

ARAB STATES

SOCOTRA ARCHIPELAGO

YEMEN



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## WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

### SOCOTRA ARCHIPELAGO (YEMEN) – ID No. 1263

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#### 1. DOCUMENTATION

- i) **Date nomination received by IUCN:** April 2007
- ii) **Additional information officially requested from and provided by the State Party:** IUCN requested supplementary information on 20 December 2007 after the first IUCN World Heritage Panel meeting. The State Party response was officially received by the World Heritage Centre on 27 February 2008.
- iii) **UNEP-WCMC Data Sheet:** 34 references (including nomination document)
- iv) **Additional literature consulted:** Attorre, F., Francesconi, F., Taleb, N., Scholte, P., Saed, A., Alfo, M. and Bruno, F. (2007) **Will dragonblood survive the next period of climate change? Current and future potential distribution of *Dracaena cinnabari* (Socotra, Yemen).** *Biological Conservation*, 138 (3-4): 430-439; Botting, D.S. (1958) **The Island of the Dragon's Blood.** Hodder and Saughton, London; Cheung, C., and DeVantier, L. (2006) **Socotra: A Natural History of the Islands and their People.** Odyssey, Hong Kong; Government of Yemen (2003) **Socotra Archipelago: UNESCO MAB Biosphere Reserve Nomination Form.** UNESCO; IUCN (2004) **The World Heritage List: Future Priorities for a Credible and Complete List of Natural and Mixed Sites.** Strategy Paper, IUCN, Gland, Switzerland; Miller, A.G. and Bazara'a, M. (1998) **The conservation status of the flora of the Soqotran Archipelago.** In H.J. Dumont (ed.): *Proceedings of the First International Symposium on Soqotra Island: Present and Future.* United Nations Publications, New York; Miller, A.G. and Miranda, M. (2004) **Ethnoflora of the Socotra Archipelago.** Royal Botanic Garden, Edinburgh; Porter, R.F. and Stone, F. (1996) **An Introduction to Socotra and its Birds.** *Sandgrouse*, 17: 73-80; Royal Botanic Garden (2000) **Conservation and Sustainable Use of the Biodiversity of Socotra Archipelago.** Unpublished Report, SCDP/EPA, Sana'a, Yemen; Zandri, E. (ed) (2003) **Saving Socotra.** UNDP/EPA/GEF/UNPOS.
- v) **Consultations:** 7 external reviewers. Extensive consultations were undertaken during the field visit including with representatives of relevant government agencies, local communities and non governmental organizations.
- vi) **Field visit:** David Sheppard, Tarek Abul Hawa and Khaldoun Al Omari, November 2007
- vii) **Date of IUCN approval of this report:** April 2008

#### 2. SUMMARY OF NATURAL VALUES

The nominated property, the Socotra Archipelago, lies in the northwest Indian Ocean near the mouth of the Gulf of Aden. Socotra, the largest island, lies 330 km east of Cape Gardafui, Somaliland and 450 km south of the coast of South Yemen. The nominated property comprises a 250 km long archipelago of four islands and two rocky islets which appear as a prolongation of the Horn of Africa. The main island of Socotra is 3,625 km<sup>2</sup>, Abd Alkuri island is 133 km<sup>2</sup> and Samha island is 41 km<sup>2</sup>. The nominated property comprises a total area of 410,460 ha. In total, 12 terrestrial and 25 marine protected areas are included within the area. The nominated property covers 73% of the land area of Socotra and around 50% of its coastal area, and all the land and coastal areas of the other islands and islets. Buffer zones of a total area of 1,740,958

ha surround the nominated areas. This includes a terrestrial buffer zone of 91,997 ha on Socotra and marine buffer zones of 1,648,961 ha extending 12 nautical miles seawards around all islands. The terrestrial and marine core areas of the nominated property and their buffer zones are summarised in Table 1.

Socotra Island consists of four main elements:

1. A jagged many-peaked granite mountain range, Jabal Haggeher, which rise to 1,526 m in Jabal Skand, steeply on the north side and more gently, with six parallel valleys, on the south;
2. Escarpment-edged limestone plateaus 300-700 m high, in the east, south-centre and west, overlying earlier basement rocks;

**Table 1:** Terrestrial and marine core areas of the nominated property and their buffer zones

Name of the area	Terrestrial core areas (ha)	Marine core areas (ha)	Terrestrial buffer zones (ha)	Marine buffer zones (ha)
Socotra	260,008	60,041	91,997	840,325
Abd Alkuri	11,858	4,874	-	456,179
Samha	5,063	26,917	-	243,083
Darsa	544	17,624	-	109,374
Kal Farun (rock)	31	11,072	-	-
Sabunya (rock)	8	12,420	-	-
<b>Total</b>	<b>277,512</b>	<b>132,948</b>	<b>91,997</b>	<b>1,648,961</b>
<b>TOTALS</b>		<b>410,460</b>		<b>1,740,958</b>

3. Coastal plains north and south, the northern a series of smaller fertile basins between headlands, the southern a 60 km-long by 6 km-wide dry strip backed by a 400 m escarpment; and
4. An interior basin of plains west of the Haggeher mountains linked to the northern coastal plain.

The coasts are varied: cliffs, wave-cut platforms, fossil reefs, cobble beaches, sand beaches and lagoons. Abd Alkuri is a low limestone-capped granite range rising to 743 m, with raised beaches on the north and sea cliffs along most of the south side. Samha is similarly a granite island capped by a desert platform of limestone surrounded by steep cliffs except at the east end.

**Geology:** Socotra is an island of continental origin, a block of Precambrian Gondwanaland. It has an igneous and metamorphic basement of schist and gneiss extensively overlaid by sandstones, marls and limestone deposited in Cretaceous and later Eocene seas, though the Precambrian Haggeher granite was probably never submerged. It lies on an undersea platform block that extends from the tip of Somaliland. The block finally separated from the Arabian plate during the rifting which began to open the Gulf of Aden in the Oligocene to Miocene epochs some 34-23 million years ago.

**Flora:** Socotra is a distinct ecoregion of xeric shrubland lying at the intersection of three biogeographic regions, African, Oriental and Palearctic. Its long isolation has contributed to an assemblage of endemic ecosystems and species, many of which have long disappeared from their Eritreo-Arabian origins. The case for Socotra as a site of Outstanding Universal Value rests largely on its high plant diversity and levels of endemism. Of its 825 plant species in 430 genera, 307 species (37%) and 15 genera are endemic, and are often very localised in their distribution, and adapted to harsh local conditions. The diversity of plant species reflects the variety of altitude, bedrock, and humidity on Socotra. This is particularly pronounced on the

Jabal Haggeher where more than half of the 200 plant species are endemic. There are many unique and characteristic plants on Socotra, including a number known from antiquity for their medicinal value, such as the bitter aloe, frankincense and the distinctive dragon's blood tree.

There are eight main types of vegetation: mangroves, coastal shrubland, croton shrubland, succulent shrubland, semi-evergreen lowland woods, woody limestone plateau herbs, submontane shrubs and a montane mosaic of evergreen woodland, grassland and dwarf shrubland. 157 plant species are classified as critically endangered, endangered and vulnerable. The 138 species classified as vulnerable include all the islands' eight frankincense species, and both dragon and cucumber trees.

**Fauna:** Because of the dry climate and small size of the islands, the terrestrial fauna of the archipelago is not large, except for reptiles, though the avifauna is rich. It is important to note that the full extent of the islands' fauna is yet to be described, including the fauna of the vast underground cave systems on Socotra. The nominated property has particular importance for bird species; of the 192 bird species, 44 breed on the islands and 85 are regular migrants. Six bird species are endemic, 10 subspecies may be endemic, and 26 bird species have internationally important populations on Socotra. The importance of the nominated property for birds is reflected in its identification as an Endemic Bird Area by BirdLife International; 22 Important Bird Areas have also been identified. Among the 34 reptiles, there is 90% endemism with all six snake species being endemic; 15 out of 18 geckoes are endemic, as are two skinks, two lizards and a chameleon. Three-quarters of the terrestrial fauna is composed of the 600 or more insects and these also have a high level of endemism. The marine life of the archipelago is subject to many converging ocean currents and lies between the major endemic populations of the Red and Arabian Seas. Marine life is very diverse and includes 283 species of coral, 730 species of coastal fish and 300 species of crab, lobster and shrimp. Marine habitats are generally

in good condition, although threats are increasing. Socotra represents a transition zone where related but distinct communities overlap. Socotra's marine communities include local and regional endemics and rare species with restricted global distributions. Marine areas in Socotra are less degraded than most Indian Ocean reefs, and the archipelago itself is a major centre of dispersal and replenishment for the surrounding seas.

### 3. COMPARISONS WITH OTHER AREAS

The nominated property is proposed for inscription on the World Heritage List under criterion (x) on the basis of its biodiversity values and in particular its value for plant conservation. Socotra also has a number of other important biodiversity values which are outlined in the nomination dossier and summarized in this evaluation report.

#### General comparison on the basis of biodiversity

Socotra has been identified as a priority area for conservation in a number of global studies and assessments. In particular the Socotra desert ecoregion was identified as "potentially of Outstanding Universal Value" in IUCN's World Heritage Strategy Paper in 2004 and in subsequent guidance by IUCN to the World Heritage Committee. Socotra is also recognized as globally important for biodiversity by a number of other organizations and classification systems, including by WWF (recognized as a Global 200 Ecoregion), Conservation International (recognized as a Biodiversity Hotspot), BirdLife International (containing 22 Important Bird Areas) and Plantlife International (identified as a Centre of Plant Diversity). Although the primary focus has been on the importance of Socotra for its botanical values, it is important to note the high level of endemism and diversity in many marine and terrestrial groups of organisms, for example land snails (96 species, 95% endemism) and reptiles (34 species, 90% endemism).

These assessments underline the importance of

Socotra for global conservation. Numerous reviews and studies have noted Socotra as a unique living laboratory and have referred to Socotra as the "Galápagos of the Indian Ocean". Socotra compares very favourably with other comparable coastal and island sites on the World Heritage List in relation to plant diversity and endemism, and biodiversity in general, as outlined in more detail below.

#### Comparison on the basis of terrestrial plant diversity and endemism

A comparison of the Socotra Archipelago with key oceanic islands in terms of plant diversity and endemism is set out in Table 2. This table shows that Socotra compares very favourably with other oceanic islands in terms of plant diversity and endemism. It is also important to note that Socotra is characterized by a lower relative level of human impact by comparison with the other islands noted in this table, particularly in relation to factors such as invasive species, development of infrastructure, and tourism development.

Socotra is located within the Desert and Xeric Shrublands Biome and thus plant diversity may be compared specifically with the Galapagos Islands which are also located within this biome. On this basis it is clear that the total number of plant species and also the number of endemic plant species is much greater on Socotra than Galapagos, even though Socotra is 48% smaller than Galapagos, and the overall percentage of endemism is lower for Socotra.

Some Socotran species and communities, such as the Dragon's Blood Tree woodland, are relicts of ancient biota. In this respect, the nominated property can be compared with the Laurisilva of Madeira World Heritage property (Portugal) which is considered an outstanding relict of a previously widespread laurel forest type. Socotra's Dragon's Blood Tree woodland represents a similarly important relict of the Miocene-Pliocene Laurasian subtropical forest.

**Table 2:** Comparison of Socotra with key oceanic islands in terms of plant diversity and endemism

Name of island	Area (square km)	Total plant species	Endemic plant species	% of endemic plant species
Juan Fernández Islands, Chile	93	147	118	80
Galapagos Islands, Ecuador	7844	543	229	42
Mauritius	1865	800-900	280	31-35
Rodrigues, Mauritius	104	145	48	33
Madeira, Portugal	769	760	129	17
Canary Islands, Spain	7273	2000	569	28
Ascension, UK	94	25	11	44
<b>Socotra, Yemen</b>	<b>3799</b>	<b>825</b>	<b>307</b>	<b>37</b>

### Comparison on the basis of terrestrial animal diversity and endemism

A comparison of Socotra with key coastal and island World Heritage properties in terms of bird diversity is set out in Table 3. Socotra has high importance for bird species as underlined by the identification by BirdLife International of 22 Important Bird Areas on Socotra. Socotra supports significant proportions of the global populations of land and sea birds, including a number of threatened species. The Egyptian Vulture (the most familiar bird on Socotra) has a population in excess of 1,000, the highest concentration in the world. Because of serious declines worldwide, the vulture has been classified as endangered in the 2007 IUCN Red List of Threatened Species. The island hosts six endemic bird species and 10 endemic subspecies (out of 192 species). For comparison, the Galapagos Islands host 22 endemics in an area approximately double that of Socotra. The Hawaiian Islands, approximately four times Socotra's size, have some 48 endemic species and subspecies. Mauritius, at about half Socotra's size, hosts 11 endemics. The Azores, at two-thirds Socotra's size, have one endemic, while the Cape Verde Islands, fractionally bigger than Socotra, host four endemics.

Socotra's other terrestrial, freshwater and cave

fauna also exhibits high endemism, comparable to or exceeding other coastal and island sites, most notably among molluscs, reptiles, crustaceans and some insects and arachnids. Levels of endemism are 95% for land snails, 90% for reptiles, 73% for isopods and 60% for spiders, with most endemics restricted to just one island and many to only small areas therein. Socotra shares similarly high levels of endemism among land snails with Hawaii and Galapagos. The islands' isopod fauna is also rich, with 38 species now known from littoral, montane and cave habitats. Isopod diversity compares favourably with other archipelagos, including the Seychelles (43 species), the Comoros (32 species), the Mascarenes (41 species), Maldives (27 species), and Hawaii (52 species).

### Comparison on the basis of marine biodiversity

A comparison of Socotra with key coastal and island World Heritage properties in terms of fish and coral diversity is set out in Table 3. This table shows that Socotra compares favourably with many other coastal and island sites in terms of marine biodiversity. Four threatened species of sea turtle are present around Socotra, with 2 species, Green and Loggerhead turtles, nesting. The 283 species of coral comprise African and Arabian species and are less degraded than most Indian Ocean reefs. The Socotra Islands

**Table 3:** Comparison of Socotra with key coastal and island World Heritage properties in terms of bird, fish and coral diversity

Name of property	Total area (ha)	Criteria	Bird species	Fish species	Coral species
Great Barrier Reef, Australia	34,870,000 (95% marine)	vii, viii, ix, x	242	1500	400
Shark Bay, Australia	2,197,300 (31% marine)	vii, viii, ix, x	230	323	95
Belize Barrier Reef, Belize	96,300 (50% marine)	vii, ix, x	187	500	100
Cocos Island, Costa Rica	199,790 (97% marine)	ix, x	87	300	32
Galapagos Islands, Ecuador	14,066,514 (95% marine)	vii, viii, ix, x	57	460	120
New Caledonia, France	1,574,300 (100% marine)	vii, viii, ix, x (nominated)	105	1695	510
Sian Ka'an, Mexico	528,000 (23% marine)	vii, x	339	175	83
Coiba Island, Panama	430,825 (50% marine)	ix, x	147	760	58
Tubbataha Reef, Philippines	33,200 (99% marine)	vii, ix, x	46	441	396
Aldabra Atoll, Seychelles	34,200 (41% marine)	vii, ix, x	65	287	210
East Rennell, Solomon Islands	37,000 (plus marine)	ix	43	759 (island group)	300 (island group)
<b>Socotra, Yemen</b>	<b>410,460 (32% marine)</b>	<b>x</b>	<b>192</b>	<b>730</b>	<b>283</b>

host 85% of the Red Sea's reef-building coral genera, 75% of the coral species, and 70% of the coastal fish families, and are thus very important in sustaining marine diversity of the greater Arabian region.

In summary the Socotra Archipelago exhibits an outstanding level of terrestrial and marine biodiversity and endemism. It has appropriately been termed the "Galapagos of the Indian Ocean". There is a strong case for the inscription of the nominated property under criterion (x).

## 4. INTEGRITY

### 4.1 Legal status

The establishment of protected areas in Socotra is relatively recent and dates from the establishment of the Socotra Island Protected Area in 1996. The nominated property and its buffer zones are governed by Presidential Decree 275 "Conservation Zoning Plan for the Socotra Islands" of 2000. All core areas of the nominated property are zoned as Nature Sanctuaries, National Parks or Areas of Special Botanical Interest in the Zoning Plan. According to Article 17 of this Presidential Decree, "all ministries and institutions involved in the development of Socotra must adhere to the implementation of the Conservation Zoning Plan, each in their areas of specialization". No other area in Yemen has such a substantial legal framework and zoning scheme. This Presidential Decree is in turn supported by other related laws such as the National Environmental Protection Law of 1995, the Local Council Authority Law of 2000, and the Water Law of 2001. It also links with the national investment plan of the Ministry of Water and Environment (MOWE) of 2002, which notes the conservation of biodiversity and sustainable use of national resources in Socotra as the top priority for habitat conservation in the country.

The Environmental Protection Authority (EPA) under the MOWE is responsible for the implementation of the Conservation Zoning Plan. The Socotra Branch of the EPA has expanded significantly, from having only one representative (in 1996) to over one hundred staff members (in 2007) at two district offices (Hadibu and Qalansiya) and across the islands. EPA activities are supported by the Socotra Conservation and Development Programme (SCDP). In the last ten years, the Socotra Branch of the EPA has gained considerable technical expertise and has become a leader in natural resource management in Yemen. Overall, the Zoning Plan has been applied successfully since 2000, although not without major challenges, including inappropriate road development on Socotra which had resulted in conflicts between the MOWE / EPA and SCDP on one hand and the Ministry of Public Works and Highways on the other (refer Section 4.4 relating to Roading).

There is a need to strengthen the legislative framework, management and enforcement capacity in relation to Socotra. The Conservation Zoning Plan is currently being revised and this provides a good opportunity to strengthen the management of the EPA and ensure it is better able to respond to emerging challenges such as extended infrastructure and road development, tourism and fisheries management. In particular, the revised Zoning Plan should carefully review the boundaries of the existing zones and ensure there is a clear mechanism for enforcement for conservation management, including through the development of By Laws to back up the Zoning Plan. Enforcement cannot be separated from financing and it is important to ensure that overall funding is increased and maintained over the longer term (refer Section 4.3 relating to Financing). The original Zoning Plan was based on inputs from a wide range of scientists, local communities and staff from the EPA and SCDP. This approach should also be applied in any revision of the Conservation Zoning Plan. In particular this legal tool needs to be mainstreamed into the current process addressing the development of the new decentralization law in Yemen.

In response to the issues raised in IUCN's letter of December 2007, the Government of Yemen recently passed Yemen Cabinet Decrees No. 45-49 of 12 February 2008 which relate to the conservation and sustainable development of the Socotra Archipelago and outline a number of measures in this regard.

### 4.2 Boundaries

The originally nominated property included both the core areas and buffer zones covering the entire island of Socotra and the surrounding marine areas. This included major towns and other areas of settlement and more intensive human use. IUCN's letter of December 2007 requested the State Party consider revising the boundaries of the nominated property so that the World Heritage property would only include areas zoned as Nature Sanctuaries, National Parks and Areas of Special Botanical Interest (representing the core areas). The State Party advised in February 2008 that these revised boundaries were provided for in the Yemen Cabinet Decree No. 45 of 12 February 2008. A revised map was submitted reflecting these changes. IUCN notes that this ensures the nominated property includes the most important areas for biodiversity conservation and that the buffer zones (while no longer formally part of the nominated property) plays an important role in ensuring complementary management for both conservation and development activities. In this context IUCN notes the clear and logical linkages between the management of the World Heritage property and the already established Socotra Biosphere Reserve.

The boundaries of the terrestrial and marine core areas include all key botanical and other biodiversity

features required to demonstrate Outstanding Universal Value. The property is of sufficient size (410,460 ha) to adequately represent all the terrestrial and marine features and processes that are essential for the long term conservation of the archipelago's rich and distinct biodiversity. The terrestrial core areas encompass about 75% of the total land area and protect all the major vegetation types, areas of high floral and faunal values, and important bird areas. The marine core areas are Nature Sanctuaries and encompass the most important elements of marine biodiversity. At present, the terrestrial and marine core areas do not suffer substantially from the adverse effects of development and demonstrate ecological integrity. It is noted, however, that local, regional and global threats are increasing and will need to be addressed in the future (refer Section 4.4).

The terrestrial buffer zone of 91,997 ha should provide adequate additional protection, although it is important that the buffer zone is managed in a complementary manner to the core areas. The terrestrial buffer zones include the Resource Use Reserves and General Use Zones and provide protection against impacts associated with urban development and other activities in these zones. The marine buffer zones of 1,648,961 ha extend 12 nautical miles seawards around all islands.

The boundaries of the core areas were developed based on the input of many scientists, as well as key local stakeholders, and this process aimed to ensure that the most important conservation values were included within the core areas of the nominated property. It is important that the same participatory and science based principles be adopted in the revision of the Conservation Zoning Plan that is currently proposed and that all relevant recent science is used to assist in the revision of the Conservation Zoning Plan and any associated boundary revisions.

### 4.3 Management

This section considers the adequacy of management authority and capacity, including issues of financing and staffing.

#### Management Authority

At present, the Socotra Branch of the EPA is principally responsible for the management of the nominated property, and its activities are supported by the SCDP (refer Section 4.1). In order to ensure that World Heritage values are maintained or enhanced in the future, it is important that any Management Authority is adequately resourced and able to effectively manage for conservation. Experience has shown that the most effective World Heritage site management is often delivered by a single authority which has adequate resources and enforcement capacity, and also with some autonomy in relation to management issues

such as staff management and the ability to generate and retain revenue. Within Yemen there is current emphasis on decentralising power and authority to local levels of administration. The EPA, through the SCDP and the Management Plan of the Socotra Archipelago (2003–2008), places great emphasis on strengthening local governance, aimed “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.”

The IUCN field mission suggested a separate Authority should be established for the management of Socotra, along the lines of the Sana'a Special Zone, which is managed as a separate Authority and reports directly to the President of Yemen. IUCN again raised the possibility of a separate Authority for Socotra in its letter to the State Party of December 2007. The State Party noted in February 2008 that Yemen Cabinet Decree No. 49 of 12 February 2008 provides for a new island wide “Socotra Authority”, which will aim to ensure “the achievement of the sustainable development of the Socotra Archipelago, while conserving its unique environment, biodiversity, and natural landscapes that are the basis for its World Heritage site nomination”. IUCN notes this as a positive response; however, effective implementation is critical as is the need to give priority to protection of World Heritage values in the property and to ensure that adequate funds are allocated for this Authority to function effectively. It is also important that any Authority works effectively and cohesively with other Yemen Government Agencies and with local communities.

#### Financing

Secure long term financing is essential for the long term viability of Socotra. Funding for the Socotra Project was initially provided through a GEF project which concluded in 2003 and which was instrumental in establishing the EPA and SCDP. Since that time the SCDP has mainly been funded by UNDP and the Italian Government as well as other donors and partners including the Dutch Government. The current system is donor dependent, with 80% of funding coming from donor sources and 20% from Yemen Government sources. There is also a heavy reliance on a limited number of donors and this situation needs to change to involve a broader range of donors. Current funding covers support for many aspects of management, including a wide range of community development and conservation activities. Overall, the current level of financial support is not adequate for long term conservation management. The financial base needs to be increased and made more long term and secure.

The IUCN field mission noted that there has been a very high level of political commitment to ensuring long term

financing for Socotra and this needs to be translated into adequate and ongoing revenue streams for the property. This issue was reinforced in IUCN's letter of December 2007. The State Party agreed in February 2008 that financing is a critical issue and identified a two pronged strategy: (a) gradual but steady increase in support for the conservation management of the Socotra Archipelago, backed up by the Yemen Cabinet Decree No. 49 of 12 February 2008 which provides for increased funding for the property (specific funds will be allocated in the national budget, starting in 2009); and (b) ongoing collaboration with a range of donors and partners to support management efforts in the property. A GEF Medium Sized Project is shortly to be approved. IUCN notes this is a positive response but that it is important to maintain efforts to increase funding for the property and also that the situation in relation to financing should be kept under review.

Noting that sustainable long term financing is one of the key issues on Socotra, IUCN recommends that a Business Plan for Socotra be developed and implemented which builds on the two approaches noted above. Such a plan should include: (a) substantially increasing the support available for conservation management on Socotra; (b) diversification of the existing funding base; (c) obtaining longer term commitments from donors and partners; (d) increasing the base level of funding from government sources, including through continuation of the existing process of transferring staff employed under the Socotra Project to the government payroll. A review of Trust Fund Options such as those operating for the RSCN in Jordan and elsewhere should also be undertaken as soon as possible, with a view to application in Socotra.

### Staffing

There is a highly motivated and professional workforce of around 100 staff working on Socotra with the EPA and SCDP. There is a particular emphasis on employing local staff and around 25 staff are employed as local extension officers within local communities. The majority of staff on Socotra have been well trained under the SCDP and there has been a high rate of staff retention since the inception of the project. The EPA is the largest government agency represented on the island (outside of the Yemen Army) and thus often plays a wide range of roles, particularly in relation to community development, beyond the role it plays on the mainland. The EPA and SCDP have had some major achievements during their relatively short life, including the cancellation or diversion of proposed new roads and other infrastructure developments, as well as the development of effective working relationships with local communities. The main challenge is that EPA and SCDP staff are undertaking such a large variety of tasks, covering the full range of community development and conservation activities. Overall the number of staff available for full time

conservation management on Socotra is limited and should be increased to ensure that natural values are adequately protected.

There are effective working relationships between EPA and SCDP staff and international experts which visit Socotra (such as from universities, the Royal Botanic Garden of Edinburgh and BirdLife International). Partnerships with local communities have also been very effective and have included joint work on aspects such as tourism development (such as campsite development on Dihamri and Homhil) as well as the involvement of local communities in small scale business development, such as in relation to honey production. The working relationships with researchers and with local communities are very positive and should be strengthened wherever possible.

An important element in retaining the workforce efficiency is to facilitate necessary means that ensure the current benefits offered to staff members are maintained as much as possible as they represent an important part of the staff motivation in return for their exceptional hard work. Additional training and capacity building is also essential to enhance the staff's enforcement, management and ecological monitoring capacity, particularly in relation to emerging challenges such as extended infrastructure and road development, tourism and fisheries management, and the management of invasive species.

### **4.4 Threats and human use**

Socotra is not suffering from many of the threats affecting other oceanic islands. This reflects a number of factors, including the relative isolation of Socotra (until 1989 the island was also politically isolated) and the relatively low resident population on the island. The total population of Socotra is 50,000 (out of 22 million in Yemen). People and nature have a very close relationship on Socotra. Traditional patterns of use involving nomadic herding have evolved over thousands of years and have strongly influenced the biodiversity of Socotra.

The traditional land-use management practices employed by the indigenous population played a vital role in protecting against the over-exploitation of natural resources and the diminution of biodiversity. Traditional rules exist, for example, about cutting of live trees for building. However, enforcement of such rules is patchy and there is a great demand for a variety of building purposes, which poses a serious threat to the vegetation. The present building boom on the island is placing great pressure on timber and disputes over land ownership and the consequent breakdown of traditional rules is likely to place an increasing pressure on all trees. This situation should be carefully monitored and strategies developed to minimise the impact of timber removal on biodiversity.



Where possible these strategies should build on traditional rules about cutting of live trees.

Traditional land-use management practices are currently changing with urbanization, with more people moving to the capital of Hadibu, increased accessibility around the island with a new road network, and immigration from the mainland. Access to Socotra is still relatively limited and there are only two flights per week during the main tourist season. A potential threat is likely to come, however, from new experiments in agriculture. For instance, the development of agroforestry to relieve pressure on native wood, although of obvious benefit, needs to be closely monitored.

The overall impacts of these trends on the natural environment remain to be seen but experience from Galapagos has shown that impacts of factors such as these can be significant. A number of the key threats and challenges facing Socotra are outlined in more detail below.

### Roading

An active road construction programme under the Socotra Roads Master Plan has been initiated in recent years in Socotra. There are two phases: Phase 1 has involved the construction of roads around part of the island and also across the island. In general this roading has been large scale and there have been some significant impacts on natural areas. In a number of areas, such as in the Qalansiya region on the north west of the island, roading has been subject to dispute on the grounds of unacceptable environmental impact and there has been some re-routing of roads and cancellation of road proposals. Phase 2 of the programme has not commenced but the original plans called for this to include a ring road around the island, including in a number of environmentally sensitive areas, including within the nominated property.

Following the concerns expressed in relation to environmental impact of roads on Socotra, a Memorandum of Understanding in relation to environmental road design and construction has been signed between the MOWE on one hand and the Minister of Public Works and Highways (MOPW) on the other. This memorandum, inter alia, includes provision for Environmental Impact Assessment studies for any new roads and notes that "roads should be designed to serve local communities without affecting the environment, in particular national parks and nature sanctuaries". In a meeting with the IUCN mission team on 17 November 2007, the MOPW also made a commitment that no activities would be undertaken on the island unless the MOWE approves. The State Party advised in February 2008 that they intended to follow a strategy with two elements: (a) developing clear guidelines for road construction

which minimise environmental impact, as noted in the Yemen Cabinet Decree No. 46 of 12 February 2008; and (b) strengthening local and national capacity to enforce road construction guidelines.

Noting that roading is clearly an important future issue on Socotra, IUCN recommends that any future roading should: (a) be located outside of the core zone of the property wherever possible; (b) be consistent with the broad policy direction outlined in the Conservation Zoning Plan and its revision; (c) be at a smaller scale than the existing roading that has been undertaken and higher quality (note disposal with a pre-agreed set of spoil etc) technical specifications; (d) be subject to Environmental Impact Assessment studies undertaken by a third party on the expense of the contractor / MOPW; (e) wherever possible, follow existing tracks and connect existing settlements; and (f) involve the EPA in the provision of environmental guidance and might even consider a MOWE / EPA written clearance before any road approval and/or development.

### Grazing

Grazing by goats has been occurring on Socotra for thousands of years and is widespread throughout the island. It appears that grazing by goats has not impacted adversely on the high levels of biodiversity on Socotra. This situation cannot be viewed in the same context as goat grazing in World Heritage properties, such as Galapagos, where goats have been introduced relatively recently and are now being treated as an invasive species and eradicated wherever possible. On Socotra, the patterns of grazing were traditionally semi nomadic, with populations fluctuating markedly in accordance with periodic droughts. This situation is changing with practices such as purchasing and stocking of grains and fodder, and this may lead to an increase in goat numbers on the island in the longer term. More information is required on the environmental impacts of goat grazing on Socotra, particularly in view of these changing practices, and also in relation to whether any control may be necessary in the future. Already overgrazing is a problem around the major settlements. Building of wells and water catchments, not yet a major problem, is likely to increase in the future. This and the impacts of grazing on the rangelands should be closely monitored. Attention also needs to be given to preventing the introduction of new domesticated varieties of goats, sheep, and cattle, something which the EPA and SCDP have been successful in achieving so far. This needs to be part of the overall regulatory mechanisms adopted in the future (e.g. linked with the revised Conservation Zoning Plan; governance arrangements; enforcement, management and ecological monitoring capacity). The State Party noted in February 2008 that it is important to maintain a careful balance between biodiversity and subsistence needs of the pastoral population on

Socotra. The Yemen Cabinet Decree No. 48 of 12 February 2008 establishes a number of measures to be undertaken in cooperation with local communities to reduce impacts from grazing. A work plan is also being developed to address this.

### Invasive species

Invasive species pose a future challenge on Socotra, particularly with increasing access and transport to the island. The irreversible impacts of invasive species on islands such as Guam and Christmas Islands illustrate the problem that can be posed on oceanic islands and the need to effectively address this issue on Socotra. The IUCN mission team noted the recent interception of a number of rabbits at the Socotra airport by the Yemeni Army, which could have had potentially disastrous consequences. IUCN recommends that a Quarantine System be developed to assist with more effective management of invasive species on Socotra. Such a system should be coupled with monitoring and eradication programmes across the islands to prevent the establishment of invasive species. Species introduced for amenity horticulture and agriculture are likely to become an increasingly important problem and this should be addressed as part of overall invasive species control plans.

### Tourism

Tourism in general, and nature based tourism in particular, are increasing rapidly around the world. These trends will impact on the future planning and management of Socotra where there has been very limited tourism to date, reflecting the relative isolation of the island. Tourism and associated pressures are increasing on Socotra: one reviewer noted that 450 tourists visited Socotra in 2004, and that the tourist numbers over the December 2006 – January 2007 period alone exceeded this figure. Tourism development to date on Socotra has focused on establishing low key camping facilities, developed in conjunction with local communities. This approach of involvement of local communities, in a fully consultative way, is fully endorsed by IUCN. There has been some interest from private developers in establishing tourist accommodation but in general this has not “taken off” in view of the challenges of access to Socotra and the limited tourist season (a number of months of the year it is not possible to visit Socotra due to the monsoon period).

There are a number of options for the future development of tourism on Socotra, unlike for many other natural areas around the world, such as Galapagos, where large scale, long established tourism developments have contributed to major environmental impacts and often constrain future options. There is thus an excellent opportunity to “get it right” in relation to future tourism development on Socotra. IUCN recommends that an Ecotourism Master Plan be developed for

Socotra which: (a) maintains the current focus on low key, nature based tourism, based on the appreciation of natural values; (b) includes a carrying capacity assessment to guide tourism development, in line with the Socotra Presidential Decree 275 (Article 8) which states that “*Travel to and from the Socotra islands should be regulated according to the capacity of these islands*”, and as noted in the Yemen Cabinet Decree No. 47 of 12 February 2008; (c) provides for direct and adequate financial contributions from tourism to the conservation and community development activities of the EPA and SCDP; (d) closely involves the Yemeni General Tourism Development Authority and Tourism Promotion Board; (e) considers options for engaging in partnerships with environmentally sensitive private sector; and (f) addresses the lack of trained local tourist guides and literature.

### Threats to the marine environment

The nominated property includes a large marine component, including a number of small, relatively well protected marine protected areas, which have been established in consultation with local communities. There have been a number of positive developments, including the ban on the taking of sea cucumbers and the development of by laws in relation to marine protection. However, the level of protection outside of the marine protected areas is relatively weak, and constrained by very limited enforcement capacity. This poses a challenge in view of the growing demand for export fisheries and over fishing of marine resources in Socotra and the wider Indian Ocean. Increased exploitation of Socotra’s marine resources raises serious concern over long term sustainability. It is thus important that marine enforcement capacity is increased and that the overarching policy framework is strengthened. In particular the revision of the Conservation Zoning Plan should give emphasis to improving marine protection and related regulations should be developed and enforced.

In summary IUCN considers that the property meets the necessary conditions of integrity as set out in the Operational Guidelines.

## **5. ADDITIONAL COMMENTS**

### **5.1 Justification for serial approach**

When IUCN evaluates a serial nomination it asks the following questions:

#### **a) What is the justification for the serial approach?**

The nominated property includes all the Nature Sanctuaries, National Parks and Areas of Special Botanical Interest in the Socotra Archipelago. The boundaries of these areas were developed based

on the input of many scientists, as well as key local stakeholders, and this process aimed to ensure that the most important terrestrial and marine conservation values were included. The serial approach is therefore fully justified and the selected sites provide a coherent property with a complete and coherent set of unifying values.

**b) Are the separate components of the property functionally linked?**

There is a high degree of functional linkage amongst the terrestrial and marine components. The terrestrial components encompass about 75% of the total land area of the Socotra Archipelago. They protect all the major vegetation types, areas of high floral and faunal values, and important bird areas. The marine components encompass the most important elements of marine biodiversity and act as major centres of dispersal and replenishment for the surrounding waters. The functional linkages are further enhanced by terrestrial and marine buffer zones.

**c) Is there an overall management framework for all the components?**

All components are governed by the Conservation Zoning Plan for the Socotra Islands. The Socotra Branch of the EPA, supported by the SCDP, is principally responsible for the implementation of this plan and the management of the nominated property. This management framework will be further enhanced by a new island wide "Socotra Authority", which will aim to ensure "the achievement of the sustainable development of the Socotra Archipelago, while conserving its unique environment, biodiversity, and natural landscapes that are the basis for its World Heritage site nomination".

IUCN concludes that the serial approach put forward is justified in this case.

## 5.2 Research

A great deal of scientific research has been undertaken on Socotra, dating back to the Balfour Expedition of 1880. This has reflected the strong interest from the international community in the biodiversity of Socotra and has resulted in a relatively well documented flora and fauna, although there are gaps in knowledge, such as in relation to invertebrates. It is also important that research be more oriented towards specific management and policy issues, such as: the requirements of endemic and threatened species; the impact of grazing on endemic plants and on rangeland requirements; and the impact of invasive species and methods for control. EPA and SCDP staff need to be involved in setting research agendas and also in developing and applying research protocols to ensure that information arising from research is relevant and also made available to EPA and SCDP staff. The role

of the EPA and SCDP in research coordination and facilitation should be strengthened. The establishment of a research station to act as a focus for these efforts would be useful.

## 6. APPLICATION OF CRITERIA

The property has been nominated under criterion (x). IUCN considers that the nominated property meets criterion (x) based on the following assessment:

### Criterion (x): Biodiversity and threatened species

Socotra is globally important for biodiversity conservation because of its exceptional level of biodiversity and endemism in many terrestrial and marine groups of organisms. Socotra is particularly important for its diversity of plants and has 825 plant species of which 307 (37%) are endemic. Socotra has high importance for bird species as underlined by the identification by BirdLife International of 22 Important Bird Areas on Socotra. Socotra also supports globally significant populations of other land and sea birds, including a number of threatened species. Extremely high levels of endemism occur in Socotra's reptiles (34 species, 90% endemism) and land snails (96 species, 95% endemism). The marine life of Socotra is also very diverse, with 253 species of reef-building corals, 730 species of coastal fish and 300 species of crab, lobster and shrimp, and well represented in the property's marine areas.

IUCN considers the nominated property meets this criterion.

## 7. RECOMMENDATIONS AND STATEMENT OF OUTSTANDING UNIVERSAL VALUE

IUCN recommends that the World Heritage Committee adopt the following decision:

*The World Heritage Committee,*

1. Having examined Documents **WHC-08/32.COM/8B** and **WHC-08/32.COM/INF.8B2**,
2. Inscribes the Socotra Archipelago, Yemen, on the World Heritage List on the basis of **criteria (x)**;
3. Adopts the following Statement of Outstanding Universal Value:

### Values

*Socotra is globally important for biodiversity conservation because of its exceptionally rich and distinct flora and fauna. 37% of Socotra's plant species, 90% of its reptile species and 95% of its land snail species do not occur anywhere else in*

the world. Socotra is of particular importance to the Horn of Africa biodiversity hotspot and, as one of the most biodiversity rich and distinct islands in the world, has been termed the “Galápagos of the Indian Ocean”.

**Criterion (x) – Biological diversity and threatened species:** Socotra is globally important for biodiversity conservation because of its exceptional level of biodiversity and endemism in many terrestrial and marine groups of organisms. Socotra is particularly important for its diversity of plants and has 825 plant species of which 307 (37%) are endemic. Socotra has high importance for bird species as underlined by the identification by Birdlife International of 22 Important Bird Areas on Socotra. Socotra also supports globally significant populations of other land and sea birds, including a number of threatened species. Extremely high levels of endemism occur in Socotra’s reptiles (34 species, 90% endemism) and land snails (96 species, 95% endemism). The marine life of Socotra is also very diverse, with 253 species of reef-building corals, 730 species of coastal fish and 300 species of crab, lobster and shrimp, and well represented in the property’s marine areas.

### **Integrity**

The property is of sufficient size to adequately represent all the terrestrial and marine features and processes that are essential for the long term conservation of the archipelago’s rich and distinct biodiversity. The terrestrial nature sanctuaries, national parks and areas of special botanical interest included in the property encompass about 75% of the total land area. They protect all the major vegetation types, areas of high floral and faunal values, and important bird areas. The marine nature sanctuaries included in the property encompass the most important elements of marine biodiversity. The property’s integrity is further enhanced by terrestrial and marine buffer zones that are not part of the inscribed property.

### **Requirements for Protection and Management**

All component areas of the property have legal protection; however there is a need to strengthen the legislative framework, and management and enforcement capacity. Whilst the property’s terrestrial and marine habitats are generally still in good condition, management planning needs to deal more effectively with current threats including roading, overgrazing and overharvesting of terrestrial and marine natural resources. Potential future threats include unsustainable tourism and invasive species. Impacts of these threats on Socotra’s biodiversity need to be closely monitored and minimized. A sustainable financing strategy is required to ensure the necessary

human and financial resources for the long term management of the property. Appropriate linkages need to be developed between the management of the property, its buffer zones and the Socotra Biosphere Reserve.

4. Commends the State Party for its major efforts for the long term conservation of the property; and recognises in particular the positive commitments from the State Party as set out in the Government of Yemen’s Cabinet Decrees No. 45-49 of 12 February 2008 which relate to the conservation and sustainable development of the Socotra Archipelago;
5. Requests the State Party to implement these Decrees as quickly as possible and, in particular, that:
  - a) Management planning for the World Heritage property be enhanced to deal more effectively with key threats, in particular ensuring that: (i) future roading works minimise environmental impacts on biodiversity and where possible are located outside the property; (ii) grazing impacts on biodiversity are monitored and effective measures taken to reduce environmental impacts from grazing; and (iii) invasive species are effectively controlled, including through limiting the entry of invasive species at ports and the airport;
  - b) A separate management authority be established for the World Heritage property which would give priority attention to the conservation of the unique biodiversity of the property. This Authority should have adequate sustained human and financial resources, and enforcement capacity;
  - c) The buffer zones (which are not part of the inscribed property) be managed in a complementary manner to the property, with appropriate linkages developed with the management of the Socotra Biosphere Reserve; and
  - d) A sustainable financing strategy be developed for the World Heritage property, which includes ongoing and adequate support from the Government of Yemen and international support from donors and partners.
6. Further requests the State Party to invite a mission to the property in 2012 to assess progress with the above recommendations and report back to the World Heritage Committee.

Map 1: Location and boundaries of the nominated property

