaders has been established over recent years. This represents a good basis for further community involvement and gradual mobilization.



(Croton Shrubland. Photo courtesy of Teresa Di Micco de Santo and Edoardo Zandri)

In the context of Socotra (as in most remote areas of Yemen) The GOY has yet suboptimal resources and capacity to tackle most pressing human development issues at community level in the immediate and medium term. Therefore the enhancement of the role of local communities would allow them to become active players in GOY development efforts.

In many cases local NGOs and community groups can effectively “help themselves” in a very effective way, provided that some initial technical and financial support is made available to them. In Yemen, some effective opportunities and mechanisms for channeling development funds to the beneficiaries at local level are in place. These are all developed and implemented in close collaboration with the Government, but are set-up as independent entities. Some examples include the Social Development Fund, the Public Works Project, Private Foundations, Small Grants Programs (GEF, Embassies etc.), Agriculture and Fisheries Fund, etc. Some new approaches are being developed to support community based regional development with small grants (i.e. the UNDP Poverty Alleviation Project YEM/97/300/REGDEV).

The engagement of communities however requires a minimal level of organization and management/administrative capacity that is not yet in place in Socotra. Only a handful of local NGOs and a few fishermen associations have recently been created on the island. These have yet very limited -if any- capacity

to identify and attract external funding from available sources, and administer them effectively.

The management plan will support community mobilization through its parallel, GEF-funded component. The GEF component will concentrate on training communities, helping them to organize themselves, and assisting them in the initial stages of their professional development. The newly established Socotra Conservation Fund will be the main vehicle to support local community groups in Socotra, and the GEF component will support SCF operation for the first 4 years.

But an equally important contribution that the management plan will make to the development and consolidation of sustainable community based organizations (CBO), will be the attempt to link Socotra communities (and those concerned by the establishment of protected areas in particular) to the process of allocation and use of local public sector resources. Supporting, technically and financially, District Councils and Administrations to adopt a participatory approach to the regular processes of local government strategic planning, capital programming and annual budgeting, will require the establishment of appropriate mechanisms for communities to participate in such processes and influence the allocation of funds of their own local governments (as opposed to those of national or external agencies/Funds) to projects and activities that address their basic needs. By the same token, participatory local government strategic planning will promote the establishment of genuine LC-CBO “partnerships” through which local authorities may provide regulatory, financial and other support to initiatives directly managed by community organizations and aimed at local economic development and environment protection.

1.8 “Engines of Growth” for the Island’s Economy

A significant baseline assessment and planning effort was carried out for the archipelago over the period 1997-2002, with assistance from the UNDP-GEF and the EU. Very few areas of Yemen have now such a comprehensive and well-integrated set of planning tools as Socotra. Considering that development of the archipelago is in its infancy, such planning effort was indeed conducted in a very timely manner. It provided the Government of Yemen with a unique opportunity to layout the most appropriate strategy for the long-term development of these islands.

A consistent and well-grounded general agreement in all studies, plans and reports has led to a clear GOY Vision for the development of Socotra: the future human development of the island will be based on the conservation of its unique characteristics and natural resources.

Addressing the basic human development needs for the local population, which had so far been neglected and needs to catch-up with the rest of the country, is a top priority. At the same time, the GOY will concentrate resources and focus on preserving the main potentials or “engines” for the economic growth of the

island: its biodiversity, natural landscapes, marine resources, all enshrined in the system of marine and terrestrial protected areas being set-up by the EPA.

These protected areas will be the basis for the development of nature and culture based tourism, and will also play a key role in preserving the marine resources of the archipelago, allowing their sustainable long-term use by local fishermen.

Preserving the engines of growth for the island economy will entail a significant effort to coordinate interventions while building all the necessary professional capacity in local GOY agencies, private sector, community groups. This will be a long term effort, and the present 5-year initiative represents the outset of a 25 years program, which the GOY will implement in collaboration with UNDP, as the leading partner and responsible for coordination and administration of all donor assistance to the island. This long-term and integrated approach is deemed essential to ensure full consistency and synergy among all GOY and donor interventions in such a unique and fragile social and environmental system.

The GOY sees a well integrated development and conservation program as the only mean of preserving the strategic resources for the development of the island, while at the same time bringing in the necessary human development and employment opportunities for the local population. The characteristics of the two main potential areas of economic development for the archipelago are outlined in the following sections.

Nature-Based Tourism Development

The EPA has recently developed (Feb 2003), the “Socotra Islands Nature-Based Tourism Development Program”, which, on the basis of all existing prior studies supported by GEF and EU, examines the nature-based tourism market potential for the Socotra Archipelago. This has been prepared with the expectation of stimulating economic growth, while protecting the Socotra's unique environmental and heritage resources, and ensuring benefits to the local people.



(The raggedfin turkeyfish (*Pterois antennata*). Photo courtesy of Teresa Di Micco de Santo and Edoardo Zandri.)

Nature-based tourism is advocated as an environmentally safe basis for achieving economic development on Socotra. This relatively new form of tourism incorporates outdoor recreation, adventure tourism, marine tourism and cultural tourism as well as ecotourism, which has been a management objective of Socotra Conservation and Development Program since its inception.

The paper discusses the concepts of nature-based tourism, ecotourism, and sustainable tourism; provides a general overview of opportunities and issues; and suggests potential areas for future intervention for market development. The intent is to provide a general overview of existing literature to generate new ideas and serve as a primer for the SCDP team, and initiate actions aimed at stimulating tourism development on the island.

The management plan suggests that small-scale community based nature tourism development is the most appropriate form of tourism development for Socotra. Community based tourism development will ensure that benefits derived from tourism development are optimally distributed among stakeholders and that tourism resources are managed to achieve optimum benefits for all Socotrans.

The active participation and cooperation of all members of the community is central to achieving sustainable tourism development. An integrated, cross-sectoral approach to dealing with the increasing pressures on natural resources and island on biodiversity is essential. Linking aspects of sustainable tourism development with biodiversity protection is a first step in this direction.

Tourism can provide an opportunity to expand Socotra's economic base and can bring to the community new skills and employment opportunities through the provision of services such as accommodation, entertainment, restaurants, information services, souvenirs and handicrafts. In the longer term, the benefits will be extended to the villages and will assist in community development and poverty alleviation. Hopefully this will stimulate follow-on social and environmental advantages including the recognition that preserved natural areas can generate ongoing employment in rural areas.

The present plan will endeavour in the initial steps and will support resource mobilization efforts for the implementation of the Tourism Development Program, focusing on enabling communities to play an active role in this sector, and on building partnerships with the private sector. However, the development of tourism on Socotra, and its potential to attract even minimal additional investments in this sector, lies in the conservation of its protected areas and intact landscapes. If this basis is lost, the main potential engine of growth for the local economy will be lost as well.

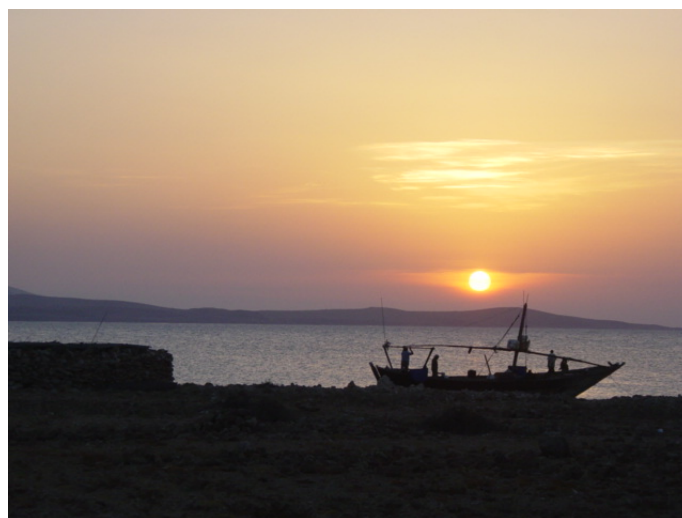
Sustainable Fisheries

This is recognized as another principal engine of growth for the economy of the island. At present, the fisheries sector represents a significant portion of the local economy. A significant amount of baseline studies have been conducted and are ongoing with GEF and EU support. These are at the basis of the formulation of a full-fledged fisheries management component for which the plan will support resource mobilization efforts.

Baseline studies have established that if properly developed (i.e. avoiding over-use in the ongoing initial phase of development), the fisheries sector will provide a sustained source of revenue for the local population in the long term. The identified network of marine protected areas has been designed also to serve as a basis for the preservation of important fish re-stocking areas, which will support the whole fisheries sector in the long-term. The plan will support the continuation of essential marine monitoring and conservation activities while additional resources for the full-fledged component are mobilized.

The main characteristics of the Fisheries sector in Socotra may be summarized as follows:

- The fisheries sector is almost entirely community-based, with strong traditional and customary fishing rules yet in place. Strong peer pressure among communities to observe customary rules results in a high level of observation thereof.
- However marine resources are being gradually over-utilized due to growing external demand, and some traditions are being overlooked in response of demand from buyer's vessels.
- Capacity to implement the Fisheries Management Plan is yet almost non-existent, with no monitoring, licensing and fisheries patrol capacity in place to protect local fishermen rights
- Poor handling and marketing capacity results in high waste (over 50%) and minimizes fishermen benefit
- Sub-optimal system of fishermen association makes them weaker on the market versus external buyers



(Fishing Boat. Courtesy of Tarek Abul Hawa)

By addressing the root causes of the above-identified issues, the plan aims at improving the livelihoods and options for revenue generation, focusing initially on those fishermen communities living in and around key marine protected areas. The main strategic areas of interventions of this potential additional component of the plan will include⁷:

- Improving fishermen organization into societies, and providing training for better handling and marketing capacity
- Fostering the preservation and enhancement of traditional sustainable fishing methodologies which will be the basis for introducing new science-based and sustainable approaches (e.g. switching from net to trap lobster fishing)
- Enhancing the ability of the MOFW and EPA to maintain and implement the Fisheries Management Plan with associated improved monitoring, legislative, licensing and patrol capacity

The plan will also identify and foster synergies between the nature based tourism and fisheries sector, such as marketing of fish to visitors, rental of boats, transportation by sea, sport fishing, accommodation in coastal villages, etc.

1.9 Local Governance: Capacity Assessment and challenges in Socotra

The Socotra archipelago is part of the Governorate of Hadramawt, and it includes two Districts (Hadibu and Qalansiyya). The new District Local Councils and District Executive Offices must deal with great difficulties and an onerous list of responsibilities relative to their limited experience and capabilities. These include:

- The peripheral location of the archipelago, which imposes tremendous logistical constraints that hamper the movements of people and goods and complicate the provision of essential services to the population;
- The significant human development backlog. Socotra and its islands are statistically the most disadvantaged area of Yemen, and development efforts in the archipelago have only started in recent years
- The responsibility to contribute to the conservation of natural resources of global importance and
- The significant international pressure to exploit the islands natural resources and eco-tourism potentials in an unsustainable fashion, and with little or no benefit for the local population and Yemen as a whole.
- A range of new socio-economic and development threats and environmental challenges facing the island. These threats are all associated with the recent opening of the island to the outside world (first civil aviation airport opening: 1999).

⁷ These will be part of the fisheries component of the plan, for which additional funding is being sought.

In facing these challenges, the District Councils and Local Administrations are constrained by serious capacity problems. We have already alluded to some of the problems (financial centralization and problematic Council-Administration relations) affecting the prospects of implementation of decentralization reforms and strengthening local governments in Yemen. In Socotra these are compounded by dysfunctional relations between the central and de-concentrated administration agencies in Sana'a and Mukalla and the islands' local authorities. In particular the Governorate structures in Mukalla do not play the necessary mentoring and supportive role that the implementation of the national decentralization reforms would require. Finally these systemic and institutional problems are compounded in Socotra by individual capacity limitations, which are the product of the historically low level of access to education and training opportunities for local people, and the limited contacts with mainland in general, which hampered human development for islanders until recent years. In Socotra, therefore, efforts to improve local governance are faced with the severe scarcity of qualified professionals even at lower grades, and the very low level of education of local GOY employees and LC members.

For all the above reasons, consistent support to the gradual reinforcement of local governance and administrative capacity in Socotra is critical to help local authorities face the extraordinary challenges that lay before them. There is a great opportunity for the present plan to put the local councils and administration in their legitimate central place in managing local development and strengthen the necessary and mutually supportive linkages between district, governorate and central authorities. Supporting the improvement of local governance is therefore a key component of the present plan; it has been designed and will be executed in a way, which is fully consistent with current efforts of both the GOY and its external development partners to implement the national decentralization reforms.

1.10 Prior Obligations and Prerequisites

The plan builds upon the installed capacity of the ongoing SCDP in Socotra and Sana'a. The present new phase of the program will entail a gradual shift towards a more direct involvement of the GOY in the administration and management of the program.

All of the program's national and international staff, essential infrastructure and equipment, administrative and management system is currently in place, and this will allow the timely commencement of program operations.

Between November 2003 and June 2004, the SCDP underwent a significant shift in the implementation approach: The former direct UN execution modality was replaced by National Execution (NEX) by the Ministry of Water and Environment (MOWE) – Environment Protection Authority (EPA).

The NEX approach places greater responsibility and control on project management and expenditures within MOWE and EPA. This shift is fully reflecting the gradual build-up of local capacity achieved since 1997, as well as lessons learned and recommendations of two prior external evaluations of the SCDP (Oct 2000 and July 2003).

The present management plan represents an immediate step taken jointly by the GOY and leading Donors on the island, towards addressing human development and environmental concerns in a more integrated fashion. This approach is in harmony with the important commitments signed at the recent Johannesburg Summit on Environment and Development (Aug 2002). The present plan aims at becoming a pilot demonstration case for the implementation of a well balanced and integrated approach encompassing development and environmental concerns in a well-defined area of intervention.



(Photo courtesy of John Farrar)

II. Strategy

The Sustainable Development and Biodiversity Conservation for the People of Socotra Island is a call for action to promote systemic and integrated human development and

biodiversity conservation in the nationally and internationally important Socotra Archipelago of Yemen, through:

- supporting main engines of growth for the local economy: eco-tourism and sustainable fisheries and implement the archipelago's zoning plan and community based management of protected areas;
- addressing selected most pressing basic community development needs and mobilize communities engagement in sustainable human development process and biodiversity conservation; and
- enhancing professional capacity of local and central government to steer sustainable development path for the archipelago, and mobilize additional resources to support an integrated conservation and development program.



institutions of the Government of Yemen, private sector, non-governmental organizations (NGOs), local communities and individuals, and international development partners of Yemen. The main intent of the management plan's implementation strategy is to create an enabling institutional environment, provide selected basic community needs and conducive technical and social conditions to secure basis for integrated sustainable development and conservation of Socotra islands. Thus the strategy takes into account the specificity of the issues to be addressed, the current institutional setting, and the biodiversity and socio-economic features and challenges facing the island. Main elements of the plan's implementation strategy are outlined below:

The management plan involves development and conservation sector

- Pursue the realization of the plans objectives by implementing all the plans components in an integrated and coordinated manner.
- Create necessary conditions to build and strengthen partnerships at all levels, especially with the local communities, private sector, and NGOs during the implementation process.

- Capitalize to the maximum possible extent on the institutional and technical opportunities and capacities already created under the previous phase of the plan.
- Create tangible mechanisms whereby relevant national staff can participate directly in the plan's implementation by establishing a decentralized management structure, transforming attitudes and practices, on the job training, learning from experiences of others and responding to lessons learned during the previous phases.
- Assign high priority to bridge technical capacity gaps in the short-term. At the same time, rely on local and national expertise to deliver the plan's outputs to the maximum possible extent.
- Mobilize and support organization of local communities to effectively participate in the plan's implementation process.
- Facilitate coordination and integration of efforts among all concerned Government entities and donor communities involved and mobilize additional resources to supplement developmental and conservation initiatives in the island.
- Better understanding of pressing development and conservation issues of the island and ensure that the Socotra issues are incorporated in regional and central developments plans.

II.1 Partnerships strategy

The implementation of the plan's activities will involve a large number of partners, each with different roles and functions. These include: (i) Government institutions; (ii) local communities and individuals; (iii) NGOs; (iv) private sector; and (v) external support agencies. Roles and functions of these partners are briefly summarized here.

Government Institutions: Implementation of the management plan's activities will not only involve MOWE/EPA and MOLA but many other Government institutions as well such as: MOH, MOA, MOFW, MOTC, MPIC, SFD, PW and local councils. The EPA will assume the lead responsibility in the plan's implementation.

Local Communities: Community based management; community development and decentralization are important components of the management plan. Local communities will be responsible to manage common resources, improve their own organizational set-up, undertake and maintain community development, conservation and ecotourism activities, and increase the involvement of women.

Non-governmental Organizations: The role of NGOs is very well recognized in organizing the local communities and assisting them in efficient management of natural resources. Given the rich ecotourism potential of Socotra and limited local capacities, the management plan will focus on mobilizing communities, raising awareness, and promoting ecotourism development. The plan provides an opportunity for the NGOs such as the SES, Socotra Women Societies, Protected Areas Management Associations and SCF and to play this role.

Private Sector: Appropriate marketing of natural attractions and provision of ecotourism services call for the involvement of the private sector such as hotel managers, tour operators, drivers etc. Given their limited capacities and experiences at local level, the plan will foster the improvement of local professional capacities and upgrading the quality of services provided on this island. This approach will maximize the revenue and benefits derived to local people from the development of ecotourism.

External Support Agencies: The management plan provides a comprehensive framework for donors' coordination in sustainable development and conservation of Socotra Island. Presently two major donors (UNDP and the Government of Italy) under co-financing modality, are providing financial contributions to this plan. The GEF program to support establishment and operation of the SCF is at an advanced stage of preparation. Once approved it will be an integral part of SDCP core program. Fellowship and scholarship programs of bilateral and multilateral agencies will continue to play active roles in capacity development of high-level cadres of involved local and national institutions. The management plan will continue to facilitate coordination and integration of efforts of donor communities involved and to mobilize additional resources during the plan's implementation process and to supplement developmental and conservation initiatives in the island.

II.2 Gender Issues

The management plan assigns highest priority to maximizing involvement of women and addressing gender issues in all aspects of the plan. This will be achieved through the following set of specific activities and cross-cutting approaches. The SCDP program currently employs a total 18 women (approx. 20% of all staff) as follows: 10 environmental education and awareness extension officers; 7 support staff; 1 Program Assistant in Sana'a.

A dedicated team led by women extension officers is managing and will continue to manage a special awareness program targeting women groups. This takes into account the structure of society in Socotra which in most cases does not allow for joint training and educational activities. This program focuses on aspects which hold primary importance for women in the island: mother & child care, primary health care and control of most incident diseases (malaria, TB, diharrea, lack of vitamin A, etc.), home-gardening & horticulture, environmental protection, etc. The team holds special events for women, develops targeted

illustrative and educational materials, arranges educational site visits and training courses for women only.

The program has supported and will continue to support the central mother and child care department of the Hadibu Hospital which was identified as the top priority for women health care in the island. Besides working side by side with the international health care specialist in Hadibu, the MOH Paramedical staff (obstetricians) will also participate in the activities of the mobile clinic and education unit which reaches all parts of the island.

The EPA (and, in the present new phase, the District Governments) have been and will continue to be encouraged to involve the two existing Socotra Women Cooperatives, and the island-wide Socotra Women Union in all aspects of the program and namely in: training activities, information sharing meetings, District Governments' statutory management and consultation processes. All SCDP's women technical staff and the above women associations and the Socotra Women Union were involved in the preparation and development of the SCDP's program document.



(Women's training session. Photo courtesy of Tarek Abul Hawa)

II.3 Intended Beneficiaries

A broad range of target groups including government institutions, local communities, NGOs, private sector, and the people of Socotra at large, will greatly benefit from the implementation of the management plan. The global community will also benefit from the plan's execution.

First of all, implementation of the plan will assist the EPA, MOLA and other major institutional stakeholders to benefit from the plan's framework

framework. The main building block of this framework are already in place (i.e. EPA Socotra branch, and SCDP Coordination Unit), and the plan will further consolidate and strengthen these blocks. The management plan's framework entails support to (i) the engines of economic growth (ecotourism and fisheries), (ii) selected most pressing community needs and (iii) capacity development at local and central levels to steer sustainable development and conservation of the island. The framework includes a range of outputs addressing protected area management planning and implementation, community based management, provision of selected basic services and utilities within and around protected areas, information system; capacity building; awareness raising, co-ordination, financing and monitoring mechanisms to implement the plans; governance mechanisms to ensure transparency and accountability. The staff of EPA, MOLA and other participating agencies, and representatives of the local councils will also benefit since this plan will build and strengthen their capacities in different aspects conservation, development and governance. The plan's interventions will also contribute towards harmonizing the functions of various institutional stakeholders.

The local community and people of Socotra will benefit greatly from improved community services, infrastructure, and facilities and improved safe water resources and food supply in the target areas. Population groups involved in fisheries and ecotourism activities will have the opportunity to acquire additional sources of income, and their professional capacities will be improved. Communities large will benefit from the improved decentralized governance systems. Improved health conditions resulting from the plan's concrete interventions and will have a positive affect on the health of overall population, especially mothers and children.

Yemen's national economy (e.g. by adding a high-profile ecotourism destination to Yemen's attractions) and the global community will also benefit from the conservation of the unique and rich biodiversity and cultural heritage of the island.

III. Detailed Description of Activities

III.1. Supporting the “Engines of Growth” for the local economy

Capacity of the EPA/MOWE Socotra Branch improved

Develop and implement a capacity building program for EPA/MOWE Socotra Branch

A program for the provision of training to the staff of the EPA and MOWE – Socotra Branch will be developed and implemented. The Program will be based on an initial training needs assessment, and will focus on the new professional skills required for the actual implementation of the Conservation Zoning Plan. This may include, but not necessarily be limited to:

- Basic skills: language, computer, GIS & Databases (for all newly recruited staff)
- Protected Areas Management
- Environmental Impact Assessment (EIA) Capability
- Project/Team Management skills
- Management-oriented Ecological Monitoring
- Ecological Monitoring System (EMS) management
- Education and Awareness Techniques
- Environmental law enforcement
- Principles of Eco-tourism & visitor management
- Sustainable Resource Use Management
- Administration and Finance
- Equipment maintenance and repair

The training program will entail a wide range of methods, including on-the-job (to a large extent), formal training on site and abroad, the program will continue to mobilize additional funds for a scholarship program for highly qualified EPA staff. The program will be supported by a full-time international technical advisor on site for a period of two years, and it will largely rely on regionally available expertise. The target beneficiaries of the training program will

comprise the staff of the EPA and MOWE, as well as representatives of other relevant government authorities, i.e. local branches of Ministry of Fish Wealth, Agriculture, Health, Education, local councils, community members, local NGOs and private sector, custom authority, port and airport authority, army and others as appropriate.

Enhance EPA operational capability in Socotra

Existing equipment of the local EPA branch will be gradually replaced as it degrades, and upgraded as per identified needs to match the requirements of the shift from Research and Survey to community-based Protected Areas Management, environmental law enforcement, EIA performance etc. This will include replacing and upgrading equipment such as 4WD vehicles, office supplies, camping and survey equipment, communication and outreach equipment, as more local staff become sufficiently trained to use it. A broad budget allocation is made to support the evolving needs of the EPA Socotra Branch, and its details will be entirely defined by the local EPA team in Socotra on an annual basis, on the basis of the budget available.



(Blackspotted Sweetlips. *Plectorhinchus Gaterinus*. Photo courtesy of Ahmed Saeed)

III.2. EPA Protected Areas Program operational

Implementation of Management Plans in four pilot protected areas of Dihamri, Homhil, Datwah lagoon, and Skund.

This activity is ongoing and will require consistent presence and increasingly demanding day to day management by EPA staff at each site. With support from the international Biodiversity Component Coordinator, particular emphasis will be placed on assisting local PA management committees and maintaining good relations with all local community groups throughout the

implementation of Management Plans. PA implementation will include a wide range of tasks including: habitat and species management, visitor management, ecological monitoring, community outreach and education, supporting community basic human development needs, etc.

The newly created (currently 3 manned) EPA Protected Areas Management Section will be strengthened, and newly appointed staff will be trained on-the-job during the whole project period. Draft Management plans for two pilot protected areas (Dihamri and Homhil) have already been developed by EPA.

Development of three new Management Plans

Experience gained in the pilot protected areas will inform the formulation and initial implementation of new management plans for additional 3 areas identified according to EPA priority ranking list. The management planning process will be largely community based, and will take advantage of the results and indications of ecological assessments carried out in previous years (1998-2002). This activity will entail: selection of new pilot areas, compilation of essential baseline information, agreement with local communities on PA management arrangements and preparation of PA Management Plans. This exercise will also provide the opportunity for newly recruited EPA staff to gain practical experience in MP development and collaborative management of protected areas.

Development and installation of visitor facilities in Protected Areas

On the basis of tourism site plans to be developed at the outset of the program, essential visitor signs, information panels and facilities will be developed and installed in all 4 pilot protected areas. These will be designed using durable and non-intrusive materials and techniques. Essential facilities may include, but not necessarily be limited to, i.e.:

- Appropriate Signage & information boards/panels
- Access Tracks and small roads essential for PA management and community needs
- Marked walking trails
- Site Maps
- Maintenance Program by local communities
- Waste management system (managed by local community)
- Campsite (where appropriate – to be managed by local communities), including shade, toilets, access to freshwater, designated fireplace, essential services (e.g. provision of firewood, food, water, waste management system, guiding etc.) by local community.

The development and installation of such facilities will be conducted by EPA in close collaboration with local PA management committees, mostly relying on locally available labor and materials.

Implementation of community-based law enforcement program

Additional funds are expected to be mobilized to support the revision and completion of specific by-laws and regulations for Protected Areas, Environmental Impact Assessments, import and export of biological material, access to bio-prospecting, as well as revenue-generation and revenue-sharing mechanisms in the tourism sector. On this basis, the EPA will work closely with all relevant local authorities and local communities in Socotra, to develop and implement suitable law-enforcement mechanisms. This will entail establishment of close collaborative links and conduction of joint training (see activity 1.1), with local tourism police, custom authority, port and airport authority, police, army etc.

III.3. Monitoring Operations

Management-Oriented Biodiversity Monitoring Program developed and implemented

The ongoing biodiversity monitoring program of the EPA is yet in its infant stages, and it is designed to provide a broad assessment of general status of the environment and biodiversity on the island if repeated every 5 years. This EMP is yet not fully implemented by the EPA due to limited resources and capacity, and it will be reviewed and improved to reflect and corroborate the new mandate of the EPA. As part of the program, the broad EMP will be continued and, where appropriate, consolidated and focused on key strategic areas, through partnerships with relevant national and international conservation NGO and research institutions. The biodiversity monitoring program will be implemented by trained EPA local staff, and community members, assisted by the full time international Biodiversity Component Coordinator. Some key partnerships are already being developed with key regional institutions, including: the Royal Society for the Conservation of Nature (Jordan), American University in Beirut (Lebanon), Durrell Wildlife Conservation Trust (UK), Birdlife International (UK), PERSGA, (Saudi Arabia) and others.

The EPA biodiversity monitoring program will be gradually shifting towards a more focused and management-oriented approach, and will be designed so as to be compatible with available resources at the EPA Socotra branch. It will concentrate largely within and around pilot terrestrial and marine protected areas, and –for some parameters- around major settlements. It will focus on monitoring main environmental parameters (e.g. meteorological data, water-wells levels, sea temperature, persistent organic pollutants, etc.); status of key rare, endemic, endangered and “flagship” species (e.g. sea turtles, dragon blood trees, etc.); control of invasive species (e.g. Indian house crow, *Prosopis spp.* Trees, etc.); protection of habitats and land-use patterns; impact of tourism, etc. The information gathered as part of the monitoring program will be utilized as integral part of the Decision Support System.

Meteo and water-well data collection network

As integral part of this activity, the existing meteorological and water-wells data collection network will be improved and expanded. This activity will be conducted as a collaboration between the EPA and the local representation of the National Water Resources Authority (NWRA) branch in Socotra. This effort builds upon prior experience at local level and aims at consolidating and expanding the achievements of ongoing phase one (Italy-UNDP-Poland, YEM/01/001, 2001-2003). This task will entail the maintenance of existing equipment, identification and purchase of new durable and user-friendly equipment and training for local staff in the use of equipment. The upgrading of equipment will be gradually effected compatibly with the capacity of local staff, and with the assistance and supervision of a short-term external consultant. The process of mapping of water resources (all island), and analyses of water quality & water-related diseases will be continued, upgrading existing maps produced by the EPA-Socotra GIS unit during years 2001-2002. The main objective will be the achievement of a comprehensive island-wide mapping of water resources. This will allow the overlapping of water resources and health information data, to produce indication of possible problem areas and prioritise interventions (e.g. on malaria).

Education and Awareness Program

The EPA education and awareness core team and its network of environmental education officers throughout the island provide significant installed capacity in this sector. In order to support the complex mandate of the EPA on the island, this team will consolidate and upgrade their range of skills and capacity throughout the next phase of the program. The E&A team will focus on the following fields:

- specific awareness raising campaigns for all levels of society
- training courses mostly for women groups, school teachers and local leaders
- supporting the establishment of environmental and archaeological clubs in schools
- special events
- consolidation of the existing environmental education centre in Hadibo
- Running the mobile health & environment awareness unit (see output 2.4)

The capacity of the local EPA team will be upgraded through the provision of training, equipment and through external short-term technical assistance in various fields, aimed at providing the local team with as wide a range of appropriate communication tools as possible (i.e. audio-visuals, art for school children, special events, etc.).

Environmental Impact Assessment (EIA) Unit in place

The EPA branch in Socotra is currently under significant pressure to supervise the performance of EIA for all major development projects in the island. Its

current capacity to perform this task is yet sub-optimal, and the local team has no choice but to rely largely on external technical assistance. The program will support the establishment of a small but effective EIA unit within EPA branch in Socotra, which will draw upon the technical skills of the local team and on a roster of external consultants. The unit will be equipped with the essential professional skills and equipment required to supervise the performance basic EIA for any development project on the island. This activity will be implemented in close cooperation with parallel activities in the EIA sector performed at national level by the EPA, through joint training and know-how sharing between the Socotra Branch and all other branches of EPA nationwide.

III.4. Support of the development of Eco-tourism

Training/Certification of Nature Guides

Training of local personnel in visitor management and nature interpretation is identified as an essential step by all eco-tourism development reports available for the archipelago. This activity will address the need to enable the local people to take an active role and gain economic benefits in the development of ecotourism on the islands.

This activity will entail the development and delivery of formal and on-the-job training courses held on site.. Selected trainees will have to demonstrate English or relevant foreign language(s) capability, and the program will support English language teaching as part of the training program. Socotri nature guides will be trained and the following specialised professional figures will be created on the island, i.e.:

- Terrestrial Nature Guides
- Caving Guides
- Marine Guides (sport fishing, diving, boat handling)
- Archaeology and Culture Guides

The above professional staff will be part of the Socotra Ecotourism Society and will be certified by the Ministry of Tourism and Environment and EPA.



(Homhil Protected Area. Photo courtesy of Tarek Abul Hawa)

Training for local stakeholders in management and service provision for eco-tourism

Specific training courses will be organized for local community leaders, hotel managers/staff, drivers & tourism police across the island, in association with the Socotra Ecotourism Society, whose members will be directly involved in the implementation of the eco-tourism and visitor management plan, as well as in the provision of services for tourists. The training courses will provide with a set of essential professional skills to deal with and take advantage of the opportunities provided by this sector.

A set of specific awareness and education workshops will be held on the island by EPA staff and external consultants, targeting all relevant GOY officials on the island, who are involved in the management of protected areas, development of ecotourism, and visitor management.

This activity will support ongoing EPA/MOWE efforts, and it aims at creating a better understanding among all relevant GOY officials at local level on the role to be played by local communities, EPA, the Socotra Ecotourism Society and the Socotra Conservation Fund, in all aspects of the management of protected areas and associated ecotourism development.

Eco-lodges and campsite management

In the development of partnerships with a set of national tour operators (private sector). This will be mostly done on-the-job, in partnership with private investors, and with provision of full-time technical assistance for the local staff. The program aims at supporting –for the first five years- local entrepreneurs and the SES in acquiring the necessary professional skills and capacity to become partners with external tour operators.

Develop Socotra Ecotourism Society as main supplier of ecotourism activities

The Socotra Ecotourism Society (SES) is a non-governmental association which has been recently (Feb 2003) established in Socotra by local communities and local private sector representatives, with the goal of promoting ecotourism development in the island. The Socotra Conservation and Development Program in coordination with the Environment Protection Authority are working closely with this new NGO in setting up training courses on ecotourism to improve services and marketing of natural attractions based upon the rich biodiversity of the island.

The SES will gradually acquire responsibility for managing an information centre at the airport and a visitor centre in Hadibu. More than 35 Socotri are members of the ecotourism association, which includes drivers, local guides, and fishermen.

Thirty people from all around the island attended language training courses supported by the SCDP (March-May 2003). A preliminary set of ecotourism packages are being developed by the SES, including rental of transportation (4WD cars with local drivers, camels, boats, etc.), rental of camping equipment, interpretation of natural, cultural and historical heritage, local guides, and food catering.

The SCDP will continue to support the SES, through provision of professional training (see above), support for SES promotional activities, and technical advice. This is expected to assist the SES in the initial period of operation, and to enable it to become an active partner with relevant national and international tour operators, which are gradually entering the island's ecotourism market. Besides the essential professional training for all the staff and members, the management plan's support to the SES will entail provision of essential office and communication equipment and facilities, mainly consisting in the two visitor centers (airport and Hadibo).



(Detwah Lagoon Protected Area. Photo courtesy of Tarek Abul Hawa)

III.5. Community Mobilization and Development

a. Access to safe drinking water improved

Five environmentally appropriate water harvesting systems are put in place

A range of small-scale interventions aimed at improving access to clean water for poor communities in and around protected areas will be supported by the management plan. The range of interventions envisaged may comprise, in order of priority, i.e.: development of natural springs (including water sources recently found in caves) with pipes and small reservoirs, rehabilitation of existing *kareefs* (traditional rainwater catchments), construction of new *kareefs*. This output builds upon prior experience and capacity of the program at local level and aims at consolidating and expanding the achievements of ongoing phase one (Italy-UNDP-Poland, YEM/01/001, 2001-2003).

Besides other small scale interventions, *kareefs* or other appropriate water management systems will be constructed or re-constructed, on the basis of existing and successfully installed socotra-specific and low-cost designs. Trained national personnel and local contractors for the supervision and implementation of this task are now available on the island. External supervision will be minimal, amounting to approx 1 person/month.

The areas for *khareef* or water management system construction will be identified on the basis of: (a) DGs and community consultation, (b) information provided by the EPA/DGs GIS database and Decision Support System and (c) Review of all other community water projects on the island for which funding is available from other sources including local and central authorities and other donors.

b. Improvement of home gardens in and around protected areas

The program will support small-scale interventions aimed at improving nutritional status of the population (with emphasis on women and children) in and around pilot protected areas managed by the EPA. The program will support the improvement of existing home-gardens where women are cultivating few essential crops (i.e. tomatoes, eggplants, sweet potato and spices) for home consumption. Small-scale interventions in support of this sector have proved successful and are ongoing in Hadibu with support from the Ministry of Agriculture and local NGOs, in collaboration with the program.

The SCDP will provide support to women groups for the improvement of existing home gardens, located within and around pilot protected areas. Assistance provided will be in the form of, i.e.: provision of seeds and tools, training for women (using experienced local women as trainers), Development and testing of small-scale irrigation techniques, Promotion of organic farming, Establishment of a community-based small nurseries, tree-planting in home gardens, encouragement of community-gardens to be managed by 3-4 families (economies of scale, labour back-up in case of illness) and other tailor-made interventions that will be developed in collaboration with local community groups and parallel home gardening projects supported by Ministry of Agriculture.

c. Malaria control program around protected areas

This activity will be implemented jointly by the local representatives of the Ministry of Health, the EPA and Program Team, and will be fully synergic and consistent with ongoing national malaria control programs. The program will support and complement the ongoing Malaria Control Program in Socotra, active since year 2001, following the guidelines of the Ministry of Health / WHO and enhancing the impact of this important GOY effort to control the most heavily incident disease on the island. The program will facilitate the extension of the existing governmental malaria control program to the so far unserved protected areas, supporting localized interventions to prevent the spread of malaria. Interventions will be part of the statutory EPA awareness program, and will range from targeted awareness campaigns to distribution of impregnated mosquito nets and will focus especially in those areas where the recent introduction of improved water management systems (*kareefs*, spring water harvesting) may increase the risk of malaria for the local population.

A baseline survey of malaria incidence, water bodies status, mosquito population and community awareness levels will be conducted at the outset of the plan, and will be repeated at year 2 and 5 of the management plan.

d. Support to the Health Sector

Health Units: Provision of essential equipment, furniture and basic renovation

These activities will be implemented jointly by local representatives of the Ministry of Health, the Program Team, and EPA. Infrastructure upgrading will be designed and implemented on the basis of careful prior review of national and regional policies and action plans of the MOH.

The gradual upgrading of Health Units performed during years 2001-2002 will be extended to four additional Health Units of the Ministry of Health, through the provision of essential equipment, furniture and basic renovation. The implementation of these activities will be conditional and consistent with the actual deployment by the Ministry of Health of full-time health workers in each of the target health units.

Hadibo Hospital: Mother & child care supported by full-time specialist for 3 years

The mother and child care department of the central Hadibo Hospital is critical to provide assistance for the whole island population. The M&C premises have been renovated with support from SCDP in year 2002, and a female Obstetrician has been recruited by the SCDP and is at work on the island with the local medical team since January 2003. This program has proved to be very successful as it (a) addresses the needs of the local women in one of the most critical sectors dealt with by the Hadibu Hospital, and (b) it provides excellent opportunity for local medical staff to be trained on-the-job and for an extended period. The program will therefore support the continuation of this activity for additional 3 years.

Hadibo Hospital: basic interior renovation and provision of essential equipment

A set of small and one-off interventions will be effected at the outset of the program to ensure an improved provision of primary and reproductive health services at the level of the central district hospital, which is currently serving the whole island. This intervention represents the consolidation of works started under prior project YEM/01/001. It is an interim measure aimed at improving current health service provision until the new hospital is operational (expected in year 2005).

Interventions will include basic interior renovation (indoor painting of hospital, renovation of hospital kitchen), and provision of a set of essential equipment, to be determined by a joint needs assessment at the outset of the program, to be conducted jointly by MOH and Program team. This activity builds upon the experience and needs identified during prior and ongoing close collaboration between the program and the MOH as part of project YEM/01/001.

Monthly Mobile health and Awareness Unit operated jointly by MOH and EPA

This activity builds upon the program's and EPA installed capacity on site, and experience gained over the period 2001-2003. The Mobile Unit program will be

implemented jointly by the Program Team, EPA and the local representatives of the Ministry of Health.

Systemic and integrated awareness and education programs are being developed and produced locally by EPA, using a wide range of audio-visual aids (posters, leaflets, video presentations, special events, etc.). These programs are designed so as to be (a) relevant to DGs programs, local issues and priority human development and environmental conservation topics, (b) consistent with parallel national campaigns promoted by the MOH, NWRA, NWASA and the EPA/MOWE in their specific fields and (c) presented in a systemic and integrated manner to the local communities. This activity will also take advantage of the existing network of Environmental Extension Officers of the EPA.

The ongoing Mobile Unit Program will be continued, and will be linked to all components of the program (health, water, environment, decentralization). Besides the provision of essential Primary health care and vaccination services, the Mobile Unit will provide education and awareness to the communities, covering primary health, water management and environmental issues in an integrated and systemic fashion.

The unit is entirely managed by the local EPA team in collaboration with local MOH staff, and is currently operating on a monthly basis to all remote areas of the island of Socotra. Once a year (conditions allowing), the unit is brought also the outer islands of the archipelago by the EPA, using locally rented fishing vessels.

III.6. Improved Capacity of Local Government in Socotra

All activities under this output will be implemented consistently with the national policies and legal framework of the decentralization reforms (Local Authority Law 4/2000 and related regulations). The two Socotra districts will be supported through this component of the program, to perform their tasks, liaise effectively with Governorate and Central Government, interact with local communities and deliver services to their constituencies.

A full-time Technical Advisor will work with the local councils and the local administration to coordinate and support all capacity building activities under this program. The TA will liaise with the DLDSP management and with the Mukalla-based District Facilitation Teams (DFT) and facilitate the intervention of the DFT external trainers who will provide short-terms inputs in the form of formal and informal (on-the-job) training.

Local Authorities Capacity Building Program

Based on an initial Training Needs Assessment, an integrated program for training the District Directors (Hadibo and Qalansiyya), Local Council Leaders, representatives of key line ministries and their support staff, will be implemented over the project period. The approximate total number of target

beneficiaries of the training program will be 100. This will include but may not be limited to:

- Councils' rights and responsibilities under the national decentralization policies and legal framework
- National legislation relevant to environmental protection and development and conservation issues in the islands
- Law enforcement with particular relation to the island's Zoning Plan and local Councils' by-laws
- District-level Strategic Planning
- Partnership building between Local Authorities, Community-based Organizations and Private Sector Units
- Local-level Investment programming and management
- Environmental Impact Assessment (EIA) requirements and principles
- Community participation in public sector decision making and implementation
- Annual District work-plans and budgets preparation, appraisal, approval and implementation
- Local Public sector / community-based procurement procedures
- Local public sector assets management
- Local Financial management, accounting and reporting
- English Language
- Computer Literacy

Upgrading of District Councils offices & facilities

Existing office facilities for the local government in Hadibo and Qalansiyya will be upgraded to meet essential operational needs. On the basis of an initial needs assessment, a detailed list of essential equipment will be jointly defined by the program and District Councils. The two District Councils will also be provided with one vehicle each, to facilitate liaison with communities in remote parts of the island. Equipment and facilities to be provided to District Councils will tentatively include:

- Room for community meetings
- Power generator to allow full-time operation
- Essential office equipment (fax/tel, computers+printers, filing cabinets, photocopier, essential furniture)
- Small renovation works (roof repair, painting, windows and door repair)
- 4WD vehicles (two land cruisers – to be provided by GOY)

Support to the Local Administration

In addition to the general training Program indicated above, and addressed to both elected councilors and nominated administrators, the program will also help strengthening and reorganizing the local administration (District Director's office and sector departments). To this effect the program will assist District Directors and local administrators:

- To assess sector-specific training needs and organize training courses for the staff at the outset of the program
- To develop job descriptions that help officials of the local administration to better do their work .
- To devise immediate measures to strengthen local capacity for own source revenue assessment and collection
- To adopt a local budget and planning system with adequate community participation
- To set the stage for involving local NGOs, citizens associations, cooperatives, private foundations, private enterprises in the delivery of local infrastructure and services where appropriate and possible
- To foster administrative transparency and put into place strong anti-corruption regulations and measures
- To developing project proposals for potential NGOs and donors' financing
- To ensure that all island's district councils and administrations "speak with one voice" when representing Socotra in regional and central government discussions

Enhanced level of cooperation with regional and central government

The current level of understanding of the island's realm and support for Socotra's development issues is yet limited among regional and central government officials. This results in the island receiving less attention than it actually requires, and in inappropriate decisions being taken outside the island. This activity aims at providing the tools and resources to the District Authorities , to foster a better understanding of, and support for, the pressing development and conservation issues of the island, and to ensure that Socotra issues are effectively incorporated in regional and central development plans. The District Authorities will be provided with resources to:

- Prepare and disseminate informative reports about the island's development issues
- Participate in regional and national development workshops, presentations and training courses
- Organise site visits to the island for high-level GOY officials responsible for the island development at central and regional level
- Support the work of liaison staff at regional and central level to facilitate communication and exchange of information with key GOY offices responsible for the island

Local Development Benefits Delivered by Local Governments in Socotra: Financing Local Governments' Delivery of Infrastructure and Services

The management plan will provide the two Socotra District Councils with predictable annual programmable resources totaling US\$ 60,000 per year, for development spending over the next 5 years. These funds, however limited, will

be critical to enable Local Councils to carry out a meaningful process of local development planning as they will provide both an incentive and a budget constraint to such process. They will be used as elements of a comprehensive local development financing strategy, to leverage co-financing from other sources (SDF, PWP, Donors, NGO and CBO) and to finance local priorities for which resources from other sources cannot be mobilized. Such resources are in essence externally-supported general-purpose transfers for development spending. This kind of transfers is supported also under the parallel UNDP “Decentralization and Local Development Support Program” (DLDSP) which is indeed concerned with the establishment of a national facility for external support to intergovernmental fiscal transfers in Yemen, under the name of “Local Authority Development Fund” (LADF). This program’s contributions to the two Socotra DC, are then the equivalent of the disbursements made to other districts from the LADF, under the DLDSP. . They will therefore be treated as part of the LADF resources and will be regulated by the same programming, procurement and disbursement rules applicable to the LADF as reflected in the LADF operations manual to be developed by the DLDSP-supporting Donors in consultation with the Ministry of Local Administration (MOLA).

Helping Local Governments to Promote Local Economic Development and Environmental protection in their jurisdictions.

While the delivery of infrastructure and services, represents a traditional area of local governments’ responsibility, local governments worldwide are increasingly confronted with the related challenges of promoting local economic development and protecting the local environment. This is particularly true for the two Socotra District Councils. The program will therefore assist local Councils to identify, through strategic planning exercises, concrete opportunities for partnerships with private sector units (including banking and micro-finance institutions) and community-based organizations, around environmental friendly local economic development opportunities. Where feasible and appropriate DC could use part of the resources accruing to them through transfers or own source revenue, to provide start-up grants take equity positions or otherwise contribute to the feasibility of the above ventures.

III.7. Improved Capacity of the Central Government to Steer and support the Development of Socotra

Capacity Building for the SCDP Coordination Unit

The Socotra Program Coordination Unit will consolidate its facilitating and coordinating role at central government level, and will focus mainly in the following areas:

- Enhancing understanding of Socotra issues among GOY and donors
- Mobilise resources for the island and develop proposals
- Facilitate improved coordination and integration of efforts among all concerned GOY entities involved
- Program Monitoring & performance assessment
- Production of SCDP Reports and issue papers
- SCDP Website oversight and management
- Provision of support to the SCDP Steering Committee and acting as its Secretariat
- Outreach and promotion of Socotra issues abroad, targeting new possible donor sources

An international Program Coordinator will assist the National Program Manager in his/her tasks and will support resource mobilization efforts in year one of the program.

The Coordination Unit will operate under the umbrella of the MPIC, and may be located within that ministry, or in the MOWE/EPA, which is the leading agency on site in Socotra. The unit will also provide overall management and administration of the program at central level, with assistance from the existing SCDP program support team of the EPA/MOWE.

III.8. Decision Support System (DSS) in use at central and local level

DSS development and operation

This activity aims at consolidating and expanding the Decision Support System concept whose development started in 2002. An easy and user friendly, menu-driven computer program will be developed with support by a team of national and international consultants. The DSS will build upon all existing data held at EPA Socotra and its structure will provide the framework to be gradually fed by data collected as part of the various components of the program.

The DSS will support the efforts of the Socotra Conservation and Development Coordination Unit, Local Authorities in Socotra and EPA/MOWE towards the monitoring of main environmental parameters, and integration of all sectoral components of the program into one planning and monitoring system.

The DSS will also gradually become a main tool for the monitoring of the Program's impact on the human development and environmental conservation on the island. This tool will complement and support ongoing effort of the EPA/MOWE/MPIC team towards the monitoring of program impact and progress in terms of human development improvement through the network of environmental extension officers. The DSS will integrate all available environmental parameters as well as key indicators related to the "Millennium Development Goals", e.g. poverty/income levels changes, job creation, school attendance, infant mortality, incidence of major diseases, etc.

The DSS will support the definition of clear Terms of Reference for each program's component, to ensure their effective integration into one systemic approach towards the sustainable development of the island.

Training will be provided to relevant staff of EPA, MOWE, Governor of Hadramawt Office and other relevant local and national authorities on the applications and use of the DSS. The training for EPA staff in Socotra and Sana'a will focus on the process of maintenance and constant updating and improvement of the DSS, required to make this decision making tool always suited to the changing social, economic, development and institutional realm of the island.

The training program will entail several subsequent visits by the trainer, to support the continued evolution of the DSS, provide refreshment courses, and technical backup when needed over the whole project period.

III.9. Socotra-Galapagos partnership initiative, operational

Professional staff and government officials exchange and training program

The Galapagos Archipelago (Ecuador, Pacific Ocean) and the Socotra islands of Yemen have special characteristics and are facing very similar development issues, although at different stages. The economic and human development of the two archipelagos will be based almost entirely on eco-tourism and fisheries. The Galapagos national park was established in 1959, and has therefore been tackling a complex set of issues that the newly created Socotra National park (2000) will have to face in the future. On the other hand, the people of Socotra have lived on the island for thousands of years, and have developed traditional measures to use sustainably their natural resources. In the Galapagos, significant human population presence is relatively recent (less than 100 years), and concentrated in rapidly developing urban areas at the edge of the national park.

The program will support the implementation of the "Partnership Initiative" between the Galapagos and Socotra archipelagos, which is designed to foster "horizontal" know-how transfer, joint training and capacity building, familiarization tours, sharing of best-practices, etc. among the two sites.

A concept document was developed for this component as a collaborative effort between the Drylands Development Centre, IUCN, UNDP, The DGCS (Rome) and the SCDP team in Yemen (see full draft information sheet Annex 4). This initiative was promoted during the recent Johannesburg summit. It will be financed under this program and will add value at national and international level, by twinning two of the most important and prominent island biodiversity conservation sites in the world.

The partnership initiative will entail close collaboration between two UNDP programs in the Galapagos and Socotra, both of which are supported by the

Italian Government. The initiative will be managed by the SCDP Coordination Unit, with support by the UNDP of Yemen and Ecuador, and in close collaboration with Ministries of environment of both countries. The first exchange of visits will take place in 2005.

II. Strategic Results And Resources Framework

Intended Outcome: Improved capacity of local authorities and community-based groups in environmental management and sustainable energy development - (Supporting the “Engines of Growth” for the Local Economy)			
Outcome indicator: Development and implementation of local sustainable development plans with the participation of the poor			
Partnership Strategy: UNDP is playing a catalytic role in linking environment to poverty and governance-related initiatives and in enhancing the capacities of decentralized bodies and local communities in natural resources management, including the protection of Socotra’s biodiversity. The Drylands Development Centre (DDC – former UNSO), GEF and the Governments of the Netherlands, Italy and Poland are UNDP main partners. With Parallel Funding by the GEF, the Socotra Conservation Fund will be operational and will support communities to develop and manage pilot environmentally sound development projects in collaboration with local authorities and EPA. The nationwide UNDP DLDS Project will support the involvement of local authorities and MOWE/EPA.			
Intended Outputs	Output Targets	Indicative Activities	Inputs Required
1. Supporting the “Engines of Growth” for the Local Economy			
Capacity of the EPA/MOWE Socotra Branch improved to implement CZP, EIA, PAM, ecological monitoring, awareness raising and resources use and management INDICATORS - EPA Socotra Branch team performing community-based PA management, visitor management in PAs, basic EIAs, targeted and management-oriented awareness and education campaigns in PAs, all based upon annual consolidated work plan and budget. BASELINE - EPA Branch currently able to conduct ecological monitoring surveys, general awareness campaigns. - PA management, EIA, EMS development, management-oriented awareness, planning and budgeting capacity is yet limited	TARGETS - EPA Socotra Branch staff structure revised to reflect broader EPA mandate (year 1) - Improved capacity of existing EPA team to perform new tasks listed above (year 3) 10 new technical staff recruited and trained (year 3)	1.1.1 Conduct training needs assessment 1.1.2 Develop & implement capacity building program for EPA/MOWE Socotra Branch 1.1.3 Mobilize additional funds for scholarship program for highly qualified EPA staff 1.1.4 Undertake on the job-training at site 1.1.5 Upgrade and/or replace equipment and vehicles	- Site Coordinator’s Advisor (international, 48 p/m) - EPA capacity building program (5 years) - Equipment and vehicles replacement and upgrading Budget: 599.000\$

EPA Protected Areas Program enhanced and operational INDICATORS • EPA annual reports and MPs implementation reports • New Management Plans • Essential visitor Facilities in place • Biodiversity Monitoring Program reports • Education and Awareness Program team reports BASELINE • Draft management plans for three pilot PAs being developed by EPA • No visitor facilities in place in any PA • No law enforcement program in place • Island-wide, not yet management-oriented, broad Biodiversity Monitoring Program developed but not yet implemented • Education and Awareness Program addressing general environmental issues for the island • No protection or conservation of the archaeological sites	TARGETS • Four PAs managed by local communities with support from EPA on the basis of an agreed management plan • Three Management Plans for additional PAs developed in collaboration with local communities • Visitor Facilities in place in all four PAs • Community-based Law enforcement program in place in all four PAs • Management-oriented Biodiversity Monitoring Program in Place • Education and Awareness Program active and focused on supporting the EPA PA Management Program • Implementation of management plan for archaeological sites	1.2.1 Implement Management Plans in four pilot protected areas of Dihamri, Homhil, Datwah lagoon, and 1.2.2 Skund. Select new pilot sites for protected areas, compile essential baseline data and secure agreement with local communities 1.2.3 Develop three new management plans 1.2.4 Develop and install essential visitor facilities in pilot Protected Areas 1.2.5 Review and update legal instruments to regulate PAM, EIA, import and export of biological materials, access to bio-prospecting and revenue generation and revenue sharing mechanisms in the tourism sector 1.2.6 Develop and enforce law enforcement mechanisms in consultation with local communities 1.2.7 Up-grade and implement a management-oriented Biodiversity Monitoring Program 1.2.8 Set-up and operate meteo and water-wells data collection network 1.2.9 Consolidate EPA's Education and Awareness Program 1.2.10 Set-up EPA's Environmental Impact Assessment (EIA) Unit and enhance its capacities 1.2.11 Develop training courses and manuals on terrestrial nature, caving, marine (sport fishing, diving, boat handling), and archaeology and culture guides 1.2.12 Provide training for local stakeholders (community leaders, hotel staff, drivers, and tourism police) in management and service provision for eco-tourism 1.2.13 Organize awareness raising workshops for government officials on the island 1.2.14 Support local entrepreneurs in acquiring basic professional skills and capacities to partner with external tour operators 1.2.15 Develop Socotra Ecotourism Society (SES) as main locally-based supplier of ecotourism activities on the island through professional training, promotional activities and technical advices 1.2.16 Enhance capacities of PAM Unit in protected area planning, management, monitoring and community mobilization	• Protected Areas Specialist (international, 24 p/m) • Hydrogeologist (shortterm 2 p/m) • National team (all program. @ 90 staff, 5 years) • Ecological Monitoring equipment (water and meteo) • Travel & operations (5 years) • Printing of educational material Budget: 1.976.633\$

2. Community Mobilization and Development			
2.1 Access to safe drinking water increased INDICATORS • No. of systems functioning • No. of people served • No. of villages served BASELINE • Water-harvesting and/or storage facilities are either completely absent or in need of upgrading/repair • Women spend much energy carrying water over long distances • Available water often contaminated	TARGETS • 5 safe water harvesting systems in place by year 5	2.1.1 Identify areas for appropriate water management systems based on community consultation, Decision Support System and on ground experiences 2.1.2 Develop water management systems including i.e.: natural water springs from caves with pipes and small reservoirs/ rehabilitation of existing kareefs/ new kareefs 2.1.3 Train national personnel and local contractors to supervise and implement construction of water harvesting systems	• Engineer (national, 10 p/m) • Engineer (international, 2 p/m) • Subcontracts for water management systems construction Budget: 203.000\$
2.2 Food security improved through home gardens and improved self sufficiency INDICATORS • No. and size of gardens • No. of women participating • Productivity of home gardens BASELINE • High incidence of malnutrition (especially with micronutrients) among women and children in rural areas throughout the year • Very low degree of agricultural activities in rural areas, limited or no access to fresh vegetables and fruit because of lack of market	TARGETS • Number and size of home gardens in target areas increased by 50% • At least 50 women involved in the training program • Productivity of existing home gardens improved by 50%	2.2.1 Support the upgrading home gardening and cultivation of vegetables within and around protected areas, through provision of training and initial equipment, seeds and materials.	• Training program for women • Equipment, tools, seeds, small irrigation schemes Budget: 160.000\$

2.3 Malaria Program extended to protected areas	TARGETS	2.3.1 Develop and implement awareness campaign in and	• Baseline (and repeat) survey of malaria
INDICATORS • No. of cases of malaria recorded in target areas • No. of people regularly using mosquito nets BASELINE • No malaria control program in place in protected areas • Awareness among population regarding malaria control still very low • Most water management systems are not monitored regularly for malaria control	• Awareness of local population increased, and reflected by higher use of preventive measures (i.e. mosquito nets) • Mosquito population density in target areas significantly declined	around protected areas, in support of the ongoing malaria control program 2.3.2 Conduct a baseline survey of malaria incidence, water bodies status, mosquito population and community awareness level in and around pilot protected areas 2.3.3 Support the extension of government malaria control program in and around protected areas	incidence in Protected Areas • Impregnated bed nets • Minor works to make water storage malaria-safe Budget: 40.000\$

2.4 Community health facilities and services upgraded in Hadibu and in proximity of protected areas INDICATORS • Increased utilization of health services at facility level • No. of cases treated by obstetrician per year • No. of renovation projects carried out and no. of equipment delivered • No. of trips effected by mobile unit BASELINE • Health units in disrepair, poorly equipped, understaffed, under-funded, low attendance and motivation of health staff, insufficient community participation • Low utilization-rate, low quality of services, high bypass-rate • Obstetrician recruited by phase 1 of SCDP in Feb 2003. • Basic renovation (indoor painting of hospital, renovation of hospital kitchen) • Basic equipment (to be determined by needs assessment) • Mobile unit running on a monthly basis	TARGETS Health Units: • Improved provision of primary and reproductive health services to communities in and around protected areas • Basic renovation of four health units • Basic equipment of four health units • Extension of district health system to the four health units (including cost-sharing, revolving-drug fund and regular supply-line) • Support to Health Facility Committees Hadibu Hospital: • Mother & Child care Unit fully operational and 4 local staff trained by year 3 • Basic renovation plan development and implemented	Health Units in the Proximity of protected areas: 2.4.1 Assess capacities and equipments of health units in the proximity of protected areas and identify gaps and needs 2.4.2 Provide essential equipment, furniture and basic renovation for selected health units in the proximity of protected areas 2.4.3 Consult with health facility committees and support their operation as appropriate 2.4.4 support the extension of district health systems to four health units Hadibu Hospital: 2.4.5 Assess capacities and status of essential equipment and premises at Hadibu Hospital 2.4.6 Support the mother & child care unit of the Hadibu Hospital with a full-time specialist for 3 years 2.4.7 Train four local staff on mother and child care 2.4.8 Enhance primary health care services at the Hadibu Hospital through provision of basic interior renovation and essential equipment Mobile Clinic, Awareness and Education Unit:	Health Units: • Subcontracts for HU equipment and minor renovation Budget: 92.000\$ Hadibu Hospital: • Mother and child care specialist (locally recruited international, 36 p/m) • Hospital equipment and renovation • Training for medical staff Budget: 75.400\$ Mobile Clinic
	by end of year one of the program Mobile clinic and education unit: • At least 60 mobile units trips implemented over the 5 year period • Mobile unit provided with broader range of audio-visual aids	2.4.9 Support the Mobile Unit program operated jointly by MOH and EPA in provision of primary health care services 2.4.10 Support mobile units to promote education and awareness raising among communities covering primary health, water management, and environmental issues in an integrated and systematic fashion. 2.4.11 Provide mobile unit with essential audio-visual aids and awareness materials	• Equipment and materials for mobile clinic & awareness unit • Operational costs Budget: 79.000\$ Component total: 246.400\$

3. Governance and Resources Mobilization			
3.1 Capacity of Local Government in Socotra, improved INDICATORS • Implementation of District-level participatory planning and budgeting procedures • Increase in local resources mobilization • Number of Councillors and Administrators Trained • Number of District Accounts independently audited BASELINE • Continuing centralization at Governorate level (Hadramawt -Mukalla) of responsibility for Socotra district –level public expenditure management. • Very limited professional capacity of district administration staff • No capacity to prepare, appraise, approve, implement, monitor and evaluate district-level strategic plans, annual work plans and budgets, • Lack of plans and procedures for local assets management (operation and maintenance)	TARGET • Local Councillors are familiar with (i) the legal framework of decentralization,(ii) their related rights and responsibilities, and (iii) the annual cycle of the District Council’s activity • The District Director, selected local administration staff and members of the Council’s permanent committee for planning and budgeting, are familiar with participatory planning, budgeting procedures and take the lead in their implementation • District strategic plans, annual work-plans and budgets are prepared and implemented in Socotra in a participatory fashion. • Community-level structures are operational and (i) ensure people’s participation in local public sector decision and (ii) perform social audits of Local	3.1.1 Develop and Implement a Local Authorities Capacity Building Program including training on participatory strategic planning, budgeting and monitoring and evaluation 3.1.2 Upgrade District Councils offices & facilities 3.1.3 Enhance DGs’ level of cooperation with regional and central government 3.1.4 Set up structures and procedures for systematic involvement of communities in DGs decision making process & development of District Plans 3.1.5 Support the external independent financial and social auditing of district accounts and assess capacities developed	• DLDSP Officer in Socotra (national, 60 p/m) • Training facilitation costs • DG budget auditing • Improvement of DG office facilities (construction and repair works) • Office equipment and consumables Budget: 200.000\$
• Lack of structures and procedures for systematic involvement of communities in LG decision-making processes. • Lack of structures and procedures for social auditing of LG administrative and financial performance • No independent auditing of LG accounts	authorities administrative and financial performance. • District authorities accounts are audited by independent external auditors		

3.2 Local Development Benefits Delivered by Local Governments in Socotra INDICATORS • Improvement in coverage and quality of basic infrastructure and services in selected sectors • Number of DC/CBO partnerships for economic development and environmental protection BASELINE • DC have not yet taken responsibility for provision (planning and financing) of basic infrastructure and services • Local administration's ability to deliver services suffers from both inadequate financing and weak capacity • Infrastructure endowment and public services delivery is grossly inadequate across most sectors in the islands • C have not yet taken responsibility for regulating and promoting local economic development and environmental protection • Local economic development opportunities based on fishery and eco tourism, are lost, under-exploited or exploited in a way that is not environmentally sustainable.	TARGET • A total of 60,000 US\$ are transferred every year to the two Socotra District Councils, and are used to finance local development expenditures (provision of infrastructure and services) reflected in approved District programs and budgets • A share of the total resources of the two councils is used to support partnership arrangements with CBO implementing local economic development or environmental protection projects prioritized in the frame of the Districts' strategic plans	3.2.1 Finance Local Governments' Delivery of Infrastructure and Services 3.2.2 Assist Local Governments to Promote Local Economic Development and Environmental protection in their jurisdictions.	• Support to DG annual development expenditure (pilot LADF fiscal transfer, 5 years) Budget: 300.000\$
3.3 Capacity of the Central Government to Steer and support the Development of Socotra, improved	TARGET • Increased quantity and quality	3.3.1 Build the professional capacity of the SCDP 3.3.2 Coordination Unit in Sana'a Develop proposals for a wide range of additional	• CTA (international, 12 p/m) • National Program
INDICATORS	of resource allocation to Socotra	conservation and development elements of the	Manager (national, 60 p/m)

• Annual SCDP reports • Proposals developed • Website BASELINE • SCDP Established in 2002 and staffed with 2 national and 1 international staff, operating with minimal budget • SCDP steering committee not formally established • Capacity of SCDP to effectively coordinate GOY efforts limited • Level of awareness of Socotra issues among GOY officials yet limited	by GOY and Donors • 3 Proposals prepared in year one • SCDP website updated on a bi-monthly basis • SCDP steering committee established by year 1 and meeting at least annually	3.3.3 program in the island and mobilize resources Report on program performance 3.3.4 Up-grade and manage SCDP Website 3.3.5 Provide secretarial services for the SCDP Advisory committee 3.3.6 Promote Socotra issues among stakeholders and donor community at national and international level 3.3.7 Produce and disseminate program reports and documentation	• SCDP coordination unit support staff (driver, assistant) • National short-term consultant • Equipment • Travel and operational costs Budget: 485.000\$
3.4 Decision Support System (DSS) in use at central and local level INDICATORS • DSS in place and being used by EPA and local authorities • No. of users in Socotra and at central level BASELINE • Initial components of DSS being used by EPA Socotra Branch	TARGET • DSS framework in place • DSS dynamic data collection system in place • DSS effectively used by EPA and local authorities	3.4.1 Develop an integrated Decision Support System (DSS) 3.4.2 Set up mechanisms and procedures for use and application of the integrated DSS by MOWE/EPA, SCDP CU and DGs 3.4.3 Train national staff on use and application of the integrated DSS	• DSS consultant (international, 4 p/m) • Training courses • Equipment and materials • Travel costs Budget: 75.000\$
3.5 Socotra-Galapagos partnership initiative, operational INDICATORS • No. of staff and officials exchanging visits • Know-how exchanged (legislation, regulations, lessons learned, etc.) BASELINE • No contact between the two archipelagos	TARGET • 6 high level GOY and GOE officials exchanging short visits • formal cooperation agreement signed between GOY and GOE • 20 professional staff exchanging visits and attending training in both archipelagos	3.5.1 Develop and implement the Socotra-Galapagos professional staff and government officials exchange and training program 3.5.2 Report on the Socotra-Galapagos initiative achievements at national and international level	• Exchange of visits by high-level government officials (6 pax) • Exchange program for technical staff (20 pax) • Training courses • Partnership Initiative management and admin. Costs Budget: 296.000\$

V. Management Arrangements

This project will be nationally executed by the Ministry of Water and Environment (MOWE) and implemented by the Environment Protection Authority (EPA) and MOLA with extensive management support services provided to the executing agent by the UNDP Country Office such as procurement, recruitment of program's national staff, and the recruitment of the program's international staff and CTA. This support will be clearly articulated in a Letter of Agreement (LOA) signed between the MOWE and UNDP. UNDP's National Execution (NEX)⁸ rules and regulations will be applied in the execution and implementation of this project. The MOWE will be responsible for achieving the desired results outlined in the project through the effective management and use of UNDP administered funds.

The EPA will be supported in the implementation of activities through a project team whose composition is listed below. The team will be provided with a fully equipped office by the MOWE/EPA (in Sana'a) and by EPA (in Socotra) at their respective premises. The EPA will be responsible for planning, management and coordination of program activities in the Socotra archipelago. External agencies such as UNOPS, IAPSO, DDC and others may be called upon, as cooperating agencies, to provide certain support and technical services to the program. More details will be spelled out in a LOA between the service provider and MOWE.



(Meeting with local officials. Photo courtesy of Tarek Abul Hawa)

⁸ National execution is a cooperative and operational arrangement whereby a Government institution assumes overall responsibility and assumption of accountability, for the formulation, management by the country program of UNDP-supported projects.

V.1 Role of the Parties

MOWE, as the executing agency, will have the overall responsibility and accountability for the effective management (execution) of this program. The MOWE will ensure that program outcomes and outputs are achieved and reported satisfactorily through periodic reports that will be generated by EPA, with support from the program team. It will be accountable to UNDP for the production of outputs; achievement of program objectives and use of UNDP administered funds and resources. The MOWE/EPA will host the SCDP Coordination Unit, which will be transferred there from its current location in the MPIC.

EPA, as the key implementing agency, will be primarily responsible for the planning and day to day management of program activities, reporting, accounting, monitoring and evaluation of program. The MOWE/EPA will also be responsible for the coordination of the other cooperating/implementing agents.

The MOWE/EPA will also be jointly responsible to ensure that the experience of the Socotra program is shared and streamlined with national-level activities i.e. EIA, Protected Areas Policies, eco-tourism development, etc.

The Ministry of Planning and International Cooperation will support the SCDP Coordination Unit (to be transferred from MPIC to MOWE) in the coordination of program activities with other development partners, and in the promotion and facilitation of resource mobilization. MPIC representatives will participate in all UNDP-led program's monitoring and evaluations.

Cooperating and Implementing Agencies: of which there may be more than one, in addition to the main implementing agency (EPA) will be responsible for the implementation of certain project's activities and delivery of inputs and their conversion into program outputs in accordance with the program objectives and work plan and as spelled out in a LOA signed between the UNDP and MOWE. It will be accountable to MOWE for the quality, timeliness and effectiveness of the services it provides and the activities it carries out as well as the use of UNDP administered funds provided to it. These cooperating agencies could be one of the following:

1. Ministry of Local Administration
2. Ministry of Health
3. Ministry of Public Works and Urban Development
4. United Nations Office for project Services (UNOPS), Drylands Development Centre (DDC), IAPSO.
5. Local and International NGOs (i.e. SCF)

The Decentralization and Local Development Support Program (*DLDSP*)⁹: this management plan will join forces with the parallel DLDSP in supporting the Socotra District Councils and Administration and will share responsibilities as follows:

(a) The DLDSP will be responsible for:

Developing and extending to the Socotra local authorities, procedures and techniques for the implementation of an improved local resources management cycle (participatory strategic planning, investment Programming, annual budgeting, project implementation and procurement, local assets management, accounting and reporting, and monitoring and evaluation). A Mukalla-based “District Facilitation Team” (DFT) set up under the DLDSP will be responsible for providing the Socotra Districts with the appropriate training, facilitation and technical assistance services. With respect to this latter point, District authorities in Socotra have stressed the importance that, to ensure consistency with national directive and sustainability of the whole effort, assistance for improvement of LC/LA management capacity be channeled through the Governorate structures in Mukalla, (rather than by an ad-hoc externally financed project management unit) as part of their regular functions of support and supervision to local authorities

(b) The SCDP will be responsible for:

Providing the Socotra District Councils with predictable annual Programmable resources for development spending over the next 5 years. Such contributions will be treated as equivalent to the disbursements made to other DLDSP-covered districts from the Local Authorities Development Fund (LADF : a financial facility established under the DLDSP to pilot a national system of fiscal transfers), and will therefore be subject to the same programming, procurement and disbursement rules applicable to the LADF.

Providing the services of a dedicated national expert (i) to serve as this program’s “liaison officer” with the DLDSP management and the Mukalla-based DFT, and (ii) to coordinate the entire effort of local authorities capacity building in the archipelago.

Extending logistic assistance, including necessary facilities and equipment, for the effective operation of District Councils and administrations in the archipelago.

UNDP: approves the project and activities work plan presented by MOWE, ensures appropriate project appraisal and capacity assessment, coordinates

⁹ The DLDSP pilot phase will be funded by UNDP and UNCDF (total cost 1.5 M. US\$). It started in mid-2003 and will have duration of two years. It is expected to continue after that as a multi-donor funded national Program of support to the implementation of decentralization reforms. The consolidated SCDP – once fully in place- is advocated as the main vehicle for supporting the channelling most additional assistance to the island, in an integrated fashion, and consistently with the GOY’s vision for a sustainable development in the archipelago.

auditing process, monitoring, evaluation and validation, and ensures financial and substantive oversight of the project. It will also play a key role in donor coordination and resource mobilization activities. The UNDP Country Office Environment Unit will provide technical backstopping and other technical support to the project when required. Furthermore, the UNDP CO will also, upon the request of MOWE, will provide support for certain logistical and administrative services. These may include the recruitment of international and national staff, procurement of certain equipment, training and capacity building, etc., and contracting with local entities. These support services will be articulated in the letter of agreement (LOA) between the MOWE and UNDP.

V.2 Project Financial Management

In line with the introduction of Enterprise Resource Project (ERP) and new NEX guidelines, the project will employ and use the Microsoft Project software for work planning, reporting, record keeping and overall financial management of the project. The program staff, in particular, the Program Management Team will be required to install the software in Sana'a and Socotra.

Disbursement of projects fund will be made in all cases, except where otherwise specified in the LOA, through direct payment request to the UNDP office. Due to the special conditions and peripheral location of the Socotra Archipelago, special arrangements will be put in place by the UNDP CO in order to facilitate direct payments to be effected in the archipelago. These may entail the opening of a special bank account for the project, and the delegation of responsibility to one or more members of the Program Management Team to issue payments on behalf of the UNDP CO, from the program's account, on the island.



(Photo courtesy of Tarek Abul Hawa)

V.3 Project Management Team

The Program Management Team will be responsible for managing inputs, delivering outputs and reporting on progress and results achieved to MOWE and UNDP. The four key members of the Program Management Team and their main tasks are listed below:

	Personnel	Key Functions	Notes
1	National Program Manager (NPM)	• Based in Sana'a, with frequent travel to Socotra • Accountable to MOWE and UNDP for use of project resources • Represent the MOWE's ownership and authority over the project • Approves expenditure requests • Represent MOWE and Program in meetings forums • Responsible for the implementation of activities and management of inputs • Prepare and update work plans • Ensure that inputs are Mobilized • Prepare and report to MOWE and UNDP	This person should be assigned to work full time as project Manager focusing only on the UNDP supported program.
2	Chief Technical Advisor (CTA)	• Based in Sana'a, with frequent travel to Socotra • Provide managerial and technical advice aimed at building the capacity of MOWE and EPA • Assist in Program Monitoring and Evaluation • Prepare reports to MOWE, UNDP and Donor Community • Mobilize resources and liaise with Donors • Mobilize international expertise in strengthening the management capacity of MOWE and EPA • Endorses expenditure requests submitted by the NPM to UNDP	International
3	National Site Coordinator (NSC)	• Based in Socotra, with regular duty travel to Sana'a • Accountable to NPM for use of project resources in Socotra • Represent the MOWE's ownership and authority over the project in Socotra • Approves expenditure requests in Socotra • Represent MOWE and Program in meetings forums on the island • Responsible for the implementation of activities and management of inputs in Socotra	National

		• Prepare and update work plans for all socotra-based activities • Ensure that inputs are mobilized • Prepare and report to NPM for submission to MOWE and UNDP	
4	Site Technical Advisor	• Based in Socotra, with regular duty travel to Sana'a • Provide managerial and technical advice aimed at building the capacity of MOWE, EPA and other partner implementing agencies in Socotra • Assist in Program Monitoring and Evaluation • Prepare reports on socotra-based activities to MOWE, UNDP and Donor Community • Mobilize resources and liaise with Donors • Mobilize international expertise in strengthening the management capacity of MOWE and EPA • Endorses expenditure requests submitted by the NPM to UNDP	International

Detailed Terms of Reference for all project personnel are prepared in accordance with the NEX guidelines.

V.4 Coordination Arrangements

The UNDP Country Office and the project team will provide effective management and coordination support to MOWE and EPA within and outside the project to build strategic partnerships and ensure the effective participation of all the concerned parties in order to achieve the desired results of the project.

The EPA will be responsible to ensure that weekly meetings are held between the EPA management in Sana'a and Socotra, a representative of UNDP (in Sana'a), and the program management team, to maximize information sharing and coordinate all activities as closely as possible.

V.5 Advisory Committee

The Advisory Committee will function as an oversight Advisory body to the Program Management Team, through MOWE and MPIC, that provides insight and advice to project staff to ensure that activities are on track and results are achieved in accordance with the project work plan. Additionally, the Advisory Committee will review the

project work plan and make policy advice and recommendations to improve project implementation. The SCDP Management Team will act as the Secretariat for the committee and will liaise with MOWE, MPIC and UNDP to arrange and prepare committee meetings.

The Committee will be convened at the launch of the project and subsequently at least once a year. It will be convened under the patronage of, and hosted by the Minister of Planning and International Cooperation, and

- Minister of Planning and International Cooperation
- .Minister of Water and Environment
- .EPA Chairman
- .Ministry of Tourism and Culture
- .Ministry of Fish Wealth
- .Ministry of Agriculture
- .A representative of UNDP CO
- .National Program Manager & CTA
- .National Site Coordinator & STA
- .SCDP Contributing Donors (Gov. of Italy)
- .District Directors of Hadibu and Qalansya (MOLA) and DLDSP Focal Point - Socotra
- .Yemeni Islands Promotion and Development Authority (MOLA)
- .Ministry of Health

Other parties (i.e. Donors and NGOs active in Socotra, relevant GOY agencies and national or international experts, etc.) may be invited to attend and/or contribute to the meetings by the SCDP Management Team. In the occasion of the AC meetings, The Program Management Team will also hold a presentation open to all AC members, as well as any interested MOWE/MPIC/EPA staff and any other stakeholder, illustrating progress and achievements and plans for the subsequent year.

V.6 Monitoring and Evaluation

The project will be subject to the standard UNDP review, monitoring and evaluation guidelines. Monitoring and evaluation will focus on outputs and their contribution (together with partnership efforts) toward the intended outcome. Information from monitoring will provide the basis for making decisions and taking action. The right mix of monitoring tools will be used including:

- a. Reporting

The National Program Manager (NPM), with assistance from the EPA technical team and the Chief Technical Advisor (CTA) will prepare and submit to UNDP and the MOWE an Annual Project Report (APR) in accordance with the new APR format of UNDP. Reporting will also include the preparation of semi-annual work plans and budgets for the project to be reviewed and approved by the UNDP country office. They shall also provide UNDP with bi-annual short narrative progress reports to assess progress against the work plan and output targets. Additional reports may be requested, if necessary, during the course of the program.

b. Validation

The program will be subject to regular and periodic field visits by UNDP Office to verify results and recommend action. At least two field inspection visits will be conducted annually.

c. Audit

As per UNDP audit requirements, the project will be subject to NEX audit once a year to ensure compliance with rules and policies under NEX and to satisfy UNDP and Government responsibilities for accountability.

Agency Services Fees

To cover all administrative costs related to the inputs for the delivery of which funding is provided through the Cost-sharing agreement with the Republic of Italy, UNDP shall charge an overhead rate of 7% (seven per cent).

To cover all administrative costs related to the inputs for the delivery of which funding is provided through UNDP TRAC funds, the UNDP CO shall charge an overhead rate of 3% (three per cent).

V.7 Tentative Work plan

	Year 1	Year 2	Year 3	Year 4	Year 5
Component 1. Supporting the “Engines of Growth”					
1.1.1 Training needs assessment	•				
1.1.2 Develop and implement a capacity building program for EPA/MOWE Socotra Branch		•	•	•	•
1.1.3 Mobilize additional funds for scholarships	•	•	•	•	•
1.1.4 Undertake on-the-job training on site	•	•	•	•	•
1.1.5 Upgrade and/or replace equipment and vehicles	•	•	•	•	•
1.2.1 Implement of Management Plans in four pilot protected areas of Dihamri, Homhil, Datwah lagoon, and Skund.	•	•	•	•	•
1.2.1 Implement Management Plans in four pilot protected areas of Dihamri, Homhil, Datwah lagoon, and Skund.	•	•	•	•	•
1.2.2 Select new pilot sites for protected areas, compile essential baseline data and secure agreement with local communities	•	•			
1.2.3 Develop three new management plans		•	•		
1.2.4 Develop and install essential visitor facilities in pilot Protected Areas	•	•	•		
1.2.5 Review and update legal instruments to regulate PAM, EIA, import and export of biological materials, access to bio-prospecting and revenue generation and revenue sharing mechanisms in the tourism sector	•	•	•		
1.2.6 Develop and enforce law enforcement mechanisms in consultation with local communities	•	•	•	•	•
1.2.7 Up-grade and implement a management-oriented Biodiversity Monitoring Program	•	•	•	•	•

1.2.8 Set-up and operate meteo and water-wells data collection network	•	•	•	•	•
1.2.9 Consolidate EPA's Education and Awareness Program	•	•	•	•	•
1.2.10 Set-up EPA's Environmental Impact Assessment (EIA) Unit and enhance its capacities	•	•	•		
1.2.11 Develop training courses and manuals on terrestrial nature, caving, marine (sport fishing, diving, boat handling), and archaeology and culture guides	•	•	•	•	
1.2.12 Provide training for local stakeholders (community leaders, hotel staff, drivers, and tourism police) in management and service provision for eco-tourism	•	•	•	•	
1.2.13 Organize awareness raising workshops for government officials on the island	•	•	•	•	•
1.2.14 Support local entrepreneurs in acquiring basic professional skills and capacities to partner with external tour operators	•	•	•	•	•
1.2.15 Develop Socotra Ecotourism Society (SES) as main locally-based supplier of ecotourism activities on the island through professional training, promotional activities and technical advices	•	•	•	•	•
1.2.16 Enhance capacities of PAM Unit in protected area planning, management, monitoring and community mobilization	•	•	•	•	•
Component 2. Community Mobilization & Development					
2.1.1 Identify areas for appropriate water management systems based on community consultation, Decision Support System and on ground experiences	•				
2.1.2 Develop water management systems including i.e.: natural water springs from caves with pipes and small reservoirs/ rehabilitation of existing kareefs/ new kareefs	•	•	•		
2.1.3 Train national personnel and local contractors to supervise and implement construction of water harvesting systems	•	•	•		
2.2.1 Support the upgrading home gardening and cultivation of vegetables within and around protected areas, through provision of training and initial equipment, seeds and materials.	•	•	•	•	•

2.3.1 Develop and implement awareness campaign in and around protected areas, in support of the ongoing malaria control program	•	•	•	•	•
2.3.2 Conduct a baseline survey of malaria incidence, water bodies status, mosquito population and community	•				
awareness level in and around pilot protected areas					
2.3.3 Support the extension of government malaria control program in and around protected areas	•	•	•	•	•
2.4.1 Assess capacities and equipments of health units in the proximity of protected areas and identify gaps and needs	•				
2.4.2 Provide essential equipment, furniture and basic renovation for selected health units in the proximity of protected areas	•	•	•		
2.4.3 Consult with health facility committees and support their operation as appropriate	•	•	•	•	•
2.4.4 support the extension of district health systems to four health units	•	•	•		
2.4.5 Assess capacities and status of essential equipment and premises at Hadibu Hospital	•				
2.4.6 Support the mother & child care unit of the Hadibu Hospital with a full-time specialist for 3 years	•	•	•		
2.4.7 Train four local staff on mother and child care	•	•	•		
2.4.8 Enhance primary health care services at the Hadibu Hospital through provision of basic interior renovation and essential equipment	•	•	•		
2.4.9 Support the Mobile Unit program operated jointly by MOH and EPA in provision of primary health care services	•	•	•	•	•
2.4.10 Support mobile units to promote education and awareness raising among communities covering primary health, water management, and environmental issues in an integrated and systematic fashion.	•	•	•	•	•
2.4.11 Provide mobile unit with essential audio-visual aids and awareness materials	•				
Component 3. Local Governance & Resource Mobilization					

3.1.1 Develop and Implement a Local Authorities Capacity Building Program including training on participatory strategic planning, budgeting and monitoring and evaluation	•	•	•	•	•
3.1.2 Upgrade District Governments' offices & facilities	•				
3.1.3 Enhance DGs' level of cooperation with regional and central government	•	•	•	•	•
3.1.4 Set up structures and procedures for systematic involvement of communities in DGs decision making process & development of District Plans	•	•	•		
3.1.5 Support the external independent financial and social auditing of district accounts and assess capacities developed	•	•	•	•	•
3.2.1 Finance Local Governments' Delivery of Infrastructure and Services	•	•	•	•	•
3.2.2 Assist Local Governments to Promote Local Economic Development and Environmental protection in their jurisdictions.	•	•	•	•	•
3.3.1 Build the professional capacity of the SCDP Coordination Unit in Sana'a	•				
3.3.2 Develop proposals for a wide range of additional conservation and development elements of the program in the island and mobilize resources	•	•	•	•	•
3.3.3 Report on program performance	•	•	•	•	•
3.3.4 Up-grade and manage SCDP Website	•	•	•	•	•
3.3.5 Provide secretariat services for the SCDP Advisory committee	•	•	•	•	•
3.3.6 Promote Socotra issues among stakeholders and donor community at national and international level	•	•	•	•	•
3.3.7 Produce and disseminate program reports and documentation	•	•	•	•	•
3.4.1 Develop an integrated Decision Support System •DSS)	•	•	•	•	•

3.4.2	Set up mechanisms and procedures for use and application of the integrated DSS by MOWE/EPA, SCDP CU and DGs	•	•	•	•	•
3.4.3	Train national staff on use and application of the integrated DSS	•		•		•

3.5.1	Develop and implement the Socotra-Galapagos professional staff and government officials exchange and training program	•	•			
3.5.2	Report on the Socotra-Galapagos initiative achievements at national and international level		•			

VI. The Budget

VI.1 Budget Overview

SOCOTRA PROGRAM – INPUT/OUTPUT BUDGET			
Budget Items Description	Total Cost	Italian Government	UNDP
Component 1: Engines of Growth			
Output 1.1 Capacity of EPA Socotra Improved	599.000	599.000	
Output 1.2 EPA Protected Areas Management Program	1.986.633	667.000	1.319.663
Sub-Total	2.585.633	1.266.000	1.319.663
Component 2: Community Development			
Output 2.1 Access to Safe Drinking Water increased	203.000	203.000	
Output 2.2 Improved Food Security through Home Gardens	160.000	160.000	
Output 2.3 Extension of Malaria Program to Protected Areas	40.000	40.000	
Output 2.4. Health Services Upgraded	246.000	246.000	
Sub-Total	649.000	649.000	
Component 3: Governance and Resource Mobilization			
Output 3.1 Improvement of the Capacity of local Socotri government	200.000		200.000
Output 3.2 Development Benefits delivered by Socotri Local Government	300.000		300.000
Output 3.3 Capacity of Central Government (SCDP Unit) Improved	485.000		485.000
Output 3.4 Decision Support System in use by local authorities and EPA/MOWE	75.000	75.000	
Output 3.5 Socotra – Galapagos Partnership Initiative	296.000	296.000	
Sub-Total	1.356.000	371.000	985.000
Evaluations, Sundries, Auditing	172.600	50.049	122.551
Program Total	4.763.633	2.336.449	2.427.184

Support Costs at 7% (on Cost-Sharing) and 3% (on UNDP Trac Funds)	236.367	163.551	72.816
GRAND TOTAL	5.000.000	2.500.000	2.500.000

GOVERNMENT OF YEMEN CONTRIBUTION		
Type of Expenditure		
Staff Salaries (Socotra)		60.000
Staff Salaries (Sanaa)		21.000
Office Expenses (Socotra)		120.000
Office Expenses (Sanaa)		36.000
DSLDP Component		90.000
Vehicles for DGs		56.000
TOTAL		383.000

VI.2. Budget breakdown

Budget breakdown by type of expenditure		
	Total	% of net budget
National staff	1.242.033	26%
Training for local staff and GOY officials	319.000	7%
International staff and consultants	796.000	17%
Travel costs (socotra-mainland and international)	382.000	8%
Equipment	366.000	8%
Vehicles	80.000	2%
Subcontracts for development micro-projects	240.000	5%
Operational costs	786.000	17%

Printing of education and awareness materials	70.000	1%
TOTAL NET BUDGET	4.763.633	100%
Project support costs	236.367	7% and 3,5%
Grand Total	5.000.000	

VII. Progress to Date towards the implementation of the Management Plan

1. Background

The Socotra Conservation and Development Program (UNDP YEM.03.004) is funded by the Government of Italy, UNDP and Republic of Yemen, and it represents the consolidated continuation and expansion of all prior initiatives implemented by UNDP in Socotra in the period 1997-2003 with support from the GEF, Netherlands, Italy and Poland.



(Photo courtesy of John Farrar)

In July 2003 all planned activities for the above prior UNDP projects were completed as planned, and funds expended. The continuation and expansion of the Socotra Conservation and Development Program (SCDP) was made possible thanks to the significant commitment of UNDP, the Republic of Italy and the Republic of Yemen (totalling over 5 million US\$). The SCDP's program support document was signed in Sanaa on July 7th, 2003. Thereafter, the SCDP team has:

- prepared the ground for the present phase of the program, and
- initiated some critical activities representing the continuation from the previous phase and that could not be interrupted.

The cost sharing agreement between UNDP and Italy was signed in June 2004. This effectively allowed mobilization of Italian funding and the start of the full project. Between July 2003 and June 2004 (over one year), UNDP has taken all necessary steps to support the continuation of key program activities without interruption between "phase I" and "phase II" of the program. This was achieved by:

Injection additional funds into the budget of Phase I project (YEM.01.003) to allow continuation of critical activities until October 2003. (6 months)

Allocation and disbursement of funds to allow the start-up of the new Phase II (YEM.03.004) ensuring the continuation of critical activities from November 2003 to June 2004. (8 months)

This approach allowed to keep all national and international project staff in place, and supported operational costs for critical activities for which continuity was essential. Other activities earmarked for funding by Italy, were kept on hold until Italian funding was effectively mobilized in June 2004.

2. General and Cross-sector Operational Issues

This progress report covers the period from the outset of the present new phase of SCDP (project YEM.03.004) in November 2003, to June 2004 (8 months). In this period the SCDP has undergone a significant shift in the implementation approach: The former direct UN execution modality, was replaced by National Execution (NEX) by the Ministry of Water and Environment (MOWE) – Environment Protection Authority (EPA).

The NEX approach places greater responsibility and control on project management and expenditures within MOWE and EPA. This shift is fully reflecting the gradual build-up of local capacity achieved since 1997, as well as lessons learned and recommendations of two prior external evaluations of the SCDP (Oct 2000 and July 2003).

However this shift in the operational arrangement, as well as the introduction by UNDP of a new financial system and new guidelines for NEX, required a significant effort to set-up a new financial and administrative system within the MOWE and EPA Socotra.

The following baseline activities were therefore critical to allow the following project operations:

- First six-months operational workplan & budget submitted to UNDP and approved in Nov 2003. This allowed smooth continuity of project operations.
- All 85 national staff contracts extended and transferred from UNOPS to SCDP (MOWE) as per new NEX project guidelines
- International CTA and PAM specialist recruited for one year with contracts shifted from UNOPS to UNDP Country Office.
- International Site Coordinator in place until end of Feb 2004 – plan for replacement / international team re-arrangement developed and being implemented
- UNOPS accounts closed and new project bank account opened and operational as of 20 Dec 2003

- Administrative and financial system for new NEX execution modality developed and in place
- SCDP admin staff trained and all financial records and budgets being shifted to ATLAS codes as of April 2004.
- Inventory of all project equipment completed and hand-over procedures ongoing
- Project budget entered in the new UNDP financial system (ATLAS)
- Support offices in MOWE and EPA merged into one single unit, to maximise cost-effectiveness and efficiency of operations. The new unit is also hosting the SCF (Socotra Conservation Fund) Secretariat in Sanaa.

The above listed preparatory activities, and particularly the shift to NEX implementation modality and the new ATLAS system introduced by UNDP, required a significant effort and in some cases constrained smooth progress project activities. However thanks to the efforts performed particularly by the SCDP administrative, financial and management team, and to the support received by the UNDP Finance and Operations Sections, there has been significant progress on each planned activity.

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Note on authorship

This publication is largely the result of the dedicated enthusiasm of Dr. Michael Gwynne who over many years compiled a comprehensive list of references relating to Soqatra. We are grateful to him for kindly making this work available to us.

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Editor's note

This bibliography is a re-edited version of material supplied by the Royal Botanic Gardens Edinburgh. Many of the entries have been checked against reputable bibliographic records or the original document, but this has not always been possible. As a result, some are bibliographically incomplete and may be inaccurate, but have been retained on the advice of the RBGE.

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78pp

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Kings of Arabia: the rise and set of the Turkish sovranity in the Arabian peninsula

294pp, black and white photographs

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Vol. 1: The western Presidency, 1670-1677 (1936, xxvii + 389pp)

Vol. 2: The eastern coast and Bengal, 1670-1677 (1952, xxxii + 474pp)
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Vol. 4: The eastern coast and Bay of Bengal, 1678-1684 (1955, xxxiii + 377pp)

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Chicago: University of Chicago Press (Re-issued 1963)

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Canberra: Australian War Memorial

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London: Hurst

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The commerce and navigation of the ancients in the Indian Ocean: 2nd edition

2 vols. (xxvi + 4 + 579pp; xvi + 791pp) as follows:

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Euphrates'

Vol. 2: an edition of the 'Periplus of the Erythrean Sea'

London: T. Cadell and W. Davies

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A general collection of the best and most interesting voyages and travels in all parts
of the world: many of which are now first translated into English: digested on a new
plan

17 vols., illustrated with plates

See Vol. 8 (pp1-56): The journal of Sir Thomas Roe, Ambassador
from his Majesty King James the First of England, to Jehan Guire,

the Mighty Emperor of India, commonly called the Great Mogol.
Containing an account of his voyage to that country, and his
observations there. Taken from his original manuscript
See pp3-5 on Roe's visit to Socotra, 24-31 August, probably in 1615
London: Longman, Hurst, Rees, Orme and Brown

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The discoveries of the world, from their first original unto the year of Our Lord 1555
[edited by F. de Sousa Tavares]: corrected and published in England, by R.
Hakluyt; and reprinted with the original Portuguese text, and edited by Vice-
Admiral Bethune

vi + 242pp (30th publication of the Hakluyt Society)

See pp102, 106

London: Printed for the Hakluyt Society

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A description of the coasts of East Africa and Malabar in the beginning of the
sixteenth century by Duarte Barbosa, a Portuguese: translated from an early Spanish
manuscript in the Barcelona Library with notes and a preface by The Hon. E.J.
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xvi + 336pp (35th publication of the Hakluyt Society)

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Reprint Corporation: New York)

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The book of Ser Marco Polo, the Venetian, concerning the kingdoms and marvels of
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2 vols., maps, illustrations

See Vol. 2, pp406-10

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Antiquary

iv + 238pp

Calcutta: Thacker, Spink and Co.

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merchant of the first century

323pp

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Instructions nautiques et routiers Arabes et Portugais des XV et XVI siècles

3 vols. as follows:

Vol. I (1921-23): Le Pilote des Mers de l'Inde, de la Chine et de l'Indonésie
par Sihab ad-Din Ahmen bin Majid, dit 'Le Lion de la Mer

iii + 182pp. Preface in French, text in Arabic (Photographic
reproduction of manuscript 2292, Bibliothèque Nationale de Paris)

Vol. II (1925): Le Pilote des Mers de l'Inde, de la Chine et de l'Indonésie par
Sulayman al-Mahri et Sihab ad-Din Ahmen bin Majid

ix + 188pp. Preface in French, text in Arabic (Photographic
reproduction of manuscript 2559, Bibliothèque Nationale de Paris)

See Ch. III for a description of the coasts of Socotra and the sea route
to the island

Vol. III (1928): Introduction à l'astromonie nautique Arabe par Gabriel

Ferrand [and others]

xii + 272pp. In French. (Bibliothèque des Géographes Arabes: Tome
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Paris: Librairie Orientaliste Paul Geuthner

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ix + 270pp, maps

London: Methuen and Co. (Revised edition published in 1963 by Penguin:
Harmondsworth)

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Prestage, E. (1933)

The Portuguese pioneers

xiv + 352pp, maps

London: A. and C. Black Ltd.

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The unveiling of Arabia: the story of Arabian travel and discovery

359pp, plates

See p203

London: George G. Harrap and Co.

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Missoes portuguesas de Socotorá

63pp, plates (Coleção Pelo Império No. 93)

Lisbon: Divisão de Publicações e Biblioteca, Agência Geral das Colónias

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Journal of the Royal Asiatic Society of Great Britain and Ireland 1949(3/4)

pp155-76

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Arab seafaring in the Indian Ocean in ancient and early medieval times

xiii + 131pp (Princeton Oriental Studies Vol. 13)

Princeton, NJ: Princeton University Press

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Beek, G.W. van (1960)

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Biblical Archaeologist 23(3) pp70-95, 5 monochrome plates, 1 map

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The Portuguese off the South Arabian coast. Hadrami Chronicles: with Yemeni and European accounts of Dutch pirates off Mocha in the seventeenth century

x + 233pp, 2 figures, 17 photographs in 13 plates, 2 maps

See pp157-58; plates 10, 12; figure 2; appendix V

Oxford: Clarendon Press

There is an obituary of Serjeant by E. Macro in *Asian Affairs* 24(3) pp377-78

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Huntingford, G.W.B. (editor and translator) (1980)

The Periplus of the Erythraean Sea by an unknown author: with some extracts from Agatharkhides 'On the Erythraean Sea'

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London: Hakluyt Society

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Groom, N. St. J. (1981)

Frankincense and myrrh: a study of the Arabian incense trade

xvi + 285pp, figures; 16pp of plates (Arab Background Series)

London and New York: Longman/Librairie du Liban

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Tibbetts, G.R. (1981)

Arab navigation in the Indian Ocean before the coming of the Portuguese, being a translation of Kitab al-Fawa'id fi Usul al-Nahr wa-l-Qawa'id by Ahmad bin Al Najdi

London: Royal Asiatic Society (Oriental Translation Fund New Series Vol XLII) (First published 1971)

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Boxhall, P.G. (1989). Arabian seafarers in the Indian Ocean

Asian Affairs 20(3) pp287-95

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The Periplus Maris Erythraei: text with introduction, translation, and commentary by Lionel Casson

xvii + 320pp, 17 maps

See pp18-19, 46, 101, 133, 164-69, 285, 292

Princeton NJ: Princeton University Press

5.2 Nineteenth century

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Salt, H. (1814)

A voyage to Abyssinia, and travels into the interior of that country, executed under the orders of the British Government, in the years 1809 and 1810; in which are included, an account of the Portuguese settlements on the East coast of Africa, visited in the course of the voyage; a concise narrative of the late events in Arabia Felix; and some particulars respecting the aboriginal African tribes, extending from Mosambique to the borders of Egypt; together with vocabularies of their respective languages. Illustrated with a map of Abyssinia, numerous engravings, and charts

xvi + 506 + lxxvpp

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London: Printed for F.C. and J. Rivington, St. Paul's Churchyard

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Owen, W.F. (1833)

Narrative of voyages to explore the shores of Africa, Arabia, and Madagascar; performed in H.M. Ships Leven and Barracouta, under the direction of Captain F.W. Owen, R.N. by command of the Lords Commissioners of the Admiralty

2 vols.

See Vol. II, pp350-52 which deals with a hydrographic survey of Socotra and the adjacent islands

London: Richard Bentley (Republished in 1968 by Gregg International Publishers: Farnborough, Hampshire)

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Performed in His Majesty's Ships Leven and Barracouta; under the direction of
Captain W.F. Owen, R.N.

Royal Geographical Society Journal 3(1) pp197-233

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Narrative of a voyage of discovery to Africa and Arabia, performed in His Majesty's
Ships Leven and Barracouta, from 1821 to 1826, under the command of Capt. F.W.
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VIII: memoir on the island of Socotra: communicated by Lieut. J.R. Wellsted, East
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Journal of the Royal Geographical Society 5 pp129-229, 1 map

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Journal of the Asiatic Society of Bengal 4 pp138-66

See pp165-66 for a Socotran-English glossary

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Wellsted, J.R. (1838)

A ramble amidst the rocky mountains of Socotra

United Service Journal and Naval and Military Magazine 1838(2) pp309-21

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Travels to the City of the Caliphs, along the shores of the Persian Gulf and the
Mediterranean. Including a voyage to the coast of Arabia and a tour on the island of
Socotra

2 vols. (xvi + 405pp; viii + 347pp)

See Vol. 2, frontispiece: depicts a 'View from the interior of Socotra'

See Vol. 2, Appendix 1 (pp334-43): Words and phrases in Socotran
and Arabic are given as a specimen of the language of that island

See Vol. 2, Appendix 2 (pp344-47): Meteorological Register, Socotra
June 1-July 19, 1834

London: Henry Colburn (Reprinted in 1968 in reduced photographic form by
Gregg International Publishers: Farnborough, Hampshire)

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Jehenne, Capitaine (1843)

Suite de rapport adressé a M. le contre-amiral Bazoche, gouverneur de l'île Bourbon, par M. Jehenne capitaine de corvette, commandant la gabare la *Prévoyante*, sur son voyage a Moka, en 1841 et 1842

Annales Maritimes et Coloniales (3rd Series) 2(19) pp215-24

Paris: Imprimerie Royale

Includes report of visit to Socotra, 1-8 December 1841

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Haines, S.B. (1845)

II. Memoir of the south and east coasts of Arabia

Journal of the Royal Geographical Society 15 pp104-60

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Haines, S.B. (1854)

V: a description of the Arabian Coast, commencing from the entrance of the Red Sea, and continuing as far as Messenaat, in Lat. 15° 3' North, Long. 53° 43' 25" East, with some observations relative to its population, government, commerce, etc. by Captain S.B. Haines of the Indian Navy

Transactions of the Bombay Geographical Society 11 pp60-211

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Fiéreck, Lieutenant (1846)

Aden et Socotra. (Extrait d'un rapport adressé, le 18 mai 1845, au commandant de la station navale de Bourbon et de Madagascar, par M. Fiéreck, lieutenant de vaisseau, commandant la corvette la *Zélée*)

Annales Maritimes et Coloniales (3rd Series) 3(2) pp552-56

Paris: Imprimerie Royale

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Loarer, Capitaine (1851)

Rapport commercial sur la côte orientale d'Afrique par M. Loarer, capitaine au long-cours, délégué du Ministre de l'Agriculture et du Commerce dans l'exploration faite par le Capitaine Guillain, commandant le *Ducouëdic*, 1846-47-48-49

244pp

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Paris: Ministre de l'Agriculture et du Commerce

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Guillain, Capitaine (1856)

Documents sur l'histoire, la géographie et le commerce de l'Afrique orientale recueillis et rédigés par M. Guillain, capitaine de vaisseau

2 parts as follows:

Part 1 (xxxi + 628pp): Exposé critique des diverses notions acquises sur L'Afrique orientale, depuis les temps les reculés jusqu'à nos jours

Part 2 (2 vols. xxiii + 556pp; 527pp, with atlas): Relation du voyage d'exploration à la côte orientale d'Afrique exécuté pendant les années 1846, 1847 et 1848, par le brick *Le Ducouëdic*

See Vol. 1 pp343-89 for an account of the visit to Socotra from 13 January to 1 February 1847

Paris: Arthus Bertrand (Publiés par ordre du Government)

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Skizze der Insektengruppe von Sokotra

Justus Perthes' Geographische Anstalt Mittheilungen 4 pp149-51

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Anon. (1876)

Notes: Socotra

Nature 13(334) pp413-15

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Anon. (1876)

Socotra

Times 14 Mar (28,576) p11

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Socotra

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Anon. (1876)

The Island of Socotra

Times 18 Apr (28,606) p9

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Capitaine, M.H. (1876)

L'île de Socotra

L'Explorateur: Journal Géographique et Commercial Hebdomadaire 3(1)
pp338-39

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Ravenstein, E.G. (1876)

Sokotra

Geographical Magazine 3(May) pp119-24, map

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Sclater, P.L. (1876)

Socotra

Times 19 Mar (28,580) p6

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Sclater, P.L. (1876)

Socotra

Nature 13(335) p426

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Anon. (1878)

Log Book: scientific expedition to Socotra
Geographical Magazine Oct 5 p267

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Hunter, F.M. (1878)

Notes on Socotra

In: Report of the forty-seventh meeting of the British Association for the Advancement of Science held at Plymouth in August 1877, p118
London: John Murray

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Robinson, P. (1878)

Cyprus and Sokotra: 'The New Colony', and 'The New Field for Missionary Enterprise': their physical, commercial, economic, historical and social aspects. With a supplement specially treating of Cyprus as an opening for colonists and merchants, and embodying information received up to the last date. With summary of telegraphic intelligence of events in the islands

50pp, 2 maps (Sokotra at 1:730,000)

See pp41-50

London: William Clowes and Sons

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Robinson, P. (1878)

Socotra, the new field for missionary and commercial enterprise

12pp, 1 map (1:730,000)

London: William Clowes and Sons

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Anon. (1879)

The British Association Reports: reports of the Committee consisting of Mr Sclater, Dr G. Hartlub, Sir Joseph Hooker, Capt. F.M. Hunter, and Prof. Flower, appointed to take steps for the investigation of the natural history of Socotra

Nature 20(514) pp440-45

Originally published in Report of the forty-ninth Meeting of the British Association for the Advancement of Science held at Sheffield in August 1879 (London: John Murray)

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Anon. (1880)

Derrotero del Golfo de Aden, Socotora e islas adyacentes, costas de Somali y de Arabia en el Golfo de Aden, costa E. de Arabia, e islas adyacentes: recopilado de las memorias de los oficiales de la Marina de la India por el Comandante C.Y. Ward, I.N.

244pp

Madrid: Publicado por Orden de los Lorés Comisarios del Almirantazgo
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Report of the committee, consisting of Mr Sclater, Dr G. Hartlaub, Sir Joseph Hooker, Captain F.M. Hunter, and Lieut.-Col. H.H. Godwin-Austen, appointed to take steps for the investigation of the natural history of Socotra

In: Report of the fiftieth meeting of the British Association for the Advancement of Science; held at Swansea in August and September 1880, p212

London: John Murray

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Bayley Balfour, I. (1880)

Report of the Socotra Committee of the British Association for the Advancement of Science of the proceedings of the expedition to the island of Socotra

In: Report of the fiftieth meeting of the British Association for the Advancement of Science; held at Swansea in August and September 1880. pp212-16

London: John Murray

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Anon. (1881)

L'expédition Riebek [sic] dans L'île de Socotra

L'Exploration: Revue des Conquêtes de la Civilisation sur Tous les Points du Globe Recueil Géographique Hebdomadaire 11(1) pp685-86

Paris: Société Bibliographique

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Anon. (1881)

Dr. Riebek's [sic] expedition to the island of Socotra

Proceedings of the Royal Geographical Society (New Series) 3 p311

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Anon. (1881)

Geographical Society of Berlin

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Anon. (1881)

L'île de Socotra

L'Exploration: Revue des Conquêtes de la Civilisation sur Tous les Points du Globe Recueil Géographique Hebdomadaire 11(1) p282

Paris: Société Bibliographique

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Anon. (1881)

Professor Dr I.B. Balfour's Forschungen auf der Insel Socotra, 1880

Dr A. Petermann's Mittheilungen aus Justus Perthes' Geographischer Anstalt 27(8) pp292-97

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Scott, A. (1881)

Remarks on the natural history of Socotra: being an account of the expedition to the island under the auspices of the Royal Society of London in Feb. and March 1880
16pp (Printed for private circulation)
Edinburgh: William Blackwood and Sons

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Anon. (1882)

At the request of the Council, an address on the island of Socotra was given by Professor I. Bayley Balfour

Proceedings of the Royal Society of Edinburgh 11 p245

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Anon. (1882)

Report of the committee consisting of Lieut.-Colonel Godwin-Austen, Dr G. Hartlaub, Sir J. Hooker, Dr Günther, Mr Seebohm and Mr Sclater, appointed to take steps for investigating the natural history of Socotra

In: Report of the fifty-first meeting of the British Association for the Advancement of Science; held at York in August and September 1882,
pp194-96

London: John Murray

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Anon. (1882)

Les voyages du Docteur Schweinfurth à Sokotra

L'Exploration: Revue des Conquêtes de la Civilisation sur Tous les Points du Globe Recueil Géographique Hebdomadaire 12(2) pp212-17

Paris: Société Bibliographique

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In: Report of the fifty-first meeting of the British Association for the Advancement of Science; held at York in August and September 1881,
pp482-94

London: John Murray

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Anon. (1883)

The British Association Reports: report of the committee, consisting of Lieut.-Col. Godwin-Austen, Dr G. Hartlaub, Sir J. Hooker, Dr Günther, Mr Seebohm, and Mr Sclater (Secretary), appointed for the purpose of investigating the natural history of Socotra and the adjacent highlands of Arabia and Somali Land

Nature 28(727) pp547-60

Originally published in Report of the fifty-second meeting of the British Association for the Advancement of Science held at Southampton in August 1882 (London: John Murray)

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Bayley Balfour, I. (1883)

The island of Socotra and its recent revelations: weekly evening meeting, Friday, April 20, 1883

Royal Institution of Great Britain Notices of the Proceedings of Meetings
(for 1883) pp1-19

Summary and review by A. Engler in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* (Leipzig) 1884 5(3) pp40-41. In German

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Anon. (1884)

Report of the committee, consisting of Lieut.-Col. Godwin-Austen, Dr G. Hartlaub, Sir J. Hooker, Dr Günther, Mr Seebohm, and Mr P.L. Sclater (Secretary), appointed for the purpose of investigating the natural history of Socotra and the adjacent highlands of Arabia and Somali Land

In: Report of the fifty-third meeting of the British Association for the Advancement of Science held at Southampton in September 1883, pp227-28
London: John Murray

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Caillaud, F.R. du (1887)

Le christianisme dans l'île de Socotorah

Les Missions Catholiques: Bulletin Hebdomadaire Illustré de l'Oeuvre de la Propagation de la Foi 19 pp212-13

Lyon: Bureaux des Missions Catholiques

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Le Globe: Journal Géographique: Organe de la Société de Géographie de Genève (4th Series) 7(2) pp213-15

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Caillaud, F.R. du (1889)

L'histoire du christianisme dans l'île de Socotorah

Revue Illustrée de la Terre Sainte et de l'Orient Catholique 6(12) pp187-89

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Un successeur de l'Apôtre Saint Thomas, Frère Antonio Loureiro, de L'Ordre de Saint Francois de l'Observance, premier missionnaire latin dans l'île Socotorah

La Palestina e le Rimanenti Missioni Francescane 1(8) pp449-512

Roma: Tipografia Artigianelli di S. Giuseppe

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Schweinfurth, G. (1891)

Erinnerungen von einer fahrt nach Sokotra

Westermann's Illustrierte Deutsche Monatshefte 69 pp603-26

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Schweinfurth, G. (1892)

Erinnerungen von einer fahrt nach Sokotra

Westermann's Illustrierte Deutsche Monatshefte 70 pp29-53

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Bennet, E.N. (1897)

Two months in Sokotra

Longman's Magazine 30(179) pp405-13

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Bent, J.T. (1897)

The island of Socotra

Nineteenth Century 41(244) pp975-92

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Anon. (1898)

Expedition to Sokotra

Geographical Journal 12(6) p614

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Bent, J.T. (1898)

Sokotra

Journal of the Manchester Geographical Society 14 pp315-16

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Bent, M.V.A. (Mrs J.T.) (1898)

The island of Sokotra: read at the meeting of the British Association, Bristol, 1898

Scottish Geographical Magazine 14(12) pp629-36

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Anon. (1899)

The Austrian expedition to Arabia and Sokotra

Geographical Journal 13(5) pp536-37

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Anon. (1899)

Results of the scientific expedition to Sokotra

Nature 60(1544) p116

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Bent, M.V.A. (Mrs J.T.) (1899)

Sokotra

In: Report of the sixty-eighth Meeting of the British Association for the Advancement of Science held at Bristol in September 1898, p943

London: John Murray

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Forbes, H.O. (1899)

The English expedition to Sokotra

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Forbes, H.O. (1899)

The expedition to Sokotra

Bulletin of the Liverpool Museums 2(1) pp1-2

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Müller, D.H. (1899)

Die südarabische Expedition der Kaiserlichen Akademie der Wissenschaften in Wien und die Demission des Grafen Carlo Landberg. Actenmässig dargestellt

61pp

Vienna: Kaiserlichen Akademie der Wissenschaften in Wien

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Müller, D.H.; Simony, O.; Kossmat, F. (1899)

The Austrian expedition to southern Arabia and Socotra

Geographical Journal 13(6) pp638-40

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Anon. (1900)

Exploration of Sokotra: report of the committee, consisting of Dr J. Scott-Keltie (Chairman), Professor I.B. Balfour, Professor W.F.R. Wheldon, and Dr. H.O. Forbes (Secretary), appointed to explore the Island of Sokotra (Drawn up by the Secretary)

In: Report of the sixty-ninth meeting of the British Association for the Advancement of Science held at Dover in September 1899, pp460-64

London: John Murray

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Bent, J.T.; Bent, M.V.A. (Mrs J.T.) (1900)

Southern Arabia

xi + 445pp

London: Smith, Elder and Co.

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Forbes, H.O. (editor) (1903)

The natural history of Socotra and Abd-el-Kuri. Being the report upon the results of the conjoint expedition to these islands in 1898-9, by Mr W.R. Ogilvie-Grant, of the British Museum, and Dr H.O. Forbes, of the Liverpool Museums, together with information from other available sources. Forming a monograph of the islands

Bulletin of the Liverpool Museums (Special Bulletin); xlvii + 598pp, 27 coloured plates, 88 illustrations in the text

See ppxvii-xlvii for narrative of the journey by Forbes; 1 colour plate (Sokotra pottery; artist T.N. Latham, opposite title page), 2 figures, 13 photographs, 1 map

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

Reviewed, probably by zoologist W.T. Blanford, in *Nature* 1903 69(1783) pp199-201

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Forbes, H.O. (1904)

4. The results of the expedition to Sokotra and Abd-el-Kuri by Mr W.O. Grant and Dr H.O. Forbes

In: Report of the seventy-third meeting of the British Association for the Advancement of Science held at Southport in September 1903, pp720-721
London: John Murray

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Schweinfurth, G. (1904)

Wissenschaftliche Ergebnisse der Expedition von Dr. H.O. Forbes nach Sokotra
Dr A. Petermann's Mittheilungen aus Justus Perthes' Geographische Anstalt
50(8) pp200-02

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Müller, D.H. (1907)

Zur geschichte der Südarabischen Expedition

Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien
Mathematisch-naturwissenschaftliche Klasse 71(1) ppi-v

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Macro, E. (1993)

The Austrian Imperial Academy's expeditions to South Arabia 1897-1899: C. de Landbergh, D.H. Müller and G.W. Bury

In: New Arabian studies 1, edited by R.B. Serjeant, R.L. Bidewell and G.R. Smith, pp 54-82
Exeter: University of Exeter Press

Includes an appendix listing publications on the expedition including all those of the Kaiserlichen Akademie der Wissenschaften in Wien.

5.3 Twentieth century

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Powell, E.A. (1925)

Beyond the utmost purple rim: Abyssinia, Somaliland, Kenya Colony, the Comoros, Madagascar

xx + 431pp, 114 sepia photographs, 2 maps
See pp129, 321-22
London: John Long Ltd.

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Stark, F. (1936)

A journey to the Hadhramaut: I

Geographical Magazine 3(6) pp365-80, 19 photographs, 2 maps
See p370

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Ingrams, W.H. (1938)

The exploration of the Aden Protectorate
Geographical Review (New York) 28 pp638-51, 1 map
See pp647, 650

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Bennet, E.N. (1938)

Isle of Bliss

Littell's Living Age pp354-539

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Tudor Pole, C.G. (1943)

Report on Socotra

19pp manuscript, 4 sketch maps

Socotra: Aden Protectorate

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Hennig, R. (1948)

Sokotra als Ostliche Insula Fortunata des Alterums

Petermann's Geographische Mitteilungen 92(1) pp89-90

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Rickards, A.R.M. (1948)

By dhow along the Hadhramaut coast to Dhofar and a visit to Socotra

29pp typescript (Coral Gables, Florida: Miscellanea Asiatica Orientalis Series; American Documentation Institute Microfilm (ADIM) No. 2347). In two parts as follows:

Part 1: By dhow along the Hadhramaut coast to Dhufar, pp1-17, 12 photographs in plates 1-6

Part 2: Notes on the island of Socotra, pp18-29, 5 photographs in plates 7-9

Washington D.C.: Library of Congress

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Tudor Pole, C.G. (1948)

Socotra: 'Isle of Bliss' in the Arabian Sea: a little known part of the Aden Protectorate with a romantic past and some distinctive features

Crown Colonist 18(195) pp70-72

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Anon. (1956)

University explorers home

Times 23 Oct (53, 669) p13

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Ingrams, W.H. (1956)

Socotra: the Isle of the Blest

Port of Aden Annual 1955-56 pp61-64

Aden: Aden Departments of State and Public Institutions, Aden Port Trust

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Botting, D.S. (1957)

Report on the Oxford University expedition to Socotra, 1956

Bulletin of the Oxford University Exploration Club 8 pp45-47

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Botting, D.S. (1957)

Socotra: island of the Dragon's Blood

Geographical Magazine 30(6) pp283-93

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Ford, W.K. (1957)

Notes on the Sokotra expedition

Liverpool Libraries, Museums and Arts Committee Bulletin 6(3) pp5-17

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Botting, D.S. (1958)

Expedition to Socotra

In: Port of Aden Annual 1957-58 pp50-55

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Botting, D.S. (1958)

Island of the Dragon's Blood

251pp, 6 figures; 30 photographs on 15 plates; 2 maps

London: Hodder and Stoughton

An account of the Oxford University expedition to Socotra, reviewed by G.

De Gaury in *Geographical Journal* 1958 124(4) pp555-56

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Botting, D.S. (1958)

The Oxford University expedition to Socotra

Geographical Journal 124(2) pp200-09, 6 photographs and 1 map,

discussion pp207-09

(216)Hickinbotham, T. (1958)

Aden

xiv + 242pp, 13 black and white photographs

See pp159-61, 167-68

London: Constable and Co.

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Stansfield, H. (1958)

East of Suez

Liverpool Bulletin 71(1) pp4-20

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Botting, D.S. (1961)

University expeditions

Geographical Magazine 34(3) pp217-23

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Anon. (1962)

British advisor visits Aden's 'Isle of Bliss'

In: Port of Aden Annual 1961-62 pp44-48, 11 photographs

Aden: Aden Departments of State and Public Institutions, Aden Port Trust

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Nelson, I.H. (1963)

Expedition to Socotra, 1963

13pp

Sections as follows: Summary of findings (5pp); Climbing report (4pp); Caving report (4pp)

Khormaksar, Aden: RAF

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Botting, D.S. (1964)

Photography on expeditions 2: the technique of travel photography

Geographical Magazine 37(6) pp413-22

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Forbes-Watson, A. (1964)

A step backwards into biblical days

East Africa Standard (Nairobi) 24 Jul pp7,11

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Johnston, C.H. (1964)

The view from Steamer Point: being an account of three years in Aden

224pp, 16 black and white photographs

See pp31, 82, 89-95

London: Collins

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Boxhall, P.G. (1965)

'Grim and gay' island

Times (Late London Edition) 26 Aug (56,410) p10f

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Boxhall, P.G. (1965)

'The Island of Bliss'

Arab World (New Series) 8(Autumn/Winter) pp5-10, 4 photographs,
editorial comment on p10

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Boxhall, P.G. (1965)

The last word (about an expedition to Socotra, a little-known island in the Indian Ocean)

The Rose and the Laurel: the Journal of the Intelligence Corps 7(27) pp69-72, 1 photograph

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Boxhall, P.G. (1965)

Report of the RAF/Army expedition to Socotra, December 1964-February 1965
66pp, 26 black and white photographs
Cyprus: Headquarters Near East Air Force

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Socotri, S.S. (1965)

Island of Socotra
Times (Late London Edition) 25 Sep (56,436) p9d

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Straight, W. (1965)

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Times (Late London Edition) 9 Dec p11d

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Boxhall, P.G. (1966)

Socotra: 'Island of Bliss'
Geographical Journal 132(2) pp213-22 plus discussion pp223-24, 4 plates of photographs

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Boxhall, P.G. (1966)

The strategic use of islands in a troubled ocean
Journal of the Royal United Services Institution 111(644) pp336-41

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Ingrams, W.H. (1966)

Arabia and the isles: 3rd edition
x + 400pp
London: John Murray (First published 1942)

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Boxhall, P.G. (1967)

General report on the expedition to Socotra Island, 1967
vi + 30pp typewritten report
London: Ministry of Defence, Middle East Command

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Boxhall, P.G. (1967)

Dragon's blood island secrets sought: experts' three-month study
Times (Late London Edition) 22 Mar (56,896) p7f, 3 photographs

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Le Fanu, P. (1967)

There's a goat in my tent
Bulletin of the British Polio Fellowship Dec p3, 1 photograph

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Boxhall, P.G. (1967-68)

Report from the leader, Major P.G. Boxhall (Middle East Command expedition to Socotra Island)

In: Annual Report of the British Schools Exploring Society 1967-68 pp102-05

London: British Schools Exploring Society

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Seaman, D. (1967)

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219pp, 60 figures, 81 plates

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Anon. (1881)

Geographical notes: Socotra

Nature 24(611) pp249-50

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See pp65, 207-09, 224, 252-54, 259, 307, 345, 363, 479, 489, 493 (cattle); 505 (sheep), 506 (goats), 590-602 (plants of economic importance); and 609-15 (Appendix F: Socotra)

See photographs nos. 125-28 (Socotran plant species); 353-54 (the Socotran Brothers from the air)

See figure 47: topographic map of Socotra showing wells and pools (scale cl: 422,400)

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Notes

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English translation (16pp typescript) available from the United Nations

Environment Programme, Box 30552, Nairobi)

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6.2 Maps

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1835

Scale 1:144,000

Prepared from the surveys made during several overland traverses by Lieutenants J.R. Wellsted and S.B. Haines. A simplified, monochrome version was published for the Royal Geographical Society and included in Wellsted's memoir of his journey (Ref. 134, Section 5.1). The RGS Map Collection also includes a hand drawn draft map, to the same scale, showing Wellsted's route.

(256)

1876

Scale 1:300,000

Prepared by E.G. Ravenstein according to survey information from J.R. Wellsted and S.B. Haines and included by Ravenstein in his journal article on Socotra (Ref. 150, Section 5.1). Includes an inset at scale 1:3,000,000 showing the western part of Socotra, the Brothers, Abd el Kuri and associated islands.

(257)

1884

Scale 1:588,000

A sketch map of the geology of the island based on an analysis of specimens collected by I. Bayley Balfour, and showing his route. Published as Plate 6 of T.G. Bonney's account of the specimen collection (see Ref. 269, Section 7).

(258)

1888

Scale 1:250,000

Drawn by E.G. Ravenstein to indicate relief, altitudes and fathom lines, and show the lines of traverse of I. Bayley Balfour's expedition in 1880. Accompanies Bayley Balfour's account of the botany of Socotra (Ref. 510, Section 11.1).

(259)

1903

No scale shown

A sketch map drawn by T.M. Latham indicating high areas and principal valleys, and showing the route taken by the British Museum-Liverpool Museums expedition of 1898-99. Published as Plate JA in the main expedition report (Ref. 195, Section 5.1).

(260)

1905

Scale 1:660,000

A sketch map showing the known water courses of the island and the principal settlements. Accompanies Volume 2 of the report of the Südarabische expedition (Ref. 37, Section 2.3).

(261)

1907

Scale 1:250,000

Shows principal geographical features, with the geology superimposed using symbols and colours. Published as Tafel 1 of F. Kossmat's account of the geology of Socotra (Ref. 275, Section 7)

(262)

1957

Scale 1:5,000,000

A map of the vegetation of Africa south of the Sahara, prepared by R.E.G. Pichi-Sermolli from two earlier maps of the plant ecology of the arid and semi-arid zones of East Africa, and the vegetation of parts of Ethiopia and Somaliland. Published, with associated commentary in Ref. 516, Section 11.1.

(263)

1960

Scale 1:150,000

Based on air photographs taken 1942-43 and originally compiled, drawn and printed as EAF No. 1631 in 1945. Published by the War Office and Air Ministry's Department of Survey as Series K 562, Sheet Socotra, Edition 1-GSGS.

(264)

1966

Scale 1: 250,000

Includes the Brothers and Sabuyinah and indicates woodland vegetation, ecological areas (wadi, sand, swamp etc), wells and springs, airfields and buildings, roads and tracks, and populated places. Published by the Ministry of Defence as Series 1501 (G), Sheet ND 39-16, Edition 1-GSGS

(265)

1970

Scale 1:550,000

A geological map indicating basement complex and cover sediments, and including two geological cross sections of Socotra (western and central). Included in the account of the geology of Socotra by Z.R. Beydoun and H.R. Bichan (Ref. 285, Section 7).

(266)

1978

Scale 1:125,000

A five colour map of Socotra with inserts of the Brothers, based on information from the RAF/Army expedition in 1964-65 and other unspecified sources. Published by the Royal Geographical Society, announced in *Geographical Journal* 144(2) page ix, and reviewed by R.A. Gardiner on pp367-68.

(267)

1979

Scale 1:500,000

A map included in a series of four topographical maps produced for the Petroleum and Minerals Board, PO Box 5176, Makalla, Aden, People's Democratic Republic of Yemen. Socotra, the Brothers and Abd al Kuri are shown on an inset on Sheet 4. Produced and published by Hunting Surveys Limited, Borehamwood, Hertfordshire, UK.

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1987

Scale 1:500,000

Three maps included as Figures in a report on potable water resources development by John Taylor and Sons (Ref. 70, Section 2.4). They cover major surface water catchment areas (Fig. 3), geological structure (Fig. 4), and geological outcrops (Fig. 5).

7. Geology and geophysics

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VI. On a collection of rock specimens from the island of Socotra

Philosophical Transactions of the Royal Society of London 174(1) pp273-94, plates (Nos. 6-7)

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Raisin, C.A. (1888)

On some rock specimens from Socotra

Geological Magazine (New Series; Decade 3) 5 pp504-07

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Sauer, A. (1888)

Ueber Riebeckit, ein neues Glied der Hornblendegruppe, sowie uber Neubildung von Albit in granitisch Orthoklasen

Zeitschrift der Deutsche Geologische Gesellschaft (Berlin) 40 pp138-46

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A note on the geology of Socotra and Abd-el-Kuri

Geological Magazine (New Series; Decade 4) 6(426) pp529-33

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Gregory, J.W. (1903)

Note on the geology of Socotra and Abd-el-Kuri

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp571-81)

See Geology pp575-78; Geology of Sokotra pp578-80, 1 map;

Geology of Abd-el-Kuri p581

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

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Anon. (1904)

The geology of Sokotra

Geographical Journal 23(2) p257

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Kossmat, F. (1907)

Geologie der Inseln Sokótra, Sémha und Abd-el-Kûri

*Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien
Mathematisch-naturwissenschaftliche Klasse 71(1) pp1-62, 13 figures, 5
plates, 1 map*

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Pelikan, A. (1907)

Petrographische Untersuchungen von Gesteinen der Inseln Sokótra, Abd-el-Kûri
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*Geological Magazine 74(5; No.875) pp219-30, 3 maps, 1 monochrome plate
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Italiana, Publications No. 71)

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xvi + 599pp, 11 figures; 82 drawings of coastal views from the sea

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9.1 Terrestrial environment

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Attempts at raising the Soqotran Dragon Tree, *Draceana cinnabari* Balf. f., outside
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135pp, 12 appendices, 4 maps

Edinburgh: Royal Botanic Garden

See appendices as follows:

1. Printed material distributed by the RBGE team (1p)
2. Baccalaureat-level Socotran personnel (1p)
3. List of administrative regions as given by central government in
Sana to the appointed governor of Socotra (the Mamur) (2pp)
4. The Homhil Enclosure (2pp)

5. The islands of Abd-el-Kuri, Samha and Darsa (3pp)
6. The recommendations of the First International Symposium on Socotra held in Aden University between 24th – 26th March (3pp)
7. The Manual of Land Management Practice (1p)
8. Local experts employed on the various field trips (2pp)
9. A brief mission report of the RGBE expedition to Socotra, February – April 1996: Part I (5pp); Brief mission report: meetings held during the RGBE expedition to Socotra, February – April 1996: Part II (7pp); Brief mission report: group meetings on Socotra, Abd-el-Kuri and Samha: Part III (2pp)
10. Collation of all existing literature and documentation on Socotra [67 references] (3pp)
11. Floral inventories, endemic species, endangered and vulnerable species, plants of ethnobotanic importance. I: Checklist of plants of the Socotra Archipelago (28pp); II: Checklist of endemic plants of the Socotra Archipelago, with conservation status using IUCN categories (8pp); III: Provisional list of plant taxa endemic to Abd-el-Kuri (1p); IV: Provisional list of plant taxa endemic to Samha (1p)
12. Maps. I: Distribution of 16 provisional indicator sites on Socotra; II: Distribution of 7 provisional indicator sites on Socotra proposed for pilot studies; III: Distribution of survey sites on Socotra; IV: Distribution of 10 vegetation transects on Socotra

9.2 Marine environment

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Biodiversity conservation and sustainable development programme: Socotra Archipelago, Republic of Yemen: Mission report (Marine Team)

102pp, 5 annexes, 4 tables, 4 maps

Annex A: Mission itinerary Marine Team (3pp)

Annex B: Consultations undertaken by the Marine Team (2pp)

Annex C: Preliminary marine species list for the Socotra Archipelago (10pp)

Annex D: References (3pp)

Annex E: Rapid rural appraisal (coastal villages)

Database forms (42pp)

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10. Zoology

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See especially vols 2,6,8,9,10,11,14,15,17

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In: Contribution to the flora and fauna of Peoples' Democratic Republic of Yemen, pp7-96

Aden: University of Aden Faculty of Education

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Island Africa: the evolution of Africa's rare animals and plants

287pp

London: Collins

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Socotra: die Insel der Dioskuren

Informationen aus dem Hessischen Landesmuseum Darmstadt 1/96 pp25-28

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Faunistic notes on Soqotra Island

In: Proceedings of the First International Symposium on Soqotra Island:

Present and Future, edited by H.J. Dumont, pp135-98

New York: United Nations Publications

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Kurzbericht über eine Expedition auf das Sokotra-Archipel

Informationen aus dem Hessischen Landsmuseum Darmstadt 1/99

Presents zoological results from the multidisciplinary expedition to Socotra.

10.2 Mammals

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Sclater, W.L. (1896)

The geography of mammals IV: the Ethiopian region

Geographical Journal 7(3) pp282-96

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Socotra Island cattle [letter]

Geographical Journal 124(4) pp587-88

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Harrison, D.L. (1964-72)

The mammals of Arabia

3 vols.

See Vol. 1: Insectivora. Chiroptera. Primates (1964, xx + pp1-192)

See Vol. 2: Carnivora. Artiodactyla. Hyracoidea (1968. xiv + pp193-382)

See Vol. 3: Lagomorpha. Rodentia (1972, xviii + pp383-670)

London: Ernest Benn Ltd. (2nd edition published in 1991)

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The origin of domestic cattle in Africa

Empire Journal of Experimental Agriculture 32(126) pp97-113, 4 figures, 14 photographs in 7 plates (Plates 5-11), one depicting the Socotran breed

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Kock, D. (1969)

Die Fledermaus: Fauna des Sudan

Abhandlungen der Senckenbergischen naturforschenden Gesellschaft 521
pp1-238

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Hutterer, R.; Harrison, D.L. (1988)

A new look at the shrews (Soricidae) of Arabia
Bonner Zoologische Beiträge 39(1) pp59-72

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Al-Jumaily, M.M. (1998)

Review of the mammals of the Republic of Yemen
Fauna of Saudi Arabia 17 pp477-502

10.3 Birds

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Anon. (1899)

XXXVII. Bulletin of the British Ornithologists' Club [meeting] No. LXII (April 29th 1899). The sixty-first meeting of the Club was held at the Restaurant Frascati, 32 Oxford Street, on Wednesday, the 19th of April, 1899. Chairman: P.L. Sclater, FRS. Twenty members and four guests were present. Mr W.R. Ogilvie-Grant gave an account of his recent journey to Socotra, and exhibited a series of specimens obtained by himself and Dr H.O. Forbes
Ibis (7th Series) 5(3, No. 19) p440

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Ogilvie-Grant, W.R.; Forbes, H.O. (1899)

The expedition to Sokotra 1: descriptions of the new species of birds
Bulletin of the Liverpool Museums 2(1) pp203

Also noted in *Ibis* (7th Series) 1900 6(1, No. 21) p202

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Ogilvie-Grant, W.R.; Forbes, H.O. (1903)

Chordata. Vertebrata. Aves

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Liverpool Museums Bulletin* (Special Bulletin) pp19-72)

See Birds, pp21-22

See The birds of Sokotra, pp23-57, 2 figures, 13 musical notations of bird calls, 2 drawings from paintings by P.J. Smit

See Birds of Abd-el-Kuri, pp58-63

See colour plates by H. Gronvold: III (*Fringillaria socotrana*, *Fringillaria insularis*), V (*Scops socotranus*), VI (*Phalacrocorax nigrogularis*), VII (*Passer hemi leucus*, *Motacilla forwardi*)

Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Ogilvie-Grant, W.R. (1913)

Exhibition and description of a new subspecies of Grosbeak *Rhynchostruthus percivali yemenensis*, from the mountains of S. Yemen

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Archer, G.; Godman, E.G. (1937, 1961)

The birds of British Somaliland and the Gulf of Aden: their life histories, breeding habits, and eggs

4 vols. (Vols. 1 and 2, 1937; Vols. 3 and 4, 1961)

Edinburgh: Oliver and Boyd

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On the plumages and moults of males of the sunbirds occurring in eastern Africa

Ibis 87(Apr) pp145-58

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On the *Otus scops* (Linnaeus) group, and allied groups, with special reference to *Otus brucie* (Hume)

Bulletin of the British Ornithologist's Club 69(1) pp162-65

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Petrels, shearwaters and other oceanic birds in the north Indian Ocean

Journal of the Bombay Natural History Society 52(2/3) pp334-38

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Ripley, S.D. (1954)

Comments on the biogeography of Arabia with particular reference to birds

Journal of the Bombay Natural History Society 52(2/3) pp241-48

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Birds of eastern and north eastern Africa: 2nd revised edition

2 vols. (Vol. 1 1957; Vol. 2 1960) (African Handbook of Birds)

London: Longman, Green and Co. (The two vols. of the 1st edition were published in 1952 and 1955)

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Benson, C.W.; Irwin, M.P.S. (1963)

Some comments on the Atlas of European Birds from the Ethiopian aspect

Ardea 51(2) pp212-29

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Bailey, R.S. (1966)

The sea-birds of the southeast coast of Arabia

Ibis 108(2) pp224-64

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Moreau, R.E. (1966)

The bird faunas of Africa and its islands

x + 424pp
London: Academic Press

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Ripley, S.D. (1966)

Le martinet pale de Socotra (*Apus pallidus berliozi* subsp. nov.)
L'Oiseau et la Revue Française d'Ornithologie 35(special issue) pp101-02

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Ripley, S.D.; Bond, G.M. (1966)

The birds of Socotra and Abd-el-Kuri
Smithsonian Miscellaneous Collection 151(7) pp1-37, 8 photographs, 1 map
(Smithsonian Publication 4681)
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The pelagic distribution of sea-birds in the eastern Indian Ocean
Ibis 110(4) pp493-519

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London: Country Life Books

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Bulletin of the British Ornithologists' Club 89(1) pp11-16

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Sea-bird observations off Somalia
Ibis 113(1) pp29-41

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Owls of the world: their evolution, structure and ecology
216pp
London: Peter Lowe

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The birds of Africa: Volume 1: ostrich to falcons
xiv + 521pp, 32 plates
London: Academic Press

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Collar, N.J.; Stuart, S.N. (1985)

Threatened birds of Africa and related islands: ICB/IUCN Red Data Book, Part 1:
3rd edition

xxxvi +761pp

Cambridge: International Council for Bird Preservation, and International
Union for the Conservation of Nature and Natural Resources

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Socotran birds

Phoenix 9 pp26-27

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A contribution to the distribution and taxonomy of Afrotropical and Malagasy birds

389pp (Tauraco Research Report No. 5)

See Socotra Island (part of Yemen), pp143-44

Liège: Tauraco Press

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Checklist of birds of the Afrotropical and Malagasy regions: Volume 1: species
limits and distribution

375pp

Liège: Tauraco Press

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Summary of the OSME survey of southern and eastern Yemen and Socotra: Spring
1993

Phoenix 10 pp18-19

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Martins, R.P.; Porter, R.F.; Stone, F. (1993)

Preliminary report of the OSME survey of southern Yemen and Socotra, Spring
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17pp

Sandy, Bedfordshire: Ornithological Society of the Middle East

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Porter, R.F.; Martins, R.P. (1993)

OSME in southern Yemen and Socotra

Bulletin of the Ornithological Society of the Middle East 31(Autumn) pp1-4

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Phoenix 11 p5

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Socotra (Yemen)

Bulletin of the African Bird Club 1(1) p30

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News and information. Middle East Committee. The Highlands and Islands Flyways Project

Bulletin of the Ornithological Society of the Middle East 34(Spring) p20

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News and information. Yemen

Bulletin of the Ornithological Society of the Middle East 35(Autumn) p52

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Jennings, M.C. (1995)

An interim atlas of the breeding birds of Arabia

134pp, 24 drawings, 198 species distribution maps, 6 maps, 2 tables

Riyadh: National Commission for Wildlife Conservation and Development

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Jennings, M.C. (1995)

Why do Egyptian vultures still occur on the larger Arabian islands?

Phoenix 12 p17, 1 figure

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Perlo, B. van (1995)

Birds of eastern Africa

224pp, 1,487 species illustrated in colour, 1487 distribution maps (Collins Illustrated Checklist)

London: Harper Collins

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Al-Saghier, O.; Porter, R.F. (1996)

The bird diversity of Soqatra

In: Proceedings of the First International Symposium on Soqatra Island:

Present and Future, edited by H.J. Dumont, pp199-212

New York: United Nations Publications

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Field guide to the birds of the Middle East

xv + 460pp

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Habitats and bird communities in southern Yemen and Socotra

Sandgrouse 17 pp103-29

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Dymond, J.N. (1996)

The Socotra Warbler *Incana incana*
Sandgrouse 17 pp142-44

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Dymond, J.N. (1996)

Biometric data of birds in southern Yemen and Socotra, Spring 1993
Sandgrouse 17 pp158-64

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Dymond, J.N.; Porter, R.F. (1996)

The Socotra Cisticola *Cisticola haesitata*
Sandgrouse 17 pp145-47

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Kirwan, G.M.; Martins, R.P.; Morton, K.M.; Showler, D.A. (1996)

The status of birds in Socotra and Abd-el-Kuri and the records of the OSME survey in Spring 1993
Sandgrouse 17 pp83-101

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Martins, R.P.; Porter, R.F. (1996)

The *Buteo* population in Socotra
Sandgrouse 17 pp134-37, 2 figures, 1 coloured photograph (Plate 23)

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Morton, K.M. (1996)

The Socotra Bunting *Emberiza socotrana*
Sandgrouse 17 pp155-57, 1 colour photograph (Plate 35)

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Porter, R.F.; Dymond, J.N.; Martins, R.P. (1996)

Forbes-Watson's Swift *Apus berliozi* in Socotra
Sandgrouse 17 pp138-41, 2 colour photographs (Plates 25 and 26)

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Porter, R.F.; Martins, R.P. (1996)

The Socotran Starling *Onychognathus frater* and Somali Starling *O. blythii*
Sandgrouse 17 pp151-54, 2 colour photographs (Plates 33 and 34)

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Porter, R.F.; Martins, R.P.; Stone, F. (1996)

The Ornithological Society of the Middle East's survey of southern Yemen and Socotra, March-May 1993: an introduction
Sandgrouse 17 pp5-14, 2 maps (1 of Socotra)

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Porter, R.F.; Stone, F. (1996)

An introduction to Socotra and its birds

Sandgrouse 17 pp73-80, 1 map

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Kirwan, G.M. (1998)

Additions to the avifauna of Socotra and Abd-el-Kuri

Bulletin of the African Bird Club 5(1) pp17-20

10.4 Reptiles and amphibians

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Blanford, W.T. (1881)

Notes on the lizards collected in Socotra by Prof. I. Bayley Balfour

Proceedings of the Scientific Meetings of the Zoological Society of London
(for the year 1881), p464, 2 figures, 1 plate (Plate XLII: artist R. Mintern)

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Peters, W. (1882)

Mittheilung über die von Herrn Dr E. Riebeck auf Socotra gesammelten Reptilien

Sitzungsberbericht der Gesellschaft naturforschender Freunde Berlin 1882
pp42-46

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Boulenger, G.A. (1889)

Descriptions of new Typhlopidae in the British Museum

Annals and Magazine of Natural History (6th Series) 4(23) pp360-63

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Boulenger, G.A. (1893)

Catalogue of the snakes in the British Museum (Natural History). Volume I:
containing the families Typhlopidae, Glauconiidae, Boidae, Ilysiidae, Uropeltidae,
Xenopeltidae, and Colubridae Aglyphae, part

xiii + 448pp, 28 plates

See pp21, 408

London: Trustees of the British Museum

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Boulenger, G.A. (1893)

Catalogue of the snakes in the British Museum (Natural History). Volume III:
containing the Colubridae (Opisthoglyphae and Proteroglyphae), Amblycephalide
and Viperidae

xiv + 727pp, 25 plates

See p46

London: Trustees of the British Museum

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Boulenger, G.A. (1893)

The expedition to Sokotra 2: descriptions of the new species of reptiles

Bulletin of the Liverpool Museums 2(1) pp4-7

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Boulenger, G.A. (1903)

Chordata. Vertebrata. Reptilia

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp73-104)

See The reptiles of Sokotra, pp75-93, 2 figures

See Reptiles of Abd-el-Kuri, pp94-96

See Plain plates by J. Green: VIII (*Phyllodactylus riebeckii*); IX
(*Phyllodactylus trachyrhinus*, *Hemidactylus forbesii*); X
(*Hemidactylus pumilo*, *Hemidactylus oxyrhinus*, *Hemidactylus*
granti); XI (*Parashalcides socotranus*, *Glauconia filiformis*,
Glauconia macrura)

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

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Boulenger, G.A. (1915)

A list of the snakes of northeast Africa, from the tropical to the Soudan and
Somaliland, including Socotra

Proceedings of the General Meetings for Scientific Business of the
Zoological Society of London (for the year 1915) pp641-58

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Mertens, R. (1934)

Die Inseln-Reptilien, ihre Ausbreitung, Variation und Artbildung

Zoologica (Stuttgart) 32(84) pp1-209

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Parker, H.W. (1938)

A new gecko from Socotra

Annals and Magazine of Natural History 11(1) pp305-07

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Bogert, C.M. (1940)

Herpetological results of the Vernay Angola Expedition. Part 1: snakes, including an
arrangement of the African Colubridae

Bulletin of the American Museum of Natural History 77 pp1-107

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Parker, H.W. (1949)

The snakes of Somaliland and the Sokotra islands

Zoologische Verhandelingen (Leiden) 6 pp1-115

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Corkhill, N.L.; Cochrane, J.A. (1965)

The snakes of the Arabian peninsula and Socotra

Journal of the Bombay Natural History Society 62 pp475-506, sketch map of
the Arabia, an inset sketch map of Socotra

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Mertens, R. (1966)

Chamaeleonidae

Tierreich (Berlin) 83 pp1-37

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Arnold, E.N. (1986)

New species of Semaphore Gecko (*Pristurus*: Gekkonidae) from Arabia and Socotra

Fauna of Saudi Arabia 8 pp352-77, 13 figures, 13 photographs [7 of specimens from Socotra and Abd el Kuri], 3 coloured plates, 1 table, 1 map

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Heimes, P. (1987)

Beitrag zur Systematik der Fächerfinger (Sauria: Gekkonidae: Ptyodactylus)

Salamandra 23(4) pp212-35

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Joger, U. (1987)

An interpretation of reptile zoogeography in Arabia, with special reference to Arabian herpetofaunal relations with Africa

In: Proceedings of the Symposium on the Fauna and Zoogeography of the Middle East, Mainz, 1985, edited by R. Kinzelbach, F. Krupp and W. Schneider

Tübinger Atlas des Vorderen Orients (Beiheft A) 28 pp257-71

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Bauer, A.; Good, D.A.; Branch, W.R. (1997)

The taxonomy of the southern African leaf-toed geckos (Squamata: Gekkonidae), with a review of Old World 'Phyllodactylus' and the description of five new genera

Proceedings of the California Academy of Sciences 49(14) pp447-97

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Rosler, H.; Wranik, W. (1998)

Untersuchungen zur Herpetofauna der Republik Jemen 2: Gekkonidae des südlichen Jemen unter der Insel Sokotra

Faunistische Abhandlungen Staatliches Museum für Tierkunde (Dresden) 21/Suppl pp113-32

10.5 Molluscs

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Petit, S. (1850)

Notice sur le genre Cyclostoma, et catalogue des espèces à ce genre

Journal de Conchyliologie (Paris) 1 pp36-55

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Petit, S. (1850)

Notice sur les coquilles rapportées par M. Guillain, officier supérieur de la marine, commandant le brick *Le Ducouëdic*

Journal de Conchyliologie (Paris) 1 pp76-77

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Petit, S. (1853)

Description de coquilles nouvelles

Journal de Conchyliologie (Paris) 4 pp360-69

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Martens, E. von (1881)

Land-Schnecken von Sokotra

Nachrichtsblatt der deutschen malakozoologischen Gesellschaft (Frankfurt-am-Main) 13 pp134-38

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Martens, E. von (1883)

Mollusken von Sokotra

Conchologische Mitteilungen 2(3/4) pp140-52, 2 plates (Nos. 28-29)

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Brown, D.S.; Wright, C.A. (1980)

Molluscs of Saudi Arabia: freshwater molluscs

Fauna of Saudi Arabia 2 pp341-58

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Van Belle, R.A.; Wranik, W. (1991)

Chitons (Mollusca: Polyplacophora) from the coast of Yemen and Socotra Island

Fauna of Saudi Arabia 12 pp366-81

10.6 Arthropods and arachnids

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Pocock, R.I. (1888)

Description of *Scolopendra valida* Lucas with notes on allied species

Annals and Magazine of Natural History (6th Series) 1(5) pp335-40

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Pocock, R.I. (1889)

XXXVIII: notes on some Buthidae, new and old

Annals and Magazine of Natural History (6th Series) 3(16) pp334-51

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Pocock, R.I. (1896)

On the Arachnida and Myriopoda obtained by Dr Anderson's collector during Mr T Bent's expedition to the Hadramaut, South Arabia; with a supplement upon the scorpions obtained by Dr Anderson in Egypt and the eastern Soudan

Journal of the Linnean Society Journal (Zoology) 25 pp292-316

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Pickard-Cambridge, F.O. (1898)

On a collection of insects and arachnids made by Mr E.N. Bennett in Socotra, with descriptions of new species. IV: Arachnida

Proceedings of the General Meetings for Scientific Business of the Zoological Society of London (for the year 1898) pp387-91

See plain plate XXXI depicting 4 species of spider from Socotra

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Pocock, R.I. (1899)

The expedition to Sokotra. III: descriptions of the new species of scorpions, centipedes, and millipedes

Bulletin of the Liverpool Museums 2(1) pp7-9

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Pocock, R.I. (1899)

The expedition to Sokotra. VII: descriptions of one new genus and four new species of spiders

Bulletin of the Liverpool Museums 2(2) pp40-42

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Pocock, R.I. (1903)

Arthropoda. Arachnida. Scorpions and spiders

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes

(*Bulletin of the Liverpool Museums* (Special Bulletin) pp175-208)

See I. The scorpions and spiders of Sokotra, pp178-201, 2 figures

See II: Scorpions and spiders of Abd-el-Kuri, pp202-05

See colour plates by F.O. Pickard-Cambridge XIV (depicts the spiders *Monocentropus balfouri*, *Nephila sumtuosa*, *Argyope*, *Areneus cardioceros*); XXIV (centipedes and spiders from Socotra)

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

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Pocock, R.I.; Walker, R.I.; Scott, A. (1903)

Arthropoda. Crustacea: Malacostraca

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes

(*Bulletin of the Liverpool Museums* (Special Bulletin) pp209-32)

See I. The decapods of Socotra, pp212-15, 1 figure

See II. Decapod and sessile-eyed crustaceans from Abd-el-Kuri, pp216-29

See plain plates by A. Scott: XIV A (7 species of crustacean from Abd-el-Kuri); XIV B (6 species of crustacean from Abd-el-Kuri)

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

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Durish, Z. (1987)

[New localities of the Stomatopods (Crustacea, Stomatopoda) in the Indian Ocean]

Zoologicheskii Zhurnal 66(6) pp938-43. In Russian

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Griswold, C.E. (1987)

The African members of the Trap-door Spider family Migidae, Araveae,
Mygologomorphae 1: the genus *Moggridgea*, O.P. Cambridge 1875
Annals of the Natal Museum 28(1) pp1-118

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Dippenaar-Schoeman, A.S. (1989)

An annotated check list of Crab Spiders (Araneae: Thomisidae) of Saudi Arabia
Fauna of Saudi Arabia 10 pp20-30, 14 figures

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Ferrara, F.; Taiti, S. (1996)

Terrestrial Isopoda (Crustacea) from Yemen
Fauna of Saudi Arabia 15 pp118-36

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Türkay, M.; Sakai, K.; Apel, M. (1996)

The Ocypode ghost crabs (Curtacea: Decapoda: Brachyura) of the Arabian peninsula
and adjacent regions
Fauna of Saudi Arabia 15 pp99-117

10.7 Insects

10.7(a) General

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Kaltenbach, A. (1982)

Insects of Saudi Arabia. Mantodea
Fauna of Saudi Arabia 4 pp29-72. In German

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Guichard, K.M. (1992)

The insects of Socotra
In: Socotra: island of tranquillity, by B. Doe, pp181-88, 7 coloured plates
London: Immel Publishing Ltd.

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Smith Meyer, M.K.P. (1996)

On some spider mites (Acari: Tetranychidae) of Yemen
Fauna of Saudi Arabia 15 pp5-19

10.7(b) Coleoptera

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Koch, C. (1970)

Die Tenebrioniden (Coleoptera) des Archpiels von Socotra
Monitore Zoologico Italiano (Supplemento) 3(4) pp69-132

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Penrith, M.L. (1983)

Revision of the *Zophosini* (Coleoptera: Tenebrionidae). Part 7: the African species of the subgenus *Oculosis Penrith*

Cimebasia: Journal of the State Museum, Windhoek, Series A – Natural Sciences 6(7) pp210-367, 39 figures, 16 maps, gazetteer on pp358-67

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Penrith, M. L. (1983)

Revision of the *Zophosini* (Coleoptera: Tenebrionidae). Part 8: the palearctic species group of the subgenus *Oculosis Penrith*, the subgenus *Cheirosis Deyrolle*, and a monotypical subgenus from Socotra, South Yemen

Cimebasia: Journal of the State Museum, Windhoek, Series A – Natural Sciences 6(8) pp369-84, 5 figures, 3 maps, gazetteer on pp382-84

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Bily, S. (1984)

Taxonomic notes on *Anthaxia* with description of new taxa (Coleoptera, Buprestidae)

Acta Entomologica Bohemoslovaca 81(3) pp212-22

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Pittino, R. (1984)

Insects of Arabia. Coleoptera Scarabaeoidea: a revision of the family Aphodiidae

Fauna of Saudi Arabia 6 pp267-360

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Penrith, M. L. (1986)

Revision of the *Zophosini* (Coleoptera: Tenebrionidae). Part 10: key to the subgenera, supplement, evolution and biogeography of the tribe, and catalogue

Cimebasia: Journal of the State Museum, Windhoek, Series A – Natural Sciences 6(10) pp417-502, 8 figures, 29 maps

10.7(c) Diptera

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Ricardo, G.; Theobald, F.V. (1903)

Arthropoda. Insecta: Diptera. Flies

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp357-78)

See The flies of Sokotra, pp359-74 (including Culicidae by F.V. Theobald, pp359-61)

See The flies of Abd-el-Kuri, pp375-76

See colour plate XXII by H. Knight depicting 11 species

Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Becker, T. (1931)

Dipteren aus Südarabien und von der Insel Sokotra: unter mitwirkung von P. Stein, Treptow, und Villeneuve, Rambouillet

*Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien
Mathematisch-naturwissenschaftliche Klasse* 71(2) pp131-60, 4 figures

NB: this issue of the journal carried papers delivered before the Akademie in the first decade of the century, but was not published until 1931.

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Mattingly, P.F. (1953)

The sub-genus *Stegomyia* (Diptera: Culicidae) in the Ethiopian region: II.
Distribution of species confined to the East and South African Sub-region

Bulletin of the British Museum (Natural History) Entomology 3(1) pp1-65, 2
figures, 13 maps

See pp22-28

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Marks, E.N. (1954)

A review of the *Aedes scutellaris* subgroup with a study of the variation in *Aedes pseudoscutellaris* (Theobald). (Diptera: Culicidae)

Bulletin of the British Museum (Natural History) Entomology 3(10) pp347-
414, 19 figures, 1 plain plate (Plate 18)

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Mattingly, P.F.; Knight, K.L. (1956)

The mosquitoes of Arabia: I

Bulletin of the British Museum (Natural History) Entomology 4(3) pp89-141,
2 figures, 2 maps, 2 tables

See pp93, 95-96, 100, 103-04, 114-25, 130, 132-33, 137-38

(449)

Pont, A.C. (1991)

A review of the Fanniidae and Muscidae (Diptera) of the Arabian peninsula

Fauna of Saudi Arabia 12 pp312-65

See pp325, 329-30, 333-34, 337, 352-53 358-59

10.7(d) Hemiptera

(450)

Kirkaldy, G.W. (1899)

The expedition to Sokotra IX: descriptions of ten new species of Hemiptera

Bulletin of the Liverpool Museums 2(2) pp45-47

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Kirkaldy, G.W. (1903)

Arthropoda. Insecta: Hemiptera. Cicadas and bugs

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp379-94)

See The cicadas and bugs of Sokotra, pp381-91

See Bugs from Abd-el-Kuri, p392

See coloured plate XXIII by H. Knight depicting 10 species

Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

10.7(e) Hymenoptera

(452)

Kirby, W.F. (1881)

On the Hymenoptera collected by Prof. I. Bayley Balfour in Socotra
Proceedings of the Scientific Meetings of the Zoological Society of London
(for the year 1881) pp649-50

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Kirby, W.F. (1900)

The expedition to Sokotra: descriptions of the new species of Hymenoptera
Bulletin of the Liverpool Museums 3(1) pp13-24

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Kirby, W.F. (1903)

Arthropoda. Insecta: Hymenoptera. Ichneumons, wasps and bees
In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp233-60)
See The Ichneumons, wasps and bees of Sokotra, pp236-54, 1 figure
drawn from an original painting by P.J. Smit
See The wasps and bees of Abd-el-Kuri, pp255-57
See colour plate XVI by H. Knight depicting 15 species
Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Kohl, F.F.; Kustos, K. (1907)

Zoologische Ergebnisse der Expedition der Akademie der Wissenschaften nach
Südarabien und Sokotra im Jahre 1898-1899: Hymenopteren
Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien
Mathematisch-naturwissenschaftliche Klasse 71(1) pp170-301, 11 plates

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Richards, O.W. (1984)

Insects of Saudi Arabia. Hymenoptera: Fam. Masaridae (the Arabian species)
Fauna of Saudi Arabia 6 pp413-40

(457)

Lisenmaier, W. (1994)

The Chrysididae (Insecta: Hymenoptera) of the Arabian peninsula
Fauna of Saudi Arabia 14 pp145-206

10.7(f) Lepidoptera

(458)

Butler, A.G. (1881)

On the Lepidoptera collected in Socotra by Prof. I.B. Balfour

Proceedings of the Scientific Meetings of the Zoological Society of London
(for the year 1881), p175, 1 coloured plate (Plate XVIII: artist E. Wilson)

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Dixey, F.A. (1898)

On a collection of insects and arachnids made by Mr E.N. Bennett in Socotra, with descriptions of new species. I: Lepidoptera, with remarks on local and seasonal forms in the genus *Byblia* Hubn.

Proceedings of the General Meetings for Scientific Business of the Zoological Society of London (for the year 1898) pp372-83

See plain plate XXX by F.O. Pickard-Cambridge depicting 1 orthopteran and 2 butterflies from Socotra

(460)

Ogilvie-Grant, W.R. (1899)

The expedition to Sokotra. IV: descriptions of three new species of butterflies
Bulletin of the Liverpool Museums 2(1) pp10-11

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Rebel, H. (1899)

Diagnosen neuer Lepidopteren aus Südarabien und von der Insel Sokotra
Anzeiger der Kaiserlichen Akademie der Wissenschaften in Wien Mathematisch-naturwissenschaftliche Klasse 36 pp359-61

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Ogilvie-Grant, W.R. (1903)

Arthropoda. Insecta: Lepidoptera

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp295-314)

See The butterflies of Socotra, pp295-313

See The butterflies of Abd-el-Kuri, p314

See colour plates by H. Horman-Fisher: XVIII (*Charaxes velox*);
XIX (*Charaxes balfouri*, *Tarucus socotranus*, *Tarucus quadratus*,
Belenois anomala, *Rhopalocampta jacunda*)

Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Prout, L.B. (1928)

New Geometridae

Novitates Zoologicae 34(2) pp53-70

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Rebel, H. (1931)

Zoologische ergebnisse der Expedition der Kaiserlichen Akademie der Wissenschaften nach Südarabien und Sokotra im jahre 1898/99. Lepidopteren
Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien Mathematisch-naturwissenschaftliche Klasse 71(2) pp31-130, 41 figures. 1 plate

NB: this issue of the journal carried papers delivered before the Akademie in the first decade of the century, but was not published until 1931.

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Alberti, B. (1954)

Über die stammesgeschichtliche Gliederung der Zygaenidae nebst Revision einiger Gruppen (Insecta, Lepidoptera)

Mitteilungen aus dem Zoologischen Museums Berlin 30 pp115-480

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Carcasson, R.H. (1964)

A preliminary survey of the zoogeography of African butterflies

East African Wildlife Journal (Nairobi) 2 pp122-57

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Popescu-Gorj, A.; Constaninescu, A. (1977)

Revision of the genus *Euclasta* (Lepidoptera, Pyraustinae): a taxonomic and zoogeographic study

Travaux de Museum d'Histoire Naturelle 'Grigore Antipa' (Bucharest) 18 pp157-246

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Wiltshire, E.P. (1980)

Insects of Saudi Arabia. Lepidoptera: Fam. Cossidae, Limacididae, Sesiidae, Lasiocampidae, Sphingidae, Notodontidae, Geometridae, Lymantriidae, Nolidae, Arctiidae, Agaristidae, Noctuidae, Ctenuchidae

Fauna of Saudi Arabia 2 pp179-240

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Naumann, C.M.; Edelman, A. (1984)

Insects of southern Arabia: the life history, ecology and distribution of *Ressita simonyi* (Rebel, 1899) (Zygaenidae, Lepidoptera)

Fauna of Saudi Arabia 6 pp473-509

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D'Abrera, B. (1986)

Sphingidae mundi. Hawk moths of the world: based on a checklist by Alan Hayes and the collection he curated in the British Museum (Natural History)

x + 226pp, 82 coloured plates

See p192

Farrington, Oxfordshire: E.W. Classey Ltd.

10.7(g) Odonata

(471)

Kimmins, D.E. (1960)

The Odonata and Neuroptera of the Island of Socotra

Annals and Magazine of Natural History (13th Series) 3(7, No. 31) pp385-92

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Pinhey, E.C.G. (1961)

A survey of the dragonflies (order Odonata) of eastern Africa

vii + 214pp

London: British Museum

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St. Quentin, D. (1968)

Zur systematischen Stellung von *Enallagma granti* MacLachlan (Odonata)

Mitteilungen der Münchner Entomologischen Gesellschaft 58 pp62-64

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Pinhey, E.C.G. (1970)

Monographic study of the genus *Trithemis* Brauer (Odonata: Libellulidae)

Memoirs of the Entomological Society of Southern Africa 11 pp1-159

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Waterston, A.R. (1984)

Insects of southern Arabia: Odonata from the Yemens and Saudi Arabia

Fauna of Saudi Arabia 6 pp451-72

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Al-Safadi, M.M. (1990)

Dragonflies (Odonata) of the Yemen Arab Republic

Fauna of Saudi Arabia 11 pp18-30, 6 figures, 1 table

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Schneider, W.; Dumont, H.J. (1996)

Checklist of the dragonflies and damselflies of Soqatra Island (Insecta: Odonata)

In: Proceedings of the First International Symposium on Soqatra Island:

Present and Future, edited by H.J. Dumont, pp233-47

New York: United Nations Publications

10.7(h) Orthoptera

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Burr, M. (1898)

On a collection of insects and arachnids made by Mr E.N. Bennett in Socotra, with descriptions of new species. II: Orthoptera

Proceedings of the General Meetings for Scientific Business of the Zoological Society of London (for the year 1898) (3) pp384-85

See plain plate XXX by F.O. Pickard-Cambridge depicting 1 orthopteran and 2 butterflies from Socotra

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Burr, M. (1899)

The expedition to Sokotra. VIII: descriptions of two new genera and six new species of Orthoptera

Bulletin of the Liverpool Museums 2(2) pp42-45

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Krauss, H.A. (1902)

Diagnosen neuer Orthopteren aus Südarabien und von der Insel Sokotra
*Anzeiger der Kaiserlichen Akademie der Wissenschaften in Wien,
Mathematisch-naturwissenschaftliche Klasse* 39(7) pp53-58

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Burr, M. (1903)

Arthropoda. Insecta: Orthoptera. Earwigs, grasshoppers and crickets
In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp409-26)
See Earwigs, grasshoppers and crickets of Sokotra, pp413-23
See Grasshoppers from Abd-el-Kuri, pp424-25
See colour plate XXV by F.O. Pickard-Cambridge depicting 8
species from Socotra
Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Kevan, D.K.M. (1973)

A new genus of Pyrgomorphidae (Acrioidea, Orthoptera) from the Island of
Socotra
Canadian Entomologist 105(9) pp1169-73

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Popov, G.B. (1981)

Insects of Saudi Arabia. Orthoptera: Fam. Tettigoniidae (bush crickets)
Fauna of Saudi Arabia 3 pp114-48, 3 colour and 8 monochrome
photographs, 1 map, 5 tables
See pp12-35

(484)

Popov, G.B. (1984)

Insects of Saudi Arabia. Orthoptera: Fam. Stenopelmatidae and Gryllacrididae
Fauna of Saudi Arabia 6 pp175-202

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Popov, G.B. (1997)

Arabian grasshoppers (Orthoptera): Families Pamphagidae (Eumastacoidea) and
Pyrgomorphidae (Acridoidea)
Fauna of Saudi Arabia 16 pp111-68

10.8 Marine life and environment

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Forbes, H.O. (1903)

Chordata. Vertebrata. Batrachia. Pisces. Batrachians and fishes
In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes
(*Bulletin of the Liverpool Museums* (Special Bulletin) pp105-08)
Liverpool: The Free Public Museums, and Henry Young and Sons

London: R.H. Porter

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Steindachner, F. (1907)

Fische aus Südarabien und Sokótra

Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien

Mathematisch-naturwissenschaftliche Klasse 71(1) pp123-68, 2 plates

(Plates I and II)

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Scheer, G. (1964)

Korallen von Abd-el-Kuri

Zoologische Jahrbücher Abteilungen für Allgemeine Zoologie und

Physiologie der Tiere (Jena) 91 pp451-66

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Food and Agriculture Organization (1968)

Report to the governments of Southern Yemen and the Seychelles Islands on the green turtle resource of South Arabia, and the status of the green turtle in the Seychelles Islands

ix + 50pp (FAO/TA Marine Turtle Biologist. Report No. TA 2367)

Rome: Food and Agriculture Organization; United Nations Development Programme

Based on the work of Dr. Harold F. Hirth

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Hirth, H.; Carr, A. (1970)

The green turtle in the Gulf of Aden and the Seychelles Islands

Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen

Afdeling Natuurkunde Tweede Reeks 8(5), p44

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Rosen, B.R. (1971)

The distribution of reef coral genera in the Indian Ocean

In: Regional variation in Indian Ocean coral reefs, edited by D.R. Stoddart and C.M. Yonge, pp263-99 (Symposia of the Zoological Society of London 28)

London: Academic Press

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Scheer, G. (1971)

Coral reefs and coral reef genera in the Red Sea and Indian Ocean

In: Regional variations in Indian Ocean coral reefs, edited by D.R. Stoddart and C.M. Yonge, pp329-67 (Symposia of the Zoological Society of London 28)

London: Academic Press

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Kimor, B. (1973)

Plankton relations of the Red Sea, Persian Gulf and Arabian Sea
Ecological Studies: Analysis and Synthesis 3 pp221-32

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Druzhinin, A.D.; Filatova, N.A. (1980)

[Some data on the Snapper family (Lutjanidae) from the Gulf of Aden region]
Voprosy Ikhtiologii 20(1) pp12-19. In Russian

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Randall, J.E. (1980)

Revision of the fish genus *Plectranthias* (Serranidae, Anthiinae) with descriptions of 13 new species
Micronesia: Journal of the University of Guam 16(1) pp101-87

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Makarieva, T.N.; Shubina, L.K.; Kalinovskiy, A.L.; Stonik, V.A.; Elyakov, G.B.

Steroids in Porifera 2: steroid derivatives from two sponges of the family Halichondriidae: Sokotrasterol sulfate, a marine steroid with a new pattern of side chain alkylation
Steroids 42(3) pp267-82

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Ivanova, E.V. (1985)

Late Quaternary biostratigraphy and paleotemperatures of the Red Sea and the Gulf of Aden based planktonic Foraminifera and Pteropods
Marine Micropaleontology 9(4) pp335-64

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Sorokin, Y. (1985)

Coral reef studies
Reef Newsletter 11 pp31-32

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Kotlyar, A.N. (1986)

[Finding of *Hoplostethus rubellopterus* (Trachichthyidae) and *Polymixia fusca* (Polymixiidae) above Error Submarine Mountain]
Byulleten Moskovskogo Obschestva Ispytatelei Prirody Otdel Biologicheskii 91(3) pp48-52. In Russian

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Parin, N.V.; Abramov, A.A. (1986)

[Two new species of benthopelagic fish of the genus *Epigonus* (Apogonidae) from the western tropical part of the Indian Ocean]
Byulleten Moskovskogo Obschestva Ispytatelei Prirody Otdel Biologicheskii 91(3) pp53-57. In Russian

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Latypov, Y.Y. (1987)

[Composition and distribution of Scleratinians of Socotra Island]
Biologiya Morya (4) pp35-41. In Russian

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Khromov, D.N. (1988)

[Two new species of the genus *Sepia* (Cephalopoda, Sepiidae) from the Sokotra Island, South Yemen waters]

Zoologicheskii Zhurnal 67(5) pp785-90. In Russian

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Wells, S. M. (1988)

Coral reefs of the world: Volume 2: Indian Ocean, Red Sea and Gulf

See South Yemen pp387-88

Nairobi: United Nations Environment Programme; Gland: International Union for the Conservation of Nature and Natural Resources

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Klausewitz, W. (1989)

Evolutionary history and zoogeography of the Red Sea ichthyofauna

Fauna of Saudi Arabia 10 pp310-37, 1 figure, 8 colour photographs in 1 plate, 3 monochrome photographs, 4 maps, 2 tables

See pp318-19

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Al-Safadi, M.M. (1996)

Freshwater fishes of Soqatra Island

In: Proceedings of the First International Symposium on Soqatra Island: Present and Future, edited by H.J. Dumont, pp213-18

New York: United Nations Publications

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MacAlister Elliot and Partners Ltd. (1996)

Preliminary marine species list for the Socotra Archipelago

In: Biodiversity conservation and sustainable development programme: Socotra Archipelago, Republic of Yemen: Mission report (Marine Team), Annex C (10pp)

Edinburgh: MacAlister Elliott and Partners

11. Botany

11.1 General

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Anon. (1881)

Scottish Horticultural Association. 'Notes on the flora of Socotra', a paper delivered to the Association by Mr Alexander Scott, Royal Botanic Gardens, Edinburgh, Tuesday, 5 July, 1881

Gardener's Chronicle (New Series) 15(16 Jul) pp86-87

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Bayley Balfour, I. (1883)

The flora of Socotra
Gardener's Chronicle (New Series) 20(8 Dec) pp719-20

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Brown, N.E. (1883)

Three interesting plants

Gardener's Chronicle (New Series) 20(1 Dec) pp277-78

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Bayley Balfour, I. (1888)

Botany of Socotra: [written] with the assistance of other botanists (Transactions of the Royal Society of Edinburgh 31)

lxxv + 446pp, map, 100 lithographed line drawings by J.N. Fitch, W.H. Fitch, Dr G. Schweinfurth, M. Smith and Mrs H. Thiselton-Dyer
Edinburgh: Robert Grant and Son, and London: Williams and Norgate

Reviewed by 'W.B.H.' in *Nature* 1888 39(996) pp99-100; and by E. Roth in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 1889 9(3) pp45-47

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Anon. (1897)

DLXXIV. Miscellaneous notes: tropical African plants

Kew Bulletin 5(127) pp241-42

Notifies the presentation to Kew of dried plant specimens collected in Socotra and South Arabia by 'the late Mr Theodore Bent'.

(512)

Blatter, E. (1914-16)

Flora of Aden: records of the Botanical Survey of India: Volume 7

xix + 418pp (in 4 parts)

Calcutta: Superintendent Government Printing, India

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Blatter, E. (1919-36)

Flora Arabica: records of the Botanical Survey of India: Volume 8

xlix + 519pp (in 6 parts)

Calcutta: Superintendent Government Printing, India (Parts 1-4 published in 1919, 1921 and 1923)

Delhi: Manager of Publications, India (Parts 5-6 published in 1933 and 1936)

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Ridley, H.N. (1930)

The dispersal of plants throughout the world

xx + 744pp

Ashford, Kent: L. Reeve and Co.

See pp47, 161

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Pichi-Sermolli, R.E.G. (1955)

Tropical east Africa (Ethiopia, Somaliland, Kenya, Tanganyika)

In: Plant ecology, pp302-60 (Arid Zone Research 6)

Paris: Unesco

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Pichi-Sermolli, R.E.G. (1957)

Una carta geobotanica dell'Africa Orientale (Eritrea, Etiopia, Somalia)

Webbia 13(1) pp15-132, 1:500,000 scale map (including Socotra), 21 full plate photographs (Tav. I-XXI)

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Popov, G.B. (1957)

The vegetation of Socotra

Journal of the Linnean Society (Botany) 55 pp706-20, 18 habitat photographs on 5 plates (Nos. 55-59), 1 map, 1 table, plant species list by J.B. Gillett.

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Anon. (1968)

March-April 1968: offerings of plants by the International Succulent Institute Inc. [*Aloe perryi* and *Dracaena cinnabari*]

Cactus and Succulent Journal 40(2) pp83-86

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Knapp, R. (1973)

Die vegetationen von Afrika

626pp (Vegetationsmonographien der einselen Grossräume Band 3)
Stuttgart: Gustav Fischer Verlag

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Lavranos, J.J. (1974)

Plant hunting on Socotra

Excelsa (4) pp25-28, 17 small colour photographs on 2 plates

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Cronquist, A. (1981)

An integrated system of classification of flowering plants

xviii + 1,262pp

New York: Columbia University Press

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Raimondo, F.M.; Rossitto, M.; Sortoni, G. (1981)

Additional records for the flora of Somalia

Webbia 35(1) pp207-22, 2 photographs of herbarium species

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Miller, A.G.; Hedge, I.C.; King, R.A. (1982)

Studies in the flora of Arabia I: a. botanical bibliography of the Arabian peninsula

Notes from the Royal Botanic Garden Edinburgh 40(1) pp43-61

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Wickens, G.E. (1982)

Studies in the flora of Arabia III: a biographical index of plant collectors in the Arabian peninsula (including Socotra)

Notes from the Royal Botanic Garden Edinburgh 40(2) pp301-30

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Reddy, K.B. (1986)

Part II: plants of Socotra

In: Contributions to the flora and fauna of the Peoples' Democratic Republic of Yemen, pp97-108

Aden: University of Aden Faculty of Education

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Miller, A.G.; Morris, M. (1988)

Plants of Dhofar, the southern region of Oman, traditional economic and medicinal uses

360pp, illustrated by Susanna Stuart-Smith

Oman: Office for Conservation of the Environment

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Kingdon, J. (1990)

Island Africa: the evolution of Africa's rare animals and plants

287pp

London: Collins

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Ba Dhiib, A.S. (1991)

Al-Nabaataat al-Tibbiyyah fi al-Yaman. Huquuq al-Tab'Mahfuuzah l-il Mu'allif

Sana'a: Maktabah al-Irshaad

Deals with medicinal plants.

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Radcliffe-Smith, A. (1992)

The botany of Socotra

In: Socotra: island of tranquillity, by B. Doe, pp189-204, 11 full page drawings by M.A. Grierson

London: Immel Publishing Ltd.

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Mies, B.; Zimmer, H. (1993)

Die Vegetation der Insel Sokotra im Indischen Ozean

Bericht der Senckenbergischen naturforschenden Gesellschaft (Frankfurt-am-Main) 123(9) pp253-75, 1 figure, 7 colour photographs, 3 monochrome photographs, 3 maps + cover design of the issue based on the Socotra article

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Miller, A.G.; Cope, T.A. (with Nyberg, J.A.) (1996)

Flora of the Arabian peninsula and Socotra: volume 1

xxi + 586pp

Edinburgh: Edinburgh University Press, in association with Royal Botanic Gardens, Edinburgh and Royal Botanic Gardens, Kew

11. 2 Flowering plants

11.2(a) General

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Bayley Balfour, I. (1882)

Diagnoses plantarum novarum et imperfecte descriptarum phanerogamarum

Socotrensium: Part 1

Royal Society of Edinburgh Proceedings 11 pp498-514

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Bayley Balfour, I. (1882)

Diagnoses plantarum novarum et imperfecte descriptarum phanerogamarum

Socotrensium: Part 2

Royal Society of Edinburgh Proceedings 11 pp834-42

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Bayley Balfour, I. (1884)

Diagnoses plantarum novarum et imperfecte descriptarum phanerogamarum

Socotrensium: Part 3

Royal Society of Edinburgh Proceedings 12 pp76-98

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Bayley Balfour, I. (1884)

Diagnoses plantarum novarum et imperfecte descriptarum phanerogamarum

Socotrensium: Part 4

Proceedings of the Royal Society of Edinburgh 12 pp402-11

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Schweinfurth, G. (1884)

Allgemeine Betrachtungen in ber die Flora von Sokotra

Botanisches Jahrbuch für Systematik 5 pp40-49

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Bayley Balfour, I. (1903)

Plantae Phanerogamae. Angiospermae. Flowering plants

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes

(*Bulletin of the Liverpool Museums* (Special Bulletin) pp447-534)

See The flowering plants of Sokotra, pp452-520, 7 figures

See The flowering plants of Abd-el-Kuri, pp521-32, 1 figure, 1 photograph (*Euphorbia abdelkuri*)

See colour plates by A. Bayley Balfour: XXVI A (*Exacum forbesii* Balf. f.); XXVI B (*Aloe forbesii* Balf. f.)

Liverpool: The Free Public Museums, and Henry Young and Sons
London: R.H. Porter

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Vierhapper, F. (1903)

Neue Pflanzen aus Sokótra, Abd al Kuri und Semhah
Österreichische Botanische Zeitschrift 53 pp434-36

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Wettstein, R. von (1906)

Sokotra: Tafel 25: *Dracaena cinnabari* Balf. f.; Tafel 26: *Dracaena cinnabari* Balf. f.; Tafel 27: *Adenium socotranum* Vierh.; Tafel 28: *Dendrosicyos socotrana* Balf. f.; Tafel 29: *Euphorbia arbuscula* Balf. f.; Tafel 30: *Boswellia socotrana* Balf. f.
Vegetationsbilder (Jena) 3(5) Plates 25-30

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Horwood, F.K. (1970)

Exotic xerophytes 7: some notes on the succulents of Socotra
National Cactus and Succulent Journal 25 pp103-05

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Horwood, F.K. (1971)

Exotic xerophytes 7: some notes on the succulents of Socotra, part 2
National Cactus and Succulent Journal 26 pp106-10

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Anon. (1971)

New or noteworthy species from Socotra and Abd al Kuri
Hooker's Icones Plantarum (5th series) 7(4) t. 3673-3700

NB: this can also be cited as *Hooker's Icones Plantarum* 37(4).

(543)

Miller, A.G.; Nyberg, J.A. (1991)

Patterns of endemism in Arabia
Fl Veg Mundi 9 pp263-79

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Starý, F. (1991)

Ostrov obézních Krasavic (The island of obese beauties)
Ziva 30(2) pp67-70

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Mies, B.; Zimmer, H. (1994)

Die Populationen von *Adenium socotranum* (Balfour) Vierhapper und *Dendrosicyos socotrana* Balfour bei Ras Hebak (Insel Sokotra, Jemen) und ihre Gefährdung
Kakteen und andere Sukkulente 45(1) pp1-5

(546)

Mies, B. (1995)

Die Sukkulenten des Sokotrischen Archipels (Jemen, Indischer Ozean), teil 1
Kakteen und andere Sukkulenten 46(4) pp92-96

(547)

Mies, B. (1995)

Die sukkulenten Pflanzenarten der Inseln Sokotra und Abd El Kuri (Jemen)
Die anderen Sukkulenten Jahrgang 13(1) No. 25 pp4-16

(548)

Mies, B.; Beyhl, F.E.; Printzen, C. (1995)

Die Waldformationen der Insel Sokotra (Indischer Ozean)
Bericht der Senckenbergischen naturforschenden Gesellschaft (Frankfurt-am-Main) 125(4) pp122-33

(549)

Miller, A.G. (1996)

Studies in the flora of Arabia XXIX: two new species from Yemen
Edinburgh Journal of Botany 53(1) pp145-47

11.2(b) Flowering plant families

Acanthaceae

(550)

Smith, A.R. (1972)

Ruellia insignis. Acanthaceae
Curtis's Botanical Magazine 178(4) t. 612 (3pp), 1 colour plate by E.M. Stones

(551)

Vollesen, K. (1989)

A revision of *Megalochlamys* and *Ecbohium* (Acanthaceae: Justiceae)
Kew Bulletin 44 pp601-80

Agavaceae

(551)

Dobbie, J.J.; Henderson, G.G. (1882)

On a red resin from *Dracaena cinnabari* (Balf. fil.), Socotra
Transactions of the Royal Society of Edinburgh 30(3) pp624-29

(552)

Bayley Balfour, I. (1883)

XXVII. The Dragon's Blood Tree of Socotra (*Dracaena cinnabari* Balf. fil.)
Transactions of the Royal Society of Edinburgh 30(3) pp619-23

(553)

Marrero, A.; Almeida, R.S.; González-Martín, M. (1998)

A new species of the wild dragon tree, *Draceana* (Dracaenaceae) from Gran Canaria and its taxonomic and biogeographic implications

(554)

Mies, B.; Zimmer, H. (1994)

Die Insel des Drachenbaums

Jemen-Report 25(1) pp4-11

Aloaceae

(555)

Baker, J.G. (1880)

A synopsis of *Aloineae* and *Yuccoideae*

Journal of the Linnean Society (Botany) 18(2, No. 108) pp148-241

See p161

(556)

Baker, J.G. (1881)

Aloe perryi: native of the Island of Socotra

Curtis's Botanical Magazine (3rd Series) 37 t. 6596 (2pp), 1 coloured plate

(557)

Anon. (1884)

Socotrine aloes

Gardener's Chronicle (New Series) 21(14 Jun) p775

(558)

Anon. (1956)

No aloes from Socotra

Pharmaceutical Journal 177(4854) p372

(559)

Jones, E.W. (1956)

Socotrine aloes

Pharmaceutical Journal 177(4860) p486 [letter]

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Reynolds, G.W. (1966)

The aloes of tropical Africa and Madagascar

xxii + 537pp, 106 colour plates

Mbabane, Swaziland: Aloes Book Fund Trustees

(561)

Brandham, P.E. (1971)

The chromosomes of the Liliaceae II: polypoidy and karyotype variation in the *Aloineae*

Kew Bulletin 25(3) pp381-99, 2 figures, 8 micro-photographs on 2 plates, 2 tables

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Reynolds, T. (1985)

The compounds in *Aloë* leaf exudates: a review
Botanical Journal of the Linnean Society 90(3) pp157-77

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Reynolds, T. (1985)

Observation on the phytochemistry of the aloe leaf-exudate compounds
Botanical Journal of the Linnean Society 90(3) pp179-99, 2 figures

Amaranthaceae

(564)

Townsend, C.C. (1980)

A peculiar new *Psilotrichum* from Socotra
Kew Bulletin 35 p134

Amaryllidaceae

(565)

Baker, J.G. (1881)

Crinum balfourii: native of the Island of Socotra
Curtis's Botanical Magazine (3rd Series) 37 t. 6570 (2pp), 1 coloured plate

Anacardiaceae

(566)

Smith, A.R. (1971)

Tropical African plants XXXI. Anacardiaceae: *Lannea ornifolia* (Balf. f.) Engel.
var. *glabra* A.R. Sm., var. nov.
Kew Bulletin 25(2) pp173-74

(567)

Kokwaro, J.O.; Gillet, J.B. (1980)

Notes on the Anacardiaceae of eastern Africa
Kew Bulletin 34(3) pp745-60
See Appendix (pp758-60): Socotran Burseraceae misplaced in
Lannea

Anthericaceae

(568)

Marais, W.; Reilly, J. (1978)

Chlorophytum and its related genera (Liliaceae)
Kew Bulletin 32(3) pp653-63

Apocynaceae

(569)

Lavranos, J.J. (1966)

On the occurrence of *Adenium* in tropical Africa and Socotra

Asclepiadaceae

(570)

Brown, N.E. (1902)

Order LXXXV: Asclepiadaceae

In: *Flora of tropical Africa: Volume 4, Section 1: Oleaceae to Gentianaceae*
vi + 647pp

See pp292-93

London: Lovell Reeve and Co. (Published under the authority of the
Secretary of State for Foreign Affairs)

(571)

White, A.; Sloane, B.D. (1937)

The Stapelieae: 2nd edition

3 volumes

See Vol. 1: xviii + pp1-407, folding map

See Vol. 2: iv + pp409-818, coloured map

See Vol. 3: pp819-1185

Pasadena, CA: Abbey San Encino Press

(572)

Bruce, E.A. (1938)

Caralluma socotrana (Balf. f.) N.E. Brown. Asclepiadaceae. Tribus Stapelieae

Hooker's Icones Plantarum (5th Series) 4(3) t. 3372 (2pp), 1 line drawing by

S. Ross-Craig

(573)

Bruce, E.A. (1940)

Edithcolea sordida N.E. Br. Asclepiadaceae. Tribus Stapelieae

Hooker's Icones Plantarum (5th Series) 5(1) t. 3413 (2pp), 1 line drawing by

S. Ross-Craig

(574)

Bullock, A.A. (1953)

Notes on African Asclepiadaceae III

Kew Bulletin (3) pp329-62, 2 figures, 2 maps

See p361

(575)

Bullock, A.A. (1955)

Notes on African Asclepiadaceae VI

Kew Bulletin (2) pp265-92

See p266

(576)

Bullock, A.A. (1955)

Notes on African Asclepiadaceae VII

Kew Bulletin (4) pp611-26 (See p615)

(577)

Dyer, R.A. (1970)

Edithcolea grandis: Somaliland, Abyssinia, Kenya, Tanzania. Asclepiadaceae
Flowering Plants of Africa 40(3/4) t. 1600 (3pp), 1 colour plate by R. Collett

(578)

Dyer, R.A. (1970)

Caralluma socotrana: Socotra, Abyssinia, Somalia, Kenya. Asclepiadaceae
Flowering Plants of Africa 41(1/2) t. 1607 (2pp), 1 colour plate by H. March

(579)

Lavranos, J.J. (1970)

The Stapelieae of Socotra
Cactus and Succulent Journal 42 pp133-38

(580)

Dyer, R.A. (1973)

Caralluma dioscoridis: Socotra. Asclepiadaceae
Flowering Plants of Africa 42(1/2) t. 1662 (2pp), 1 colour plate by H. March

(581)

Lavranos, J.J. (1979)

Caralluma dioscoridis
Asclepiadaceae 18 pp10-12

(582)

Plowes, D.C.H. (1979)

The Stapeliads of North East Africa
Excelsa (9) pp35-52, sketch map (p52A), 40 small monochrome and 16
small colour photographs in 7 plates on pp34, 36, 38, 40, 42, 45, 46

(583)

Gilbert, M.G. (1980)

Duvaliandra: a new genus of stapeliad
Cactus and Succulent Journal of the UK 40 pp39-50

Synonym of *Caralluma dioscoridis*

(584)

Anon. (1985)

Caralluma socotrana
Asclepios 33 pp44-46

Reprinted from *Hooker's Icones Plantarum* with comments.

(585)

Bryuns, P.; Forster, P.I. (1991)

Studies in the flora of Arabia XXVI: a new species of *Sacrostemma* from Arabia
Edinburgh Journal of Botany 48(3) pp333-35, 2 figures

Begoniaceae

(586)

Anon. (1881)

Begonia socotrana

Gardener's Chronicle (New Series) 15(12 Feb) p209

(586)

Hooker, J.D. (1881)

Begonia socotrana: native of the Island of Socotra

Curtis's Botanical Magazine (3rd Series) 37 t. 6555B (2pp), 1 coloured plate

(587)

Hooker, J.D. (1881)

New garden plants: *Begonia socotrana*

Garden 19 p209

(588)

Anon. (1882)

Begonia socotrana

Gardener's Chronicle (New Series) 18(11 Nov) p626

(589)

Anon. (1885)

Begonia socotrana

Gardener's Chronicle (New Series) 23(3 Jan) p12

(590)

Anon. (1885)

Begonia socotrana

Gardener's Chronicle (New Series) 23(9 May) p606

Boraginaceae

(591)

Radcliffe-Smith, A. (1973)

Trichodesma scottii. Boraginaceae

Curtis's Botanical Magazine 181(3) t. 732 (5pp), 1 colour plate

(592)

Miller, A.G.; Riedl, H. (1982)

A revision of *Cystostemon* Balf. f. (Boraginaceae)

Notes from the Royal Botanic Garden Edinburgh 40(1) pp1-21, 3 line drawings by S. Mackay and J. Ryrie, 3 maps

See pp5-6, 9, figure 2 (map)

Burseraceae

(593)

Birdwood, G. (1870)

On the genus *Boswellia*

Transactions of the Linnean Society 27 pp111-48

(594)

Thulin, M.; Al-Gifri, A. (1996)

The Frankincense Tree (*Boswellia* spp) of Soqatra

In: Proceedings of the First International Symposium on Soqatra Island:

Present and Future, edited by H.J. Dumont, pp107-13

New York: United Nations Publications

Caryophyllaceae

(595)

Petrusson, L.; Thulin, M. (1996)

Taxonomy and biogeography of *Gymnocarpus* (Caryophyllaceae)

Edinburgh Journal of Botany 53(1) pp1-26, 8 line drawings probably by L.

Petrusson, 2 SEM micro-photographs, 2 maps

See pp7-10, 17-19, 20-22, figures 9 and 11

Chenopodiaceae

(596)

Boulos, L. (1991)

The identity, typification and distribution of *Salsola imbricata* Forsskal: studies in the Chenopodiaceae of Arabia 1

Kew Bulletin 46(1) pp137-40

(597)

Boulos, L. (1991)

Notes on *Suaeda* Forssk. ex Scop.: studies in the Chenopodiaceae of Arabia 2

Kew Bulletin 46(2) pp291-96, 1 photograph (herbarium specimen)

See pp295-96

(598)

Boulos, L.; Friis, I.; Gilbert, M.G. (1991)

Notes on the Chenopodiaceae of Ethiopia, Somalia and southern Arabia

Nordic Journal of Botany 11(3) pp309-16, 1 line drawing, 3 maps

See pp310 (map), 311 (map)

Compositae

(599)

Piovano, G. (1954)

Contributo alla conoscenza della flora dell'Africa Orientale I: Compositae

Webbia 10(2) pp647-66 (See p653)

(600)

Kingham, D.L. (1976)

A study of the pollen morphology of tropical African and certain other *Vernonieae* (Compositae)

Kew Bulletin 31(1) pp9-26, 1 figure, 24 SEM photographs on 4 plates, 2 tables

(601)

Kilian, N. (1988)

Die *Lactuceae* (Compositae) der Kapverdischen Inseln (W-Afrika)

Willdenowia (Berlin) 18(1) pp113-216, 13 figures, 2 line drawings by C.

Dervin, 15 photographs, 13 maps

See figures 10 and 18

(602)

Jeffrey, C. (1996)

Notes on Compositae I: the *Cichorieae* in east tropical Africa

Kew Bulletin 18(3) pp427-86, 9 line drawings by M.A. Grierson

See pp434, 454, 472-77

Crassulaceae

(603)

Bally, P.R.O. (1960)

Kalanchoe farinacea. Socotra Island. Crassulaceae

Flowering Plants of Africa 34(1/2) t.1329 (2pp), 1 colour plate

(604)

Radcliffe-Smith, A. (1973)

Kalanchoe robusta. Crassulaceae

Curtis's Botanical Magazine 179(4) t. 657 (3pp), 1 colour plate by E.M. Stones

(605)

Dyer, R.A. (1979)

Kallanchoe robusta: Socotra. Crassulaceae

Flowering Plants of Africa 45(3/4) t. 1783 (2pp), 1 colour plate by R. Collett

(606)

Anon. (1986)

The 1986 offering of plants for sale by the International Succulent Institute Inc.

[*Kallanchoe robusta*]

Cactus and Succulent Journal 58(2) pp70-79

Cruciferae

(607)

Kowal, E.; Cutler, D.F. (1975)

The wood anatomy of *Schouwia purpurea* subsp. *arabica* and *Fabrisinapis fruticosus* (Cruciferae)

Kew Bulletin 30(3) pp503-07, 1 figure, 4 photographs on 2 plates

(608)

Gomez-Campo, C. (1977)

Studies in Cruciferae III: *Hemicrambe townsendii* nom. nov.

Anales del Instituto Botánico A.J. Cavanilles 34 pp151-55

(609)

Jonsell, B. (1982)

Flora of Tropical East Africa: Cruciferae

73pp, 24 line drawings by J.C. Dunkley

See pp59-60, figure 20

Rotterdam: A.A. Balkema (Published on behalf of East African Governments)

FTEA editor, R.M. Polhill

(610)

Jonsell, B. (1993)

26. Brassiceae (Cruciferae)

In: Flora of Somalia: volume 1, edited by M. Thulin, pp62-73, figures 3-36

Kew: Royal Botanic Gardens

Cucurbitaceae

(611)

Jeffrey, C. (1967)

Flora of Tropical East Africa: Cucurbitaceae

156pp, 26 line drawings by D. Erasmus, M.A. Grierson, E.M. Stones, A. Webster

See pp103-04

London: Crown Agents for Overseas Governments and Administrations
(Published under the authority of the Secretary of State for the Colonies)

FTEA editors: E. Milne-Redhead; R.M. Polhill

(612)

Jeffrey, C.; Thulin, M. (1993)

57. Cucurbitaceae

In: Flora of Somalia: volume 1, edited by M. Thulin, pp118-32

Kew: Royal Botanic Gardens

Dirachmaceae

(613)

Bate-Smith, E.C. (1973)

Chemotaxonomy of *Geranium*

Botanical Journal of the Linnean Society 67(4) pp347-59

(614)

Baazara'a, M.; Guarino, L.; Miller, A.G.; Obadi, N. (1991)

Dirachma socotrana: back from the brink?

Oryx 25(4) pp229-32

(615)

Radcliffe-Smith, A. (1992)

Dirachma socotrana

Oryx 26(4) p235

Euphorbiaceae

(616)

Radcliffe-Smith, A. (1973)

An account of the genus *Cephalocroton* Hochst. (Euphorbiaceae)

Kew Bulletin 28(1) pp123-32

See p131

(617)

Radcliffe-Smith, A. (1987)

Flora of Tropical East Africa: Euphorbiaceae (Part 1)

407pp, 75 line drawings by J.C. Dunkley, C. Grey-Wilson, M.A. Grierson, P. Halliday, O. Milne-Redhead, G. Papadopoulos, M.M. Watt

See pp51-52, 68-70, figure 7

Rotterdam: A.A. Balkema (Published on behalf of East African Governments)

Prepared at the Royal Botanic Gardens, Kew with the assistance of the East African Herbarium. FTEA editor, R.M. Polhill

(618)

Radcliffe-Smith, A. (1991)

Notes on Arabian Euphorbiaceae III: a new *Jatropha* from former South Yemen

Kew Bulletin 46(2) pp327-29, 1 line drawing by C. Grey-Wilson

(619)

Beyhl, F.E. (1996)

The Emta Tree (*Euphorbia arbuscula* Balf. f.), a succulent tree of dracoid habitus from the island of Soqatra

In: Proceedings of the First International Symposium on Soqatra Island: Present and Future, edited by H.J. Dumont, pp115-23

New York: United Nations Publications

Gentianaceae

(620)

Klackenberg, J. (1985)

The genus *Exacum* (Gentianaceae)

Opera Botanica (Copenhagen) (84) pp1-144

Globulariaceae

(621)

Morucchio, G.B. (1970)

Adumbratio Florae Aethiopicae Part 20: Globulariaceae

Webbia 24(2) pp619-34, 3 figures, 4 line drawings, 1 fold-out map. In Italian

Gramineae

(622)

Stapf, O. (1907)

The grasses of British Somaliland

Kew Bulletin 39(4) pp203-28

(623)

Cope, T.A. (1984)

Some new Arabian grasses

Kew Bulletin 39(4) pp833-36

(624)

Cope, T.A. (1992)

Some new Arabian grasses II

Kew Bulletin 47 pp655-64

Hyacinthaceae

(625)

Miller, A.G.; Alexander, D. (1996)

Haemanthus grandifolius Balf. f.: an enigma resolved

Edinburgh Journal of Botany 53(1) pp43-47, 1 line drawing by D. Alexander

Hydrocharitaceae

(626)

Ridley, H.N. (1886)

On the freshwater Hydrocharideae of Africa and its islands

Journal of the Linnean Society (Botany) 22(5, No. 145) pp232-40, plain plates XII (*Bootia exserta* Ridley: artist J. Kirk), XIV (*Blyxia radicans* Ridley: artist J.N. Fitch)

Hypericaceae

(627)

Robson, N.K.B. (1957)

The genus *Hypericum* in Africa south of the Sahara, Madagascar and the Mascarenes

Kew Bulletin (3) pp433-46, 2 maps, 2 tables

See pp433, 443-45

(628)

Moggi, G.; Pisacchi, A. (1967)

Adumbratio Florae Aethiopicae Part 14: Hypericaceae

Webbia 22(1) pp233-88, 14 line drawings, 1 photograph, 9 fold-out maps. In Italian

(629)

Smith, A.R. (1971)

Tropical African plants XXXI. Hypericaceae: *Hypericum* sp. nov. aff. *H. scopolorum* Balf. f.

Kew Bulletin 25(2) pp173-74

(630)

Robson, N.K.B (1985)

Studies in the genus *Hypericum* L. (Guttiferae)3. Sections 1. *Campylosporus* to 6a. *Umbraculoides*.

Bulletin of the Natural History Museum (Botany) 12 pp163-325, 24 line drawings (artist Margaret Tebbs), 34 maps (Map 4: Socotra)

See pp192-94

(631)

Robson, N.K.B. (1987)

An Iranian floristic link with Socotra, South Yemen, in *Hypericum* (Hypericaceae)

Plant Systematics and Evolution 155(1/4) pp89-92

(632)

Robson, N.K.B. (1993)

Studies in the *Hypericum*: validation of new names

Bulletin of the Natural History Museum (Botany) 23(2) pp67-70

See *Hypericum frieriense* N. Robson, sp. nov., p68

Iridaceae

(633)

Baker, J.G. (1878)

Systema Iridacearum

Journal of the Linnean Society (Botany) 16 pp61-180

(634)

Hooker, J.D. (1881)

Babiana Socotrana: native of the Island of Socotra

Curtis's Botanical Magazine (3rd Series) 37 t. 6585B (2pp), 1 coloured plate

Labiatae

(635)

Miller, A.G. (1985)

The genus *Lavandula* in Arabia and tropical northeast Africa

Notes from the Royal Botanic Garden Edinburgh 42(3), 5 line drawings by
S. Rae, 6 maps, figures
See pp503, 514-15, figure 3

(636)

King, R.A. (1988)

Studies in the flora of Arabia XIX: *Teucrium* in the Arabian peninsula and Socotra,
South Yemen

Notes from the Royal Botanic Garden Edinburgh 45(1) pp21-42

Leguminosae

(637)

Roti-Michelozzi, C.G. (1957)

Adumbratio Florae Aethiopicae Part 6: Caesalpinioideae (excl. gen. *Cassia*)

Webbia 13(1) pp133-228, 7 line drawings, 2 photographs (Tav. XXII-
XXIII), 1 fold-out map. In Italian

(638)

Brenan, J.P.M. (1959)

Flora of Tropical East Africa: Leguminosae. Subfamily Mimosoideae

173pp, 23 line drawings by O. Milne-Redhead, S. Ross-Craig, E.M. Stones,
D.R. Thompson, A. Webster

See p134

London: Crown Agents for Overseas Governments and Administrations
(Published under the authority of the Secretary of State for the Colonies)

FTEA editors: C.E. Hubbard, E. Milne-Redhead

(639)

Brenan, J.P.M. (1967)

Flora of Tropical East Africa: Leguminosae. Subfamily Caesalpinioideae

230pp, 52 line drawings by O. Milne-Redhead, E.M. Stones, J. Chandler,
J.M. Lerinckx, J. Loken, S. Ross-Craig

See p65

London: Crown Agents for Overseas Governments and Administrations
(Published under the authority of the Minister for Overseas Development)

FTEA editors: E. Milne-Redhead. R.M. Polhill

(640)

Polhill, R.M. (1968)

Miscellaneous notes on African species of *Crotalaria* L: II

Kew Bulletin 22(2) pp169-348, 31 figures, 28 line drawings by M.A.
Grierson and R. Polhill, 4 maps, 4 tables

Menispermaceae

(641)

Benevenuto, E. (1974)

Adumbratio Florae Aethiopicae Part 26: Menispermaceae
Webbia 29(1) pp17-80, 1 figure, 14 line drawings, 5 fold-out maps. In Italian

Moraceae

(642)

Friis, L. (1983)

The acaulescent and succulent species of *Dorstenia* sect. *Kosario* (Moraceae) from NE tropical Africa and Arabia

Nordic Journal of Botany 3 pp533-38

(643)

Berg, C.C.; Hijam, M.E.E. (1989)

Flora of Tropical East Africa: Moraceae

95pp, 23 line drawings by F.M. Bata-Gillot, J. Brinkman, W. Scheepmaker, W.E. Trevithick, E.H. Hupkens van der Elst, J. Williamson, I. Zewald

See pp60-65

Rotterdam: A.A. Balkema, on behalf of East African Governments

FTEA editor, R.M. Polhill

(644)

Dyer, R.A. (1959)

Ficus pretoriae: Transvaal, Natal, Portuguese East Africa to Somaliland and Socotra

Flowering Plants of Africa 33(4) t. 1319 (2pp), artist C. Letty

(645)

Smith, A.R. (1971)

Dorstenia gigas: Moraceae

Curtis's Botanical Magazine 178(3) t. 596 (4pp), 1 colour plate by E.M. Stones

Pedaliaceae

(646)

Bruce, E.A. (1953)

Flora of Tropical East Africa. Pedaliaceae

23pp, 7 line drawings by E.M. Stones, A. Webster

See p6

London: Crown Agents for the Colonies (Published under the authority of the Secretary of State for the Colonies)

FTEA editors: W.B. Turrill, E. Milne-Redhead

Plumbaginaceae

(647)

Smith, A.R. (1971)

Tropical African plants XXXI. Plumbaginaceae: *Limonium sokotorum* (Vierh.) A.R. Sm., comb. nov.

Primulaceae

(648)

Bizzari, M.P. (1970)

Adumbratio Florae Aethiopicae Part 21: Primulaceae

Webbia 24(2) pp635-98, 13 line drawings, 4 fold-out maps. In Italian

Resedaceae

(649)

Miller, A.G. (1984)

A revision of *Orchradenus*

Notes from the Royal Botanic Garden Edinburgh 41(3) pp491-504, 1 line drawing by A. Miller, 1 figure, 2 maps

See pp494-96 (map)

Rhamnaceae

(650)

Johnston, M.C. (1972)

Flora of Tropical East Africa: Rhamnaceae

40pp, 12 line drawings by D. Bridson, A.C. Leuter, L.M. Ripley, D.R. Thompson

See pp14-15

London: Agents for Overseas Governments and Administrations (Published under the authority of the Secretary of State for the Colonies)

FTEA editors: E. Milne-Redhead; R.M. Polhill

Rubiaceae

(651)

Smith, A.R. (1971)

Tropical African plants XXXI. Rubiaceae: *Gaillonia tinctoria* Balf. f.

Kew Bulletin 25(2) p186

(652)

Verdcourt, B. (1973)

A revision of the African species of *Carphalea*

Kew Bulletin 28 p423

(653)

Puff, C. (1988)

Observations on *Carphalea* Juss. (Rubiaceae, Hedyotideae), with particular reference to the Madagascan taxa and its taxonomic position

Bulletin du Jardin Botanique National de Belgique 58(3/4) pp271-323, 15 figures, 45 photographs, 2 maps, 3 line drawings, 1 graph

(654)

Bridson, D.M. (1995)

A new *Kraussia* (Rubiaceae – Octotropideae) from Socotra

Kew Bulletin 50(4) pp773-76, 1 line drawing by S. Dawson, 1 table

Scrophulariaceae

(655)

Miller, A.G.; Short, M.; Sutton, D.A. (1982)

Revision of *Schweinfurthia*

Notes from the Royal Botanic Garden Edinburgh 40(1) pp23-40, 2 line

drawings by D.A. Sutton, 18 SEM microphotographs on 3 plates, 2 maps

(656)

Musselman, L.J.; Hepper, F.N. (1988)

Studies in the flora of Arabia XX: the genus *Striga* in Arabia

Notes from the Royal Botanic Garden Edinburgh 45(1) pp43-50, 1 line

drawing by M. Bates

See pp45-46

Violaceae

(657)

Smith, A.R. (1971)

Tropical African plants XXXI. Violaceae: *Hybanthus enneaspermus* (L.) F. Muell

Kew Bulletin 25(2) p173

11.3 Non-flowering plants

11.3(a) General

(658)

Kuhn, M. (1883)

Über Berichte Farne und Charen von der Insel Socotra

Deutschen Botanischen Gesellschaft (Berlin) 1 pp238-43

(659)

Bayley Balfour, I. (1903)

Plantae Cryptogamae. Thallophyta, Fungi, Characeae. Algae. Diatomaceae.

Flowerless plants II

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes

(*Bulletin of the Liverpool Museums* (Special Bulletin) pp543-68

See The fungi, lichens, charas, sea-weeds and diatoms of Sokotra,
pp545-66

See The lichens and sea-weeds of Abd-el-Kuri, pp567-68

See plain plate XXVII: lichens (*Rocella balfourii*, *Pyxine coccoes*)
from Sokotra and Abd-el-Kuri

Liverpool: The Free Public Museums & Henry Young and Sons

London: R.H. Porter

11.3(b) Algae

(660)

Bayley Balfour, I.; Cockburn, C.; Scott, A.; Dickie, M.C. (1882)

Diagnoses algarum novarum Socotrensium

Proceedings of the Royal Society of Edinburgh 11 p456

(661)

Kitton, F. (1884)

On some Diatomaceae from the Island of Socotra

Journal of the Linnean Society (Botany) 20(8, No. 131) pp513-15, 1 plain plate (XLVIII) depicting 4 Socotran species

(662)

Dickey, G. (1888)

Algae

In: Botany of Socotra: [written] with the assistance of other botanists, by I. Bayley Balfour (Transactions of the Royal Society of Edinburgh 31), pp394-400

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Dickey, G. (1888)

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In: Botany of Socotra: [written] with the assistance of other botanists, by I. Bayley Balfour (Transactions of the Royal Society of Edinburgh 31), pp400-02

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In: Botany of Socotra: [written] with the assistance of other botanists, by I. Bayley Balfour (Transactions of the Royal Society of Edinburgh 31), pp330-36

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Pócs, T. (1982)

Hepaticological exploration of Subsaharan Africa

In: Bryophyte taxonomy: methods, practices and floristic exploration: proceedings of the International Association of Bryologists Taxonomic Workshop meeting, Geneva, 27 Aug – 2 Sep 1979, edited by P. Geissler and S.W. Greene

Nova Hedwigia: Zeitschrift für Kryptogamenkunde (Berlin) 71 pp495-500

(667)

Jovet-Ast, S. (1983)

[*Riccia trichocarpa* and *Riccia canescens*]

Cryptogamie Bryologie et Lichenologie 4(1) pp37-46. In French

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Mies, B. (1994)

Checklist der Gefäßpflanzen, Moose und Flechten und botanische Bibliographie der Insel Socotra und des Socotrinischen Archipels (Jemen, Indischer Ozean)

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Al-Gifri, A.N.; Kürschner, H.; Mies, B. (1995)

New records, additions and a new species, *Sematophyllum socotrense* Buck (Sematophyllaceae, Musci) to the bryophyte flora of Socotra (Yemen): studies in Arabian bryophytes 19

Nova Hedwigia 61 pp3-4

(670)

O'Shea, B. (1995)

Checklist of mosses of sub-Saharan Africa

Tropical Bryology (10) pp91-108

See pp98, 99-100, 114, 144, 151

11.3(d) Ferns

(671)

Anon. (1884)

The ferns of Socotra

Gardener's Chronicle (New Series) 20(11 Aug) p178

(672)

Bayley Balfour, I. (1903)

Plantae Cryptogamae. Pteridophyta. Flowerless plants I

In: Natural history of Sokotra and Abd-el-Kuri, edited by H.O. Forbes (*Bulletin of the Liverpool Museums* (Special Bulletin) pp535-42)

See The ferns, mosses, and liverworts of Sokotra, pp537-41

See The ferns of Abd-el-Kuri, p542

Liverpool: The Free Public Museums, and Henry Young and Sons
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Pichi-Sermolli, R.E.G. (1956)

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Webbia 12(1) pp121-46, 1 figure, 1 line drawing, 7 photographs (Tav. XLII-XLVI), 2 fold-out maps. In Italian

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(677)

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Mycotaxon 44 pp155-62

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1. People

This index includes authors, editors, translators and people mentioned in publications (excluding illustrators).

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