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H. E. Mr. Hamid Alawadhi

Ambassador and Permanent Delegate of
Yemen to UNESCO

Maison de l'UNESCO Bureau M5.28

1, rue Miollis

75732 PARIS Cedex 15

France

20 December 2007

Your Excellency,

IUCN Evaluation of the "Socotra Archipelago" (Yemen) – Nominated for inclusion on the World Heritage List

The IUCN World Heritage Panel met in Gland, Switzerland, from 3 to 7 December 2007 to examine World Heritage nominations for natural and mixed properties and cultural landscapes. The IUCN Panel examined in detail each nomination dossier and any supplementary information from the State Party, reports and reviews of field evaluators and desk reviewers, and other references regarding the nominated properties.

IUCN seeks to develop and maintain a dialogue with States Parties during the evaluation process. We would thus like to clarify a few points following the discussions of the IUCN Panel. Following your response, IUCN will formulate its final recommendation to the World Heritage Committee which will meet from 2 to 10 July 2008 in Quebec City, Canada.

Following the discussions of the IUCN Panel, it would be appreciated if the State Party of Yemen could please:

1. Confirm that the boundary of the area nominated as potential World Heritage will only include areas zoned as Nature Sanctuary, National Park and Areas of Special Botanical Interest (representing the core zones) as discussed during the IUCN evaluation mission and provide a new detailed topographic map showing the revised boundaries of the nominated property;
2. Identify how adequate and long term funding will be provided for the management of the nominated area. The Mission Team noted that the current funding base is limited, donor dependent and short term. A secure and sustainable funding base is essential for effective management and IUCN seeks further information from the Government of Yemen as to how this will be guaranteed;
3. Outline proposed management arrangements for the nominated areas, such as the proposed Separate Authority for Socotra discussed during the Mission, and also outline how this will specifically improve the conservation management of the nominated property;
4. Outline how any future roading on Socotra will avoid or minimise impacts on biodiversity in and adjacent to the nominated property; and
5. Outline measures to address the potential impacts on biodiversity associated with increased grazing by goats and other animals, associated with changes in traditional rangeland management practices (as outlined on page 87 of the nomination document).

Please submit your response to the above points as soon as possible, in order to facilitate our evaluation process, but no later than the **28 February 2008**, as per the Operational Guidelines. Please note that any information submitted after this date will not be considered by IUCN or the World Heritage Committee. It should be noted, however, that while IUCN will carefully consider any supplementary information submitted, it cannot properly evaluate a completely revised nomination or large amounts of new information submitted at the last minute. So please keep your response brief and respond only to IUCN's requests.

Supplementary information should be submitted officially in three copies to the UNESCO World Heritage Centre in order for it to be registered as part of the nomination. An electronic copy of any supplementary information to both the UNESCO World Heritage Centre and IUCN Headquarters would also be helpful.

Should you have any questions concerning this letter, please do not hesitate to contact Mr. Bastian Bomhard (Tel: +41 22 999 0158, Fax: +41 22 999 0025, Email: bastian.bomhard@iucn.org).

Thank you again for your collaboration and support for the implementation of the World Heritage Convention.

Yours sincerely,



David Sheppard
Head, Programme on Protected Areas

Cc (by email) Yemeni National Commission for UNESCO, Prof. Mohamed A. Al-Kadasi, Secretary-General
UNESCO World Heritage Centre, Ms. Veronique Dauge and Mr. Alessandro Balsamo
IUCN Regional Office for West Asia / Middle East, Dr. Odeh Al-Jayyousi
IUCN Regional Committee for West Asia, Prof. Dr. Abdulaziz H. Abuzinada



Ref : 145 MWE
Date : 27-2-2008
No. of Pages : 1-7

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Mr. David Sheppard
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Mr. Alessandro Balsamo
UNESCO World Heritage Centre
7, Place de Fontenoy
75352 Paris 07 SP
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RE: Clarifications re the IUCN evaluation Socotra Archipelago (Yemen) - Nominated for inclusion on the World Heritage List.

Sana'a, 26 February 2008

Dear Sirs,

It is our pleasure to provide you with the clarifications kindly requested to the State Party of Yemen in IUCN's letter of 20 December 2007. A response on each of the five points listed in the letter is provided below, with additional details in the annexes.

1. We are pleased to confirm that the boundary of the area nominated as potential World Heritage Site includes the areas zoned as Nature Sanctuaries, National Park and Areas of Special Botanic Interest (as defined in Presidential Decree no. 275 of year 2000 on the Conservation Zoning Plan for the Socotra Archipelago, Yemen). Specific reference to this is also made in the Government of Yemen's Cabinet Decree no. 45 of the 12th of February 2008, section 1.1 (Annex 1)

Please find enclosed the revised map with the boundaries of the nominated property (Annex 2),

2. We fully share your concerns with respect to the importance of securing a sustainable funding base for the management of the nominated area. Since the declaration of the Archipelago as the first protected area in the country (year



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2000), the Government of Yemen has been steadily increasing its support to the conservation of the Socotra Archipelago. However we recognise that the financial and technical resources our government was so far able to allocate are not yet sufficient to address the appropriate management of such a complex site. As you are aware, the first steps towards the conservation of the Socotra Archipelago were taken by our Government with considerable support from the international community, mostly through the UN-led Socotra Conservation and Development Programme and the Global Environment Facility.

To address the issue of securing adequate and long-term funding for the management of the site, we have to recognise our main constraints: our national capacity in the field of protected areas management, both financially and in terms of human resources, is still limited. Therefore we are moving forward in the recognition that the management of the Socotra Archipelago can only be achieved through a combination of national and international efforts. In this respect the strategy being adopted by the GoY is two pronged:

(a) The GoY will continue to step-up its financial support to the conservation of the Socotra Archipelago, which has already increased considerably over the past 10 years¹. This is also reflected by the increase in number of staff of the Socotra Branch of the Environment Protection Authority (EPA) from 4 in 1997, to 51 in 2008. We confirm that this trend will continue, with a gradual but steady increase in support for the conservation and appropriate management of the Archipelago. This is also confirmed by the recent Cabinet Decree n.49 (of 12 Feb. 2008 – Annex 1) mandating the Minister of Planning and International Cooperation and the Minister of Finance “to provide the necessary and sustainable financial support for the establishment of an effective administrative structure for the management of the World Heritage Site in the Socotra Archipelago. This will include the possibility of establishing an entry fee for non-resident visitors to the island, collecting fines from violations of the environmental law, and allocating the needed funds in the national budget, starting in year 2009”. Our past track-record, and Cabinet Decree 49, illustrate our Government’s firm commitment to taking all required steps to secure a sustainable funding base for the management of the nominated area.

¹ GOY annual funding for the Socotra Branch of the Environment protection Authority (EPA) increased from 360 US\$ in 1997 to 171,000 US\$ in 2008. Source: EPA/SCDP



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(b) In combination with the above-mentioned increasing government resources, we are engaged in an ongoing collaboration with a range of donors and international organizations to support our efforts in the management of the nominated WHS in the long-term. We regard this international collaboration as essential for the coming period of 10-15 years, to allow us to build the required professional capacity and sustainable financing mechanisms that help Yemen to sustain this effort with our own national means. We recently had the pleasure to record the continued commitment of UNDP and other lead donors to support the conservation of the archipelago in the framework of the UN-led Socotra Conservation and Development Programme. The UNDP confirmed continued support to the efforts of the Environment Protection Authority until 2009 (ref. UNDP letter in Annex 3). We are working closely with them to extend this support beyond 2009, focusing on the establishment and consolidation of the new "Socotra Authority" (see pt.3 below), with a gradual transfer of capacity from the EPA/SCDP.

In the framework of the ongoing UN-led programme in the archipelago, a new GEF-funded Medium Sized Project (2.7 M US\$ - 5 years) supporting improved governance and environmental protection, is now in its final stages of approval. Within this project, we will undertake a study on the long term funding options for the nominated site that will further guide the Government on the next steps in this regard. In addition to the above, and also in the framework of the ongoing UN programme, a new 1.5M US\$ project to support to the marine conservation of biodiversity and sustainable fisheries sector is being developed in collaboration with the FFEM/France (see letter AFD in Annex 4). Finally, the EPA is engaging in a wide range of field research initiatives in collaboration with European institutions, led by the Royal Botanical Gardens of Edinburgh and Birdlife International.

We recognise that the initiatives illustrated above remain inevitably short-term and donor-dependent. However in the framework of these programmes we are strongly supporting the establishment and consolidation of national professional capacity, locally-based financing mechanisms (i.e. entry-tax, environmental fines), as well as an internationally supported trust-fund or endowment-fund, which may help in supporting our Government's efforts in the long-term.

We trust that the continued national and international support for the conservation of the archipelago will gradually create the best possible conditions for its long-term conservation. In this respect, we look forward to important lessons learned from similar sites worldwide.



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3. Our Government has recently taken a crucial step towards the establishment of a new island-wide "Socotra Authority". In Cabinet Decree n. 49 (Feb. 12, 2008 - Annex) "The Minister of Water and Environment is mandated to present a proposal to establish a national entity responsible to plan and coordinate all developments, investments and economic activities (in the Socotra Archipelago) and supervising it in cooperation with the Ministry of Local Administration, Ministry of Legal Affairs, Ministry of Civil Service, Tourism, Agriculture and Fish Wealth. This national entity will aim at ensuring 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 WHS nomination".

Cabinet Decree n.49 also mandates the Minister of Planning and International Cooperation and the Minister of Finance to provide the necessary and sustainable financial support for the establishment of an effective administrative structure for the management of the WHS in the island. To support this effort, and in addition to the above-mentioned 2.7 M US\$ GEF-UNDP grant (focusing on mainstreaming environment into local governance), our Ministry is discussing a 200.000 € grant from the Government of France to support the necessary legal, policy and organizational steps towards the timely establishment of the new "Socotra Authority" in 2008-2009 (see Annex 4).

We regard the establishment of this new Authority as an important step forward towards the harmonization of our Government and donors' interventions in the Socotra Archipelago. This should be the avenue for ensuring that existing conservation plans and priorities are duly and consistently taken into account as an integral part of the process of "development" in the Archipelago. We envisage that an island-wide Authority will provide for increased control and monitoring capacity at the local level, combining this with strong and direct ties to the central government. This set-up will allow the Authority to apply greater influence on the archipelago's governance i.e. over all ongoing and planned construction of necessary infrastructure and services in the Archipelago (see also below).

4. Our Government is committed to put in place adequate policy and management measures to avoid or minimise impacts on biodiversity within and adjacent to the nominated area, linked to road construction in the archipelago. Our focus is on the following two main fronts:

(a) Defining clear guidelines for road construction, consistently with the



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existing environmental legislation and the Conservation Zoning Plan for the Archipelago. In this respect, the recent Cabinet Decree n.46 (Feb. 12, 2008) (Annex 1) mandates the Minister of Planning and International Cooperation, the Minister of Public Works and our Ministry to update the existing Road Master Plan for Socotra, including all future roads and taking into consideration the Conservation Zoning Plan (Presidential Decree no. 275, 2000) and relevant socio-economic factors. This process is already ongoing, and the biodiversity studies, recently undertaken by the Environment Protection Authority (EPA) and the Socotra Conservation and Development Programme (SCDP), in collaboration with the Royal Botanic Gardens of Edinburgh (RBGE) and Birdlife International, will provide the basis to updating of the roads master plan. Our Ministry is also mandated by this Cabinet Decree to prepare new and more specific guidelines for road construction to be applied in Socotra, consistent with IUCN guidelines for sites that have World Heritage Status.

(b) Strengthening local and national capacity to enforce road construction guidelines. In our view this requires improved coordination and collaboration between all relevant ministries and local authorities within our Government. Recent years have exposed the limitations in our internal coordination mechanisms, in spite of existing legislation. While some successes were achieved in preserving important areas, some damage to the natural values of the Archipelago has unfortunately also occurred. However recent events have raised our Government's awareness and attention to the importance of ensuring tighter control measures over any future infrastructure development in the Archipelago.

Initial steps were recently taken through increased bilateral collaboration agreement between the Ministry of Public Works and our Ministry of Water and Environment (ref. inter-ministerial letter Annex 5). However we regard the recent Cabinet Decree 49 of 2008 for the establishment of the new island-wide "Socotra Authority" (Annex 1) as a most important step towards ensuring better coordination of Government efforts and therefore avoiding or minimising impacts of any future road construction. We envisage that such a new Authority will play a critical role in the enforcement of existing environmental legislation in the archipelago.

5. Our Government recognises the importance of maintaining the delicate balance between the unique biodiversity of the islands, and the subsistence needs of its largely pastoral population. We are working towards defining and



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implementing measures to address the potential impact on biodiversity that are associated with the changes in the rangeland management practices. Field research on this important topic is ongoing (see below), and we remain fully committed to addressing this issue as confirmed by Cabinet Decree 48 of Feb. 12th 2008 (Annex 1). The decree envisages a set of immediate measures focusing on the reduction of anticipated damage that can be caused by the uncontrolled management of livestock. This decree presents a series of actions to be undertaken with local pastoral associations, supported by the ongoing "Livestock project" undertaken by the Socotra Conservation Fund (SCF) in collaboration with the Environment Protection Authority (EPA) and the Socotra Conservation and Development Program (SCDP).

Over the past decade, our efforts in the complex and delicate field of rangeland management in Socotra, are consistently supported by a team of national and international experts. To address your concern, we have requested our team of the Environment Protection Authority in Socotra to consult with their international counterparts. As a result, I am pleased to attach a paper, prepared by our EPA/SCDP team with support from the Royal Botanic Garden, Edinburgh (UK), Birdlife International, "La Sapienza" University, Rome and Pavia University, Pavia (Italy). The paper outlines a common vision, foreseen measures and associated workplan to address the long-term impact of changing rangeland management practices on Socotra. (Annex 6). Let me hereby just include some excerpts of the paper:

- *"Socotra is not a wilderness island, but an island shaped by man and his livestock: exclude goats and you no longer have the essence of what makes Socotra special, the combination of endemic fauna and flora-and goats*
- *Although goat grazing may be the most important driver of environmental change on Socotrano plant species are under immediate threat because of goats*
- *The authors postulate that it is not the present goat grazing pressure that has a long-term impact on the biodiversity, but the increasingly reduced grazing dynamics (in space as well as in time)*
- *It is not the presence of goats (and livestock) that is the problem- it is the way they are managed.*

In the attached work plan, the international scientific institutions cited above, in collaboration with EPA/SCDP and SCF, commit themselves to follow-up studies and actions to help the Government of Yemen better understand and manage the anticipated problems related to the changes in livestock grazing practices"



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We hope that our efforts to address your valuable concerns, may provide your team with sufficient clarifications. Myself and my colleagues at the EPA/SCDP remain at your complete disposal for any additional clarification you may require.

With my best regards and deepest gratitude for your assistance and support at this important juncture for Socotra and indeed all our country,

Yours sincerely

Abdul Rahman El-Eryani
Minister of Water and Environment

Annexes

1. Cabinet Decrees no 45 – 49 (February 12, 2008) with respect to the improved Conservation and Sustainable Development of the Socotra Archipelago (including the English translation).
2. New detailed map, indicating the boundaries of the proposed World Heritage Site property
3. Letter of UNDP Resident Representative a.i. to the Minister of Planning and International Cooperation (re. Support to Biodiversity and Sustainable Development to the People of the Socotra Programme)
4. Letter of intent of other financial partners
5. Memorandum of Understanding between the Minister of Public Works and Highways and the Minister of Water and Environment, on environmental road design and construction on Socotra
6. Grazing Position Paper and Work Plan



HE Mr. Hamid Alawadhi
Yemeni National Commission for UNESCO, Prof M.A.Al-Kadasi, Secretary-General
UNESCO World Heritage Centre, Ms.Veronique Dauge
IUCN Regional Office for West Asia / Middle East, dr.O.Al-Jayyousi
IUCN Regional Committee for West Asia, Prof.A.H. Abuzinada

**English Translation of the Government of Yemen's Cabinet Decisions
with respect to the improved Conservation and Sustainable
Development of the Socotra Archipelago.**

Tuesday 12th February 2008 (Official text available in Arabic).

**Cabinet Decree no (45) 2008
on
Procedures to ensure increased protection of the Socotra Archipelago.**

1- The Minister of Water and Environment is mandated to:

a- Prepare the topographical maps that define the borders of the nominated area to be added to the World Heritage Site list. This will include the nature sanctuaries, national parks and areas of special botanical interest to form the Core Zone according to the IUCN classification. This will be done in cooperation with the national Land Use Planning Authority and local authorities.

b- Enhancing the continuous Monitoring and Evaluation of natural resources and issuing the supporting legislation and by-laws for the sustainable use of those resources. This should be done through continuous consultation and discussion with the local communities, providing them with all relevant information. This should be developed on the basis of the results of scientific research and consultancies produced by national and international institutes that cooperate with the Ministry of Water and Environment.

c- Orienting the government and public sector to raise awareness at the local, national and international level on relevant environmental laws and the Presidential Decree no. 275, 2000 for the Conservation and Development of Socotra Archipelago.

Contents of page no. 19 of the Cabinet Decrees

Cabinet Decree no (46) 2008
on
Limiting the Damage of Road Construction to the Natural Environment.

1- The Minister of Planning and International Cooperation, Minister of Public Works in cooperation with the Minister of Water and Environment, are mandated to:

- a- Update the existing Road Masterplan for Socotra island. The update should include all future roads, and should take into consideration the Socotra Conservation Zoning Plan and socio-economic factors.
- b- Search for sources of funding to rehabilitate and maintain the natural areas that were damaged by road construction activities in previous years.
- c- Prepare specific guidelines for the special criteria for road construction in Socotra, consistently with the IUCN guidelines for sites that have World Heritage Status. This should be done in cooperation with the Ministry of Water and Environment.

Cabinet Decree no (47) 2008
on
Improving the opportunities for the sustainable management of eco-tourism in the
Archipelago.

1- The Minister of Tourism, in cooperation with the Minister of Water and Environment, are mandated to producing a study on visitor and tourism carrying capacity that identifies the maximum number of visitors to the island, and coordinate with the national air carrier (Yemenia) so that flight schedules are organized so as to be consistent with the limits and carrying capacity identified in the above study.

2- The Ministry of Planning and International Cooperation should look for sufficient funds to establish the appropriate infrastructure for eco-tourism, that is based on nature conservation in Socotra. This should be done ensuring the involvement of local communities in the eco-tourism sector, and the income should be directed at supporting the conservation of biodiversity in the archipelago.

Cabinet Decree no (48) 2008
on
The procedures to reduce the anticipated damage that is going to be caused by the
uncontrolled management of livestock.

1- The Minister of Agriculture, in cooperation with the Minister of Water and Environment and the Local Authorities in Socotra, should take all legal means to support appropriate rangeland management, by encouraging and fostering indigenous traditional rangeland management practices. This should be done by encouraging the establishment of pastoralists associations all over the Archipelago in order to:

- a- Encourage all these associations to restore the seasonal movement (transhumance) of their livestock from the poorer rangelands to the richer rangeland areas, according to the original tradition of the Socotri people.
- b- Encourage all these associations to establish farms for their livestock, located outside of the World Heritage site, through a program that supports the additional balanced feeding of livestock. This should be done in order to increase the productivity and the level of marketing value of livestock, and allow the export and sale within and outside of the island, increase the income for the poorest among the local people, and reduce the pressure on the rangeland within the WHS areas.
- c- Encourage the associations to agree on the limits on the number and species of livestock that each association can raise on natural rangeland. In case that such limits were to be exceeded, any excess livestock should be removed and transferred to the fattening farms that are to be located outside of the WHS area.

2- The Minister of Transportation and the Minister of Agriculture are mandated to:

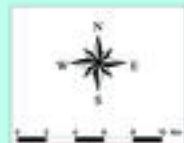
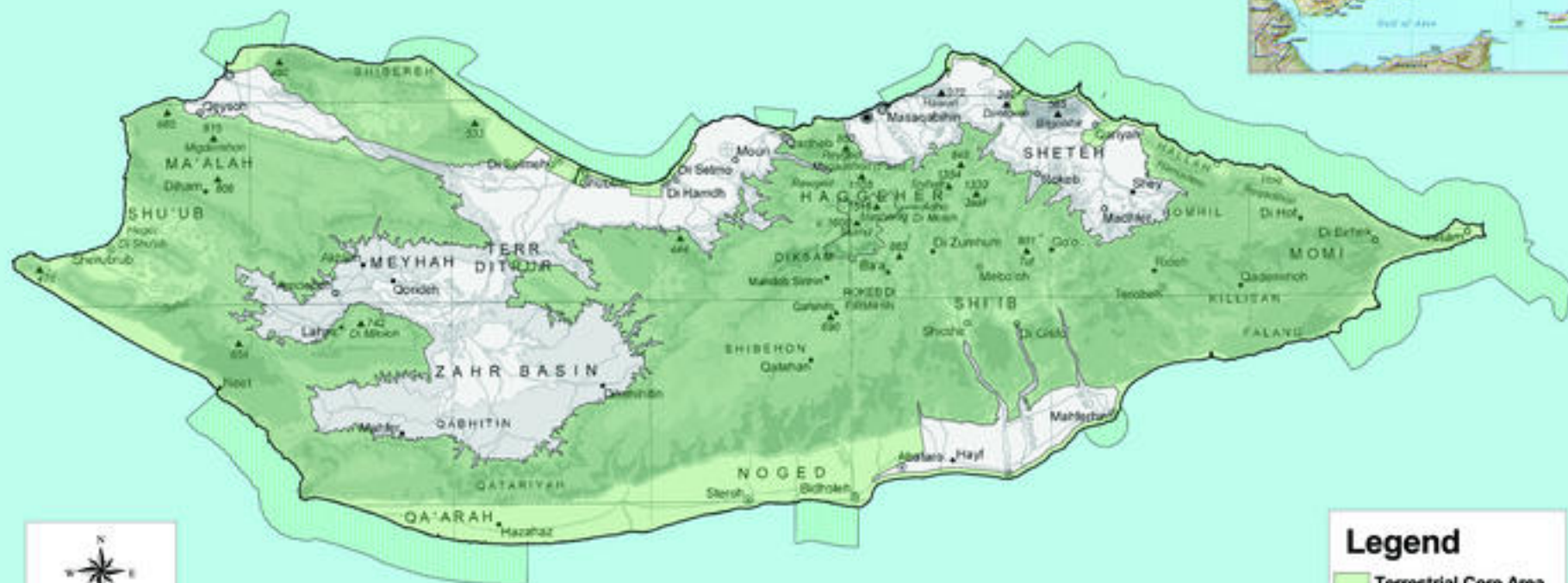
- a- Require all access ports (air and sea) to prevent the introduction into the archipelago of any alien species of plants and animals that may invade the island replacing native biodiversity, and/or cause the spread of diseases. This is with the exception of materials that may be accepted on an exceptional basis, upon joint authorization by the Ministry of Agriculture and Irrigation and the Ministry of Environment. This will include the establishment of a quarantine for animals and plants to be introduced in the island.
- b- Directing the local authorities to allow the export of slaughtered or live livestock, under the supervision and authorization of the specialized veterinary authorities.

**Cabinet Decree no (49) 2008
on
Mobilizing the necessary funding for setting up an effective institutional and
management structure for the archipelago.**

1- The Minister of Planning and International Cooperation and the Minister of Finance are mandated to provide the necessary and sustainable financial support for the establishment of an effective administrative structure for the management of the WHS in the island. This will include the possibility of establishing an entry fee for non-resident visitors to the island, and collecting fines from violations of the environmental law, and allocating the needed funds in the national budget, starting in year 2009.

2- The Minister of Water and Environment is mandated to present a proposal to establish a national entity responsible to plan and coordinate all developments, investments and economic activities and supervising it in cooperation with the Ministry of Local Administration, Ministry of Legislation, Ministry of Civil Service, Tourism, Agriculture and Fish Wealth. This national entity will aim at ensuring 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 WHS nomination.

Boundaries of the nominated property



Legend

- Terrestrial Core Area
- Marine Core Area



United Nations Development Programme**YEMEN**

File: Socotra
Ref: 080203
20 February 2008

Excellency,

**Subject: Support to Biodiversity Conservation and Sustainable
Development for the People of Socotra Programme**

Reference is made to your letter Ref. No. MPIC/1/8 dated 17 February 2008 concerning request for continuation of support to the Socotra Programme in line with the Cabinet's decisions relating to Socotra conservation and development and nomination of Socotra as a UNESCO World Heritage Site. As you have indicated in your letter, UNDP with its partners have been supporting conservation and development activities in Socotra for more than 10 years with an investment of over US \$ 12 m. UNDP will be the last to withdraw from the Socotra Programme, especially at this critical moment.

I would like to confirm that UNDP remains committed and is still committed to support biodiversity conservation and sustainable development of the nationally and internationally unique Socotra Archipelago. Our commitment to biodiversity conservation is reflected in UNDP's new Country Programme 2007-2011. In addition to our on-going programme co-financed with the Italian Government, we are currently preparing for a Global Environment Facility (GEF) project to support Socotra governance and biodiversity conservation. The total estimated budget of the project is \$ 2.7 m of which GEF and UNDP will contribute \$1 m each while the government is expected to contribute \$ 0.7 m. The French Government has also expressed their interest to join this programme focusing on sustainable fisheries with total contribution of Euro 1 m.

Meanwhile UNDP has been discussing with H.E. Minister of Water and Environment on how best to assist the Government with the establishment of an appropriate governance structure, taking into account time required to establish and make operational an island-wide authority.

H.E. Dr. Abdulkarim Al-Arhabi
Deputy Prime Minister for Economic Affairs,
Minister of Planning and International Cooperation
Ministry of Planning and International Cooperation
Sana'a, Republic of Yemen



I take this opportunity to assure you that, in addition to the new governance and biodiversity conservation project under preparation, UNDP is committed to put additional financial resources to maintain capacities of the Socotra programme until the end of 2008. We will undertake thorough analysis towards the last quarter of 2008, to identify gaps to further maintain the local capacities in 2009 to support government efforts in establishment of the island-wide authority.

This clearly indicates our commitment for Socotra. We will also undertake the required efforts to work with other potential donors to coordinate and provide continued support to Socotra.

We sincerely hope that our continued cooperation will assist Yemen in doing justice to Socotra as a UNESCO World Heritage site.

Please accept, Excellency, the assurance of my highest consideration.

A handwritten signature in dark ink, appearing to read 'Selva Ramachandran'.

Selva Ramachandran
Resident Representative a.i.

CC: H.E. Engineer Abdul-Rahman Al-Eryani
Minister of Water and Environment
Ministry of Water and Environment
Sana'a, Republic of Yemen

H.E. Mr. Mario Boffo
Ambassador
Embassy of Italy
Sana'a, Republic of Yemen

Sana'a, le 27 Janvier 2008

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Dr. Abdurrahman Fadl Al Eryani
Minister of Environment and Water
Sana'a – Republic of Yemen

Ref. : 2008/YE/SG/N° 36

Subject : Confirmation that AFD's planned financing the institutional setting up of the new Island
Authority for Socotra

Re: Your letter dated 21th February

Dear Mr. Abdurrahman Al Eryani,

First of all, I would like to thank you for your last letter and for your interest in working further in cooperation with the Agence Française de Développement.

As I told you during our earlier discussions, the AFD has warmly welcomed the last cabinet decrees (from decree N°45 to decree N°49) about the conservation of Socotra and especially the one concerning the creation of the new Island authority. We are sure that this institution would be of much value for the conservation and the development of the Island and would be able to manage under its umbrella the international aid given to Socotra Archipelago for better coordination and efficiency.

Therefore, we are very glad to renew our commitment to support you in the implementation of this institution. As you are fully aware, we have a special fund for projects' preparation to finance feasibility studies and capacity reinforcement and we could probably allocate a part of this one million Euro fund for financing the technical assistance to prepare and accompany the set-up of this national entity. As mentioned in your letter, we would need the Terms of References of this technical assistance and a detailed budget including number of Men/hour.

This support could be then very useful for the implementation of future projects on the Island, among them the project focused on marine biodiversity that the French Global Environment Facility (FFEM) could finance. Indeed, as you already know, the steering committee of FFEM will study this project opportunity by the end of March and we have good hope that they will accept to allocate an amount about one million Euro for Socotra.



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internet : <http://www.afd.fr>

ÉTABLISSEMENT PUBLIC - DOTATION 400 MILLIONS D'EUROS
N° TVA intracommunautaire FR 80 775 665 599 RCS Paris B 775 665 599

Lastly, we are very glad that, generally speaking, the French aid is likely to scale up for the protection and the development of Socotra and therefore we hope that this aid could achieve important results on the Archipelago. We are sure that, thanks to your availability, your kindness and your dedication for Socotra, we will be able to answer together to the challenges that the Island is facing.

I would like to thank you again for your precious support. Please accept the assurances of my highest consideration.

Sincerely yours,

Simon Goutner
AFD's representative in Yemen



Copy : His Excellency Mr. Gauthier, French Ambassador in Yemen
Mr Nabil A. Shaiban, Director General, Intl. Cooperation with Europe and the Americas, MoPIC
Mr. Paul Scholte, Chief technical advisor, SCDP
Ms. Agnese Pinto, programme officer, UNDP
Mr. Selva Ramashadran, country representative, UNDP



Letter of Intent

“Call to Action for the Establishment of the Socotra Authority” February 18th, 2008

The Socotra Archipelago’s natural and cultural values should be carefully preserved for future generation. These values are the most valuable asset for the long-term sustainable economic development for the people of these islands, and a precious resource for all Yemen.

We are pleased to acknowledge the achievements of the interventions of the Government of Yemen with its international partners for the conservation of Socotra Archipelago, in the period 1998-2008. The prime example is the approval and subsequent implementation of the “Conservation Zoning Plan for the Archipelago” (Presidential Decree No. 275/2000). This was achieved thanks to the establishment of a strong local team, allowing the Environment Protection Authority to be at the forefront of the protection and sustainable development of Socotra in the past decade. This also laid the foundation for the ongoing nomination process of Socotra as a UNESCO World Heritage Site.

However we recognise that significant issues remain to be addressed, in order to ensure the long-term conservation of this globally important site (i.e the development of an appropriate road system that will not further negatively affect the natural values of the archipelago). The management challenges lying ahead for the conservation and sustainable development of Socotra are getting increasingly complex, and are yet remaining well beyond the capacity of national authorities, both in technical and financial terms. Therefore we share the Government of Yemen’s concern over the future conservation of the Archipelago of Socotra, and its sustainable development, especially in view of the upcoming UNESCO World Heritage Site Nomination.

The approval of the Cabinet Decree on the “Improved Conservation and Sustainable Development of the Archipelago of Socotra” of 12th February 2008, represents an important step forward, and in the right direction. This further underscores the continued and sincere intentions of the Government of Yemen, and sets the stage for the development of an adequate framework for the continued collaboration between the Government of Yemen and the international community in the Archipelago. In particular, we look forward to the establishment of an appropriate governance structure for the Socotra Archipelago. This new “Socotra Authority” envisages facilitating the continued and expanded collaboration among all relevant agencies of the Government of Yemen, and the international community.

In this respect, we wish to stress the importance of maintaining and consolidating the existing professional capacity within the Socotra branch of the Environment Protection Authority (EPA) through the supporting Socotra Conservation and Development Programme (SCDP). In the current situation, this provides an immediate and viable basis for a smooth transition towards the proposed new Governance Structure for the Archipelago. This should also be combined with a concerted effort to build-up of capacity in the various branches of the local administrations that will be involved in the new Authority.

Finally, in view of the importance of consolidating and expanding conservation efforts in the Archipelago, we are hereby pleased to reconfirm our sincere commitment to explore all avenues for further cooperation with the Government of Yemen to support the conservation and sustainable development of the Socotra Archipelago, and the implementation of the relevant Cabinet Decree of 12th February 2008.

Finally, in view of the importance of consolidating and expanding conservation efforts in the Archipelago, we are hereby pleased to reconfirm our sincere commitment to explore all avenues for further cooperation with the Government of Yemen to support the conservation and sustainable development of the Socotra Archipelago, and the implementation of the relevant Cabinet Decree of 12th February 2008.

Signatory:



Sana'a, 19.02.2008

Fax: 00967-1-425309



Letter of Intent

"Call to Action for the Establishment of the Socotra Authority" **February 18th, 2008**

The Socotra Archipelago's natural and cultural values should be carefully preserved for future generation. These values are the most valuable asset for the long-term sustainable economic development for the people of these islands, and a precious resource for all Yemen.

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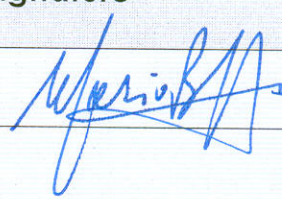
However we recognise that significant issues remain to be addressed, in order to ensure the long-term conservation of this globally important site (i.e the development of an appropriate road system that will not further negatively affect the natural values of the archipelago). The management challenges lying ahead for the conservation and sustainable development of Socotra are getting increasingly complex, and are yet remaining well beyond the capacity of national authorities, both in technical and financial terms. Therefore we share the Government of Yemen's concern over the future conservation of the Archipelago of Socotra, and its sustainable development, especially in view of the upcoming UNESCO World Heritage Site Nomination

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Signatories:

Name	Position	Signature
MARIO BOFFO	AMBASSADOR OF ITALY	

Sana'a, 18.02.2008

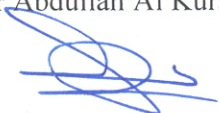
Fax: 00967-1-425309

Memorandum
on environmental road design and construction on Socotra

Further to the field visit to Socotra (April 27-30, 2007) of our advisors, Mr. Yahya Mohammad Al Ashwal (Ministry of Public Works and Highways) and Mr. Malek Ahmed Abdulaziz (EPA/Ministry of Water and Environment), together with their staff and road company representatives, we decide on the following points:

1. To update the 2002 Roads Master Plan by our two ministries jointly in consultation with the local authorities, taking into account the following points:
 - All future roads to be designed, with their proper standards.
 - Formulating a mechanism to follow up the construction of future roads including environmental mitigation measures to be implemented.
 - Determining locations of quarries and disposal areas.
 - Leveling and discipline the surplus cut material at road sides.
2. Roads should be designed to serve local communities without effecting the environment, in particular national parks and nature sanctuaries.
3. Environmental Impact Assessment studies should be part of any new design through an independent third party, mutually selected by our ministries.
4. We hereby instruct our respective advisors Mr. Yahya Mohammad Al Ashwal and Mr. Malek Ahmed Abdulaziz to follow-up the agreement.

Omar Abdullah Al Kurshumi



Minister of Public Works and Highways

Date: 5/6/2007

Abdul-Rahman F. Al Eryani



Minister of Water & Environment

Date: 5/6/7

Goats: part of the problem or the solution to biodiversity conservation on Socotra?

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Preface

This paper was prepared in response to the comments of the IUCN - World Heritage Site evaluation mission to Socotra island (November 2007). A common view on the importance and environmental impact of goats and other livestock in Socotra is presented by a team of ecologists, animal production scientists, and livestock herding practitioners with long-term first-hand experience on the island. They argue that whereas goats have a long term impact on the environment, goats are also of crucial importance to the island's largely pastoral population who depend on them for their livelihoods and basic nutrition. In the second part, a workplan is presented, comprising a series of ongoing and committed experimental and practical actions designed to provide an improved understanding of the complex grazing issue in the archipelago.



PART I. POSITION PAPER

Introduction

1. Review position of goats on islands:
 - a. Goats are considered amongst the most notorious invasive species on many islands (and indeed in several continental areas as well), driving species to extinction and / or leading to widespread habitat destruction (Campbell and Donlan 2005). On several islands throughout the world, including the Galapagos, eradication programs are under way to protect the natural environment against the devastating impact of goats (e.g. Campbell and Donlan 2004).
 - b. On Socotra, goats were probably introduced with the first people moving in, at least 2000 years ago, and have become an intrinsic part of the island's economic as well as natural environment. It remains a matter of speculation as to what the impact of their introduction on the Archipelago's ecosystem has been.
 - c. Probably triggered by the rapid land use changes of the second half of the 20th century, the 'goat problem', as perceived by many scientists and conservationists, started.

Social – Economic- Cultural dimensions of livestock on Socotra

2. Livestock on Socotra comprises, in order of numerical importance: goats, sheep, cattle, camel and donkey (see appendix for some recent estimations).
3. Goats, and too a lesser extent sheep and cattle, are the main source of economic production in rural (non-coastal) Socotra.
 - a. Without goats, people would not be able to continue to live in most of the rural areas: people "harvest the land" through their goats as there are very limited possibilities for other forms of agriculture.
 - b. They provide important nutritional improvements (Randolph *et al.* 2007)
 - c. People are strongly attached to their livestock, making it virtually impossible to exclude them from large areas of the island. This strong attachment to livestock has a historical and cultural dimension which goes beyond just viewing them as a source of nutrition. The position of goats on Socotra can in no way be compared with the situation on other islands (e.g. Galapagos) where they have been relatively recently introduced and are not so closely intertwined with local livelihoods.
 - d. Goat husbandry gets to the heart of what makes Socotra unique. The flora and vegetation in its present form on Socotra have survived because of traditional land management practices. The vegetation of Socotra today is a result of these practices – without goats it would look very different: **Socotra is not a "wilderness" island – but an island that has been shaped by man and his livestock. Exclude goats and you no longer have the essence of what makes Socotra special: the combination of endemic fauna and flora - and goats.** As such it serves as a rare reminder of how wildlife, people and their livestock can co-exist sustainably.

4. However, major developments in land use have taken place
 - a. Over the last few decades, there has been a trend for people to settle in towns and villages.
 - b. Increased land value and resulting division of land between tribes has resulted in an increase in land ownership conflicts. This has caused more pressure on some areas, and less movement of livestock.
 - c. The expanding network of tarmac roads has triggered a new type of movement of livestock undertaken by car. Little is known of its impact, but it is likely that the more accessible areas will experience an increased grazing pressure.
5. Changes in livestock husbandry techniques
 - a. Whereas in the past, breeding was prevented by "Al-Qasra" (temporarily preventing male sheep and goats breeding) or by "Al-khasii" (castration), these practices have become increasingly rare.
 - b. Previously, sheep were herded to an overnight compound; now they are left to roam.
 - c. Increasingly, livestock is held as capital (with income provided from other sources, e.g. fisheries).
6. Changes in rangeland management practises (see Morris 2002)
 - a. There is a decline in the practise of preventing grazing until after the onset of the rains, allowing it to recommence only after the grass has become established ("Nabituh" or "Qabiuh" practice).
 - b. Decline in areas grazed by sheep only (probably in line with the decline in numbers of sheep anyhow).
 - c. Deterioration of the "Al-Zuraeb" grazing system in the Haghier Mountains (enclosing pastures with stone walls).

Ecological dimensions

7. Goats have been on Socotra for at least 2000 years:
 - a. A number of endemic species (e.g. *Jatropha*, *Tephrosia*) are unpalatable or otherwise (e.g. *Dendrosicyos*) seemingly well adapted to grazing. Socotra also has endemic dung beetles. There is, therefore, reason to suspect that herbivory has been a phenomenon on Socotra for already considerable evolutionary time.
 - b. There seem to be some remaining 'wild goats' on Socotra, possibly descendents of the first introduced goats. It remains a matter of speculation as to whether the introduction of these goats coincided with the extinction of a native herbivore.
 - c. Some livestock specialists believe that limited goat grazing has some importance for the ecosystem on Socotra, such as seed distribution, creating patches in vegetation, trampling ('Savory effect'), but this probably only holds good for low and fluctuating populations.
 - d. Goats have contributed to the limitation of agriculture, a distinct advantage in this erosion-prone environment.
 - e. There is a fascinating evolutionary argument, related to cliff systems. It can be speculated that certain plant species (most notably frankincense trees) have evolved on cliffs because of higher available moisture

levels (i.e. fog) and because of grazing factors. Removing grazing pressure therefore removes an evolutionary driver.

8. Yet, despite the long presence of goats on Socotra, there are many ecological indications that they have an increasing impact on the environment, including:
 - a. Lack of regeneration of some of the most special and important tree species on the island (e.g frankincense, dragonblood). This holds for intensively grazed areas (e.g Homhill), but also in seemingly much less degraded environments (e.g. *B. elongata* in remote areas with low population densities).
 - b. Continued use of several threatened tree species (*Boswellia elongata*, *B. bullata*, *Cadaba insularis*, *Dendrosicyos socotrana* and even too some extent, although less than in the past, *Dracaena cinnabari*) resulting in severely damaged trees.
 - c. Suspected spread of unpalatable or un-preferred species (e.g. *Tephrosia apollinea*, *Senna holosericea*, *Solanum incanum*, *Asphodelus fistulosus* and *Calotropis procera*), pers. obs. Tony Miller.
 - d. Data from 354 km of transects on Socotra assessing bird populations, show that the highest densities of several species are found in areas with good grass cover (that is allowed to produce seed). Overgrazing, and not leaving patches of such suitable grass habitat is expected to have an impact on the numbers and distribution of the globally near-threatened Socotra Cisticola and Socotra Bunting.
9. The impact of goats on the vegetation of Socotra has long-term consequences for conservation. (note: dragon blood trees have a generation time of well over a century). **No plant species (and accompanying animal species) are under immediate threat because of goats.** Present livestock densities (see appendix) suggest a relatively low pressure (1 goat per 4 ha) that are approximately 10 times lower than the feral goat population on Pinta island (Galapagos) before eradication (Campbell and Donlan 2004). In other words, **although goat grazing may be the most important driver of environmental change on Socotra, this manifests itself principally in the long term.** In the short-medium term, outside drivers (including large infrastructures) may have a more lasting impact especially because of the accompanied changes in land use patterns – (for instance in case of the ring road). **We hypothesize that it is not the present (absolute) goat grazing pressure that has an impact on the biodiversity, but the increasingly reduced grazing dynamics (in space as well as in time):**

Reduced mobility, triggered by a more sedentary lifestyle and limited migration from the settlements.

- a. In Homhill, for example, people who in the past led a semi-transhumant way of life, have settled over the last decades. It is therefore no surprise that the local frankincense (*Boswellia elongata*) forest is aging in an unnatural way as shown by its skewed age-distribution (Peijnenburg 2007).
- b. In Eastern Skand, on the other hand, it is obvious that grazing pressure is declining as shown by the expansion of woody vegetation, sometimes completely covering old fields and habitation).

A comparative study conducted in two important rangeland areas, characterised by the same geo-pedological features, shows contrasting effects of the disruption of the transhumance system. In Momi (E.Socotra) the reduced migration and prolonged presence of livestock caused the widespread of plant species such as *Asphodelus fistulosus* and *Cynodon dactylon*, indicators of overgrazing. In the more isolated and less inhabited Ma'alah area (W.Socotra), the reduced grazing pressure has triggered the rapid expansion of shrubs, such as *Lycium sokotranus*, while the remnant grassland patches are characterised by presence of important fodder species, such as *Apluda mutica*, *Chloris virgata* and *Dichanthium annulatum*.

Reduced fluctuations of goat populations in time

- c. Goat populations have historically fluctuated dramatically, mainly as a function of rainfall. Major droughts, during which livestock populations most probably crashed, occurred in 1844, 1942-3 and 1954, and more recently 1972, 1976, 1981, 1984-5 and 1999 (De Geest et al. in prep).
- d. New developments and livestock management techniques have had a direct impact on the survival of goats and other livestock species during the dry season / droughts, most notably by :
 - i. water provision (e.g.. through water reservoirs that have a direct impact on surrounding rangelands)
 - ii. veterinary care
 - iii. supplementary fodder (sorghum-grains)
 - iv. Transporting animals by truck to other areas.

For the impact of these changes, a comparison is useful with Dhofar (Oman) with its comparable culture, language, environment and flora to Socotra. The vegetation of large parts of Dhofar has been devastated over the last 30 years, largely due to changes in land management practices – increases in water availability, veterinary services and supplementary fodder (Miller 1994). Admittedly this is also due to increasing numbers of cattle and camel but the message is the same: **It is not the presence of goats (or livestock) on the island that is the problem – it is the way they are managed.**

Grazing and livestock management

- 10. The Socotra Conservation and Development Program and the Socotra Conservation Fund have considerable experience with grazing and livestock management.
 - a. Exclosures Homhill, Dixam, Fermihin:
 - i. There have been long negotiations with local communities to establish these, complicated by claims of land ownership by neighbouring communities
 - ii. Employment of local guards has been necessary
 - iii. Yet still difficulties arise with individual goat and sheep keepers who regularly put their animals *inside* the exclosures

- b. We are aware, however, of the long time needed to show the impact of excluding goats (easily 20 years). From the Yemen mainland (Dhamar) there are disappointing experiences excluding sheep for over 15 years.
- c. We also have experience with mitigation measures, including establishing nurseries (for raising endemic species) and the planting of dragonblood seedlings in the Dixam enclosure.

11. Experiences of the SCF Community-Based Livestock Development and Marketing Improvement Project. This programme initially focused on animal health improvements, according to an overall action plan based on meetings with livestock herders across the island, concerning what they felt were the priority issues which needed addressing if they were to sustainably improve their livelihoods. Hence the overall work programme actually comprises four related components, namely:

- a. An animal health campaign to treat the two most prevalent health problems, internal parasites and worms and external parasites, which occur with most livestock on the island, with additional liver fluke in cattle. All these quite easily treated conditions nevertheless result in very low animal productivity, with animals continuously grazing rangeland but not converting this efficiently into live weight gain.
- b. Pilot trials exploring how local, endemic Socotran species and cultivars of fodder trees and shrubs and/or fodder crops such as sorghum, millet, elephant grass or alfalfa could be established on sites away from environmentally vulnerable areas, to maintain animal nutrition during periods of drought, whilst reducing pressures on overgrazed range.
- c. Evaluation, documentation and awareness-raising of traditional and rangeland conservation practices, given the worrying indications that the past ten years have seen the gradual abandonment of some of these practices as lifestyles change and animal herding families locate to the coast to earn money from fishing.
- d. Exploring the potential for pastoralists to move beyond subsistence herding, by exploring potential new markets so that they could remove excess, less productive animals from the flock, possibly even selling them to the 8,000 Socotrans in the Gulf who appreciate the unique taste of Socotran meat.

12. Future potential risks of intensifying animal husbandry

- a. Most livestock improvement measures aim at reducing fluctuations in livestock numbers. This might be beneficial for pastoralists in the short term, yet reinforces the pressure of goats on the environment (see also pt. 14b).
- b. An important concern is the potential use of veterinary drugs (e.g. antibiotics and ivermectin) on Socotra. Recently a link has been shown between Egyptian Vulture declines in Spain and the use of antibiotics Lemus *et al.* (2008). Socotra has an international responsibility for the globally Endangered Egyptian Vulture population, which is probably the highest in the world.
- c. It is therefore important that all animal drugs used on Socotra are vetted for possible unintended side-effects on wildlife; that any dead vulture, bird of prey or raven is collected for tissue analysis; and that

the method of application of ivermectin (if used) is regulated. SCF will use its influence and contacts with relevant authorities and pastoralists to sensitize them. Birdlife will assist EPA with the necessary wildlife monitoring including, if necessary, tissue analysis.

Direction for Solutions

13. Solution to the problem of lack of plant regeneration: Excluding livestock from certain areas and rangelands, but see limitations explained above.
14. Solutions to the lack of grazing dynamics (pt 9),
 - a. Reducing the number of goats and other livestock. Relevant to this are:
 - i. Providing alternative incomes for pastoralists
 - ii. Diversified production (e.g. using camels and donkeys for pack animals for tourists /
 - iii. Alternative money saving (banking instead of livestock as capital saving)
 - iv. Alternative sources of meat (e.g. chickens)
 - v. Regulate (and enforce) the maximum number of goats per household.
 - b. Taking goats off the range during droughts
 - i. Marketing for overseas markets, as foreseen by the SCF programme (11d), but then targeting a take off during droughts, is worthy of further investigation.
 - ii. Culling with compensation (the Australian way) could be considered.



**PART II. WORKING PROGRAMME ON GRAZING ON SOCOTRA
of the Socotra Conservation and Development Programme – Environmental
Protection Authority - Socotra Conservation Fund – Royal Botanic Garden
Edinburgh – La Sapienza University - Pavia University (2008 onwards)**

1. **Protection by excluding livestock: Action – Research** Exclosures ($>100\text{ m}^2$) have shown to be difficult to manage (see points above), yet potential exists in the :
 - a. Experimentation with small exclosures ($<1\text{ m}^2$) around individual tree seedlings already present (will start March 2008)
 - i. Selection of a number of pilot areas, based on ecological importance and (especially) existing grazing management practises (e.g. Qara, Homhill, Fermihin, Dexam, around Hadibu ?).
 - ii. In close consultation with local communities (men *and* women), identify important seedlings to be protected (possibly frankincense, ziziphus, maerua, etc.).
 - iii. Test a series of exclosure types (material, size, anchoring, mesh size, etc.).
 - iv. Implement in close collaboration with local communities (men *and* women), a series of protective exclosures in the selected areas with the selected species.
 - v. Develop and start implementing a simple programme to monitor the results of the exclusion.
 - vi. Expand into other areas, where relevant.
 - b. Planting and protection of existing endemic trees - shrubs on the edges of homegardens (ongoing, will be further taken up in collaboration with Triangle and Czech Brno university team)
 - c. In collaboration with honey project (late 2008 onwards), develop so-called ‘bee-gardens’ (areas surrounding bee hives protecting them from intruders, including goats).
2. **Ecological Research**
 - a. Dynamics of *Dracaena cinnabari* populations, a 50 years historic perspective, comparison between numbers and distribution in 1956 with present situation (ongoing, in collaboration with University of Durham and AREA). Targeted study areas are the same as those in the earlier study on the potential distribution as of 2080 due to climate change (Atorre *et al.* 2007).
 - b. Follow-up of a monitoring programme on vegetation change (ongoing, RBGE – SCDP- La Sapienza University).
 - c. Initiate a programme of bird population monitoring to integrate with that of vegetation monitoring.
 - d. Survey extent of changes to traditional management systems; canvas pastoralists for solutions.
 - e. Proposed research programme (initiated by RBGE in collaboration with several European universities as well as SCDP) on the importance of grazing versus climate to evolutionary processes on Socotra – through the Boswellia/cliff programme. This study aims at understanding the apparent increase in aridity on the island (Miller *et*

al.2003) and to support and underpin the programme of management of protected areas and the livestock programme with rigorous science research. (see also 2 c above)

3. Livestock surveys and management

- a. Assessment of livestock numbers and distribution including the percentage / number of feral goats, (ongoing SCDP-team) see appendix for data so far.
- b. Assess the presence and origin of the so-called wild goat: 'Tahr expedition', planned for March – April 2008.
- c. Implement the Cabinet Decree no. 49 of Feb. 12th 2008:
 - *Encourage all these associations to restore the seasonal movement (transhumance) of their livestock from the poorer rangelands to the richer rangeland areas, according to the original tradition of the Socotri people.*
 - *Encourage all these associations to establish farms for their livestock, located outside of the World Heritage site, through a program that supports the additional balanced feeding of livestock. This should be done in order to (a) increase the productivity and the level of marketing value of livestock, and (b) allow the export and sale within and outside of the island, (c) increase the income for the poorest among the local people, and (d) reduce the pressure on the rangeland within the WHS areas.*
 - *Encourage the associations to agree on the limits on the number and species of livestock that each association can raise on natural rangeland. In case such limits were to be exceeded, any excess livestock should be removed and transferred to the fattening farms that are to be located outside of the WHS area.*
 - *Directing the local authorities to allow the export of slaughtered or live livestock, under the supervision and authorization of the specialized veterinary authorities.*
- d. Design an insurance system that allows pastoralists to destock in times of drought (analogy to Australian graziers who are compensated culling their sheep, thus saving the rangelands as well providing a minimum income to the grazer and his family).
- e. The SCF animal health component will extend this year to reach areas where many of these animals invariably mix and graze together with animals from other areas each season, dependant on the variable rainfall patterns, which determine where good pasture is available. This is because these other pastures will also be contaminated with the same endo and ecto parasites so it is important to treat all animals. SCF will also work closely with SCDP to monitor the effects of these activities on the rangelands during this pilot phase.
- f. Herders will be organized into a recognizable and formal association with clear and agreed upon objectives and guidelines to maintain the program and to ensure self regulation that will prevent any negative impact on the environment and its biodiversity.
 - i. A coordinated effort by SCF and SCDP will initiate the establishment of herder associations along the lines of tribal

divisions and relations. Each association will have an elected management committee that will be responsible for the implementation of agreed plans for animal health, production, rangeland conservation and marketing.

- ii. Each association will document the traditional management and grazing system in its area and ensure its continuation or, if this is considered no longer practical, to devise, agree and thereafter enforce local regulations, so as to mitigate any negative impact that the discontinuation of such traditional systems might have on the environment.
 - iii. The associations will regulate the number and composition of the herds/flocks that each member of the association could have in relation to the condition of the rangeland. Any more animals above that should be moved to holding farms outside the world heritage area for possible marketing.
 - iv. Every association will be sensitized for the risk of potentially damaging animal drugs.
 - v. Every association will be encouraged to set up holding/fattening farms in carefully selected areas to move surplus animals away from natural rangelands for marketing inside or outside the island.
 - vi. A union of herder associations will be established, with clear and agreed upon functions, to supervise and promote appropriate management system that will ensure more income for Socotran herders, healthier herds and more sustainable rangeland.
4. **Land use and land tenure issues.** At the base of any grazing research is the need to further understand land use and land tenure issues on Socotra, based on Morris (2002).
- a. Assess changes to traditional practices (see Morris 2002): only by understanding the past can we truly see how things are changing and how we can put them right.
 - b. Survey extent of changes to traditional management systems; canvas pastoralists for solutions.
5. **Integration and modelling.** Parallel to the field-based actions and research presented above, efforts will be undertaken to model the physical and ecological parameters of the island. This should provide further insight into the hypotheses regarding the spatial and temporal dynamics of livestock populations on Socotra. A start will be made with a hydrological model that quantifies the water balance in relation to the main soil types of Socotra. The model belongs to process-based models of deterministic type and has been written by using STELLA Research 7.0 (ISEE systems) an object-oriented software, which allows the drawing together of several modules interacting by functional links. In particular, this hydrological model can be used for each soil type on Socotra and then geographically represented by using GIS techniques.

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Appendix

1. Livestock numbers (Brown 1966, cited in Naumkin 1993), (observations Naumkin).
 Camel: 350 (larger)
 Cattle: 1800, except 150 all others in Hagghier (number outside Hagghier now higher)
 Goat: 19 000 (population has increased, more numerous than sheep)
 Sheep: 26 000 (population has declined)
 Donkey: 500
2. Estimations, 1999: 220 000, before the drought estimation by SCDP extension officers
3. Present estimations, assessed by road counts during the dry season suggest a number of goats of approximately 50 000. Compared to the numbers of livestock treated by SCF (Nov-Dec-07: Dixam: 15 481 goats, 5 346 sheep; Qara: 14 612 goats, 1 149 sheep) this seems to be an underestimation, as the number of goats is estimated at around 100 000 (SCF-pers.comm). The survey is limited only to the first road census and it is not an average estimate for the whole dry season. The values of livestock density, in dry season as well as after the rain period, will be more accurate including in the calculation all the censuses. In addition data collected with the road census with line-transects in areas not covered by roads, such as the mountain areas.