



11th Conservation Workshop for the Fauna of Arabia

and

First Conference on Biodiversity Conservation in the Arabian Peninsula

Sharjah,
United Arab Emirates

January 31 - February 4, 2010



2010 International Year of Biodiversity

Proceedings of

11th Conservation Workshop for the Fauna of Arabia
and
**First Conference on Biodiversity Conservation in the
Arabian Peninsula**

Sharjah, United Arab Emirates

January 31 - February 4, 2010

Edited by

Philip Seddon¹ and Kevin Budd²

Organised by

Environment and Protected Areas Authority (EPAA)
Government of Sharjah, United Arab Emirates

¹ Department of Zoology, University of Otago
PO Box 56, Dunedin, New Zealand
Email: philip.seddon@stonebow.otago.ac.nz

² Breeding Centre for Endangered Arabian Wildlife
Po Box 29922, Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

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Conservation Workshop for the Fauna of Arabia

Red List Training Workshop

Caroline Pollock¹, Rebecca Miller¹ &
David Mallon²



¹ IUCN Species Survival Commission Red List Unit, Cambridge, United Kingdom

² IUCN/SSC Antelope Specialist Group, Manchester, United Kingdom



Conservation Workshop for the Fauna of Arabia IUCN Red List Training Workshop

Workshop venue: University of Sharjah, United Arab Emirates
Time and date: 09:00 – 17:30, Sunday 31st January & Monday 1st February, 2010

Workshop objectives:

1. To improve understanding of the meaning of the terms used in the IUCN Red List Categories and Criteria.
2. To provide training on how to produce good-quality assessments suitable for inclusion in the *IUCN Red List of Threatened Species*TM.
3. To provide training on how to apply the IUCN Red List Categories and Criteria for regional level assessments to produce good-quality assessments suitable for inclusion in a regional or national Red List.

PROGRAM

Day 1 - Sunday, 31 January 2010	
0800-0850	<i>Registration</i>
0900-0910	Welcome and Opening <i>Mr Abdulaziz Al Midfa, Environment and Protected Areas Authority</i>
0910-0920	Introduction to 2010 Themes and Break <i>Dr Philip Seddon</i>
0920-0930	Welcome and introductions <i>Caroline Pollock, IUCN Red List Unit</i>
0930-0950	A brief history of IUCN's red listing work and the role of the Red List Unit <i>Rebecca Miller, IUCN Red List Unit</i>
0950-1100	The IUCN Red List Categories and definitions of terms used in the criteria <i>Caroline Pollock, IUCN Red List Unit</i>
1100-1130	<i>TEA/COFFEE BREAK</i>
1130-1230	The IUCN Red List Criteria and thresholds <i>Rebecca Miller, IUCN Red List Unit</i>
1230-1300	Practical session 1: global assessments. <i>Applying the IUCN Red List criteria for global-level Red List assessments (based on case studies provided by IUCN)</i>
1300-1400	<i>LUNCH</i>
1400-1430	Reports back from working groups and discussion
1430-1500	Using the IUCN Red List Criteria for regional and national Red List assessments <i>Rebecca Miller, IUCN Red List Unit</i>
1500-1530	Practical session 2: regional assessments. <i>Applying the IUCN Red List criteria for regional- or national-level Red List assessments (based on data brought to the workshop by participants)</i>
1530-1600	<i>TEA/COFFEE BREAK</i>
1600-1645	Practical session 2: regional assessments (continued).
1645-1730	Reports back from working groups and discussion
1730-1740	<i>Day 1 Closing</i>

DAY 2 - Monday, 1 February 2010	
0830-0900	<i>Registration continues</i>
0900-0930	Open plenary session: any issues from day one that need to be revisited?
0930-1100	Introduction to the IUCN Species Information Service (SIS) <i>Caroline Pollock, IUCN Red List Unit</i>
1100-1130	TEA/COFFEE BREAK
1130-1300	Practical session 3: regional assessments (continued). <i>Applying the IUCN Red List criteria for regional- or national-level Red List assessments (based on data brought to the workshop by participants).</i>
1300-1400	LUNCH
1400-1430	Open plenary session: any further issues needing discussion?
1430-1530	Practical session 3: regional assessments (continued).
1530-1600	COFFEE BREAK
1600-1630	Practical session 3: regional assessments (continued).
1630-1730	Reports back from working groups and discussion: each working group to report back to plenary on their assessments carried out today and difficulties encountered.
1730-1740	Red List Summary <i>Caroline Pollock & Rebecca Miller</i>
1740-1750	GIS Summary <i>Dr Stephen Holness</i>
1750-1800	Closing and Thanks <i>Mr Abdulaziz Al Midfa</i>

Process

The training was led by Caroline Pollock and Rebecca Miller of the IUCN Red List Unit. The format of the workshop consisted of a series of presentations, practical sessions in small groups, report-backs and general discussion.

Results

Presentation 1: The IUCN Red List

Contents: Introduction to IUCN - members, the six commissions, secretariat; Species Survival Commission (SSC), SSC Steering Committee, and Specialist Groups; history of the IUCN Red List; the Red List Unit – role and responsibilities; Red List Index; Global Species Assessments; regional initiatives.

Presentation 2: Introduction to the IUCN Red List process

Contents: Introduction to the IUCN Red List Categories and Criteria; scope of application; structure of the categories; types of data required; concepts and definitions; key terms; the IUCN Red List Criteria – criteria, subcriteria and thresholds.

Practical session 1: Applying the IUCN Red List Criteria for global-level Red List assessments

Participants divided into six working groups to carry out global-level Red List assessments using a set of 12 case studies provided by IUCN. The case studies were for species that are unlikely to be familiar to the workshop participants. The aim of this exercise was to allow participants to become more familiar with the IUCN Red List terminology and gain a better understanding of the application of the Red List Categories and Criteria.

Report back and discussion:

Each group presented their assessments, followed by comments and discussion of any issues or difficulties with applying the Red List criteria.

Presentation 3: Using the IUCN Red List Criteria for regional and national Red List assessments

Contents: Scales of regional assessments - continent/country/province, etc; additional categories for regional assessments; applicable and non-applicable taxa for regional assessment; process for carrying out regional assessments, taking into account events outside of the region that may affect taxa within the focal region; worked through examples.

Practical session 2: Applying the IUCN Red List Criteria for regional- or national-level Red List assessments

Participants divided into five working groups to carry out regional assessments of taxa they had selected themselves, including species of crocodile, fish, birds and mammals.

Participants' own knowledge of these taxa was used to practice assessments at the regional level.

Report back and discussion:

Each group presented their assessments, followed by comments and discussion of any issues or difficulties with applying the Red List criteria for regional-level assessments.

Plenary session: Navigation of the IUCN Red List website

This was an additional session held at the request of the workshop participants who felt they needed some guidance on how to use the IUCN Red List web site. The live web site was displayed and participants were taken through all of the search and data export functions.

Summary and discussion:

A final summing-up session and questions. In this session, the participants showed an eagerness to put their training in to practice in future by working towards updating Red List assessments for native species on the Arabian Peninsula.

All participants were given a certificate of attendance, and a CD containing:

- Red List Criteria summary
- IUCN Red List Categories and Criteria. Version 3.1 (English version)
- IUCN Red List Categories and Criteria. Version 3.1 (Arabic version)
- Guidelines for using the Red List Categories and Criteria. v.7.0
- Guidelines for Application of the IUCN Red List Criteria at Regional Levels
- Documentation Status and Consistency Checks for Red List Assessments
- Three training presentations
- Case studies and answers

Participants

Abi-Said, Mounir Rachid
American University of Beirut
Beirut, Lebanon
Email: mabisaid9@gmail.com

Abtin, Elham
Department of the Environment, Sistan &
Baluchestan Office
Zabol, Iran
Email: ala_saly@yahoo.co.uk

Al Dosary, Mubarak
Public Commission for the Protection of Marine
Resources, Environment and Wildlife
Manama, Bahrain
Email: mubarak_aldosary@hotmail.com

Al Hashmi, Ahmed
Emirates Marine Environment Group
Dubai, United Arab Emirates
Email: buhumban@hotmail.com

Al Jumaily, Masa'a Mahdi
Sana'a University
Sana'a, Yemen
dr.masaa@hotmail.com

Al-Mahdhoury, Saleh Siad
Office for conservation of the Environment, Diwan
of Royal Court
Muscat, Oman
Email: almahdhoury@hotmail.com

Al Nabhani, Hilal Bin Mohammed
Ministry of Environment & Climate Affairs
Muscat, Oman
Email: nabhani-h@hotmail.com

Al Omari, Khaldoun
IUCN Regional Office for West Asia
Amman, Jordan
Email: khaldoun.alomari@iucn.org

Al Rasbi, Khalid Juma Mohammed
Omani Wild Animals Breeding Centre
Muscat, Oman
Email: tayamooo@hotmail.com

Alsafran, Salem Hussain
Minsitry of Environement
Doha, Qatar
Email: shsafran@moe.gov.qa

Al Sagheer, Omar Ali Saeed
Yemen Society for the Protection of Wildlife,
Sana'a, Yemen
Email: omar.alsaghier@undp.org

Al Shamlan, Mohammad Mubarak
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: MS_2041080014@hotmail.com

Alsharif, Hassan Zain Ahmed Mohammed
Dubai Municipality
Dubai, United Arab Emirates
Email: hzain1982@gmail.com

Alshehi, Hamed
Hamra Municipality
Sharjah, United Arab Emirates

Al Suwaidi, Hana Saif
Environment and Protected Areas Authority
Sharjah, United Arab Emirates
Email: epaa@epaashj.ae

Ashour, Mohamed Aladin
Public Commission for the Protection of Marine
Resources, Environment and Wildlife
Manama, Bahrain
Email: mashour@batelco.com.bh

Behbehani, Salah
The Scientific Centre Management Company
Kuwait City, Kuwait
Email: salah@tsck.gov.kw

Bell, Stephen
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: stephen.bell@emirates.com

Boug, Ahmed
National Wildlife Research Centre
Taif, Saudi Arabia
Email: boug2010@gmail.com

Budd, Jane
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: jane.budd@bceaw.ae

Hamidan, Nashat Abdul Fattah
The Royal Society for the Conservation of Nature
Amman, Jordan
Email: nashat@rscn.org.jo

Hammer, Catrin
Al Wabra Wildlife Preservation, Qatar
Doha, Qatar
Email: awwp.mammal@alwabra.com

Khassim, Ali
Environment Protection and Development
Department
Fujairah, United Arab Emirates
Email: engali6299355@yahoo.com

Korshunov, Vladimir
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: korshunvlad@mail.ru

Mobaraki, Asghar
Department of the Environment
Tehran, Iran
Email: amobaraki@yahoo.com

Mohana, Hussain Ali
Ministry of Health
Manama, Bahrain
Email: Hhumood@health.gov.bh

Resueno, Annabel Dimapilis
The Scientific Centre Management Company
Kuwait City, Kuwait
Email: annabel@tsck.gov.kw

Roosenschoon, Peter
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: warthogg10@yahoo.com

Sambas, Anas Zubeir
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: newlook01@gmail.com

Seddon, Philip
Zoology Department, University of Otago
Dunedin, New Zealand
Email: philip.seddon@stonebow.otago.ac.nz

Serhal, Assad
Society of the Protection of Nature in Lebanon
Beirut, Lebanon
Email: spnlorg@cyberia.net.lb

Shobrak, Mohamed
Taif University
Taif, Saudi Arabia
Email: mshobrak@gmail.com

Sobhan, Istiak
Dubai Municipality
Dubai, United Arab Emirates
Email: istiak_sobhan@yahoo.com

Soroor, Doaa Hamdi
Ministry of Environment & Water
Dubai, United Arab Emirates

Swanson, William
Centre for Conservation and Research of
Endangered Wildlife
Cincinnati, United States of America
Email: bill.swanson@cincinnati.org

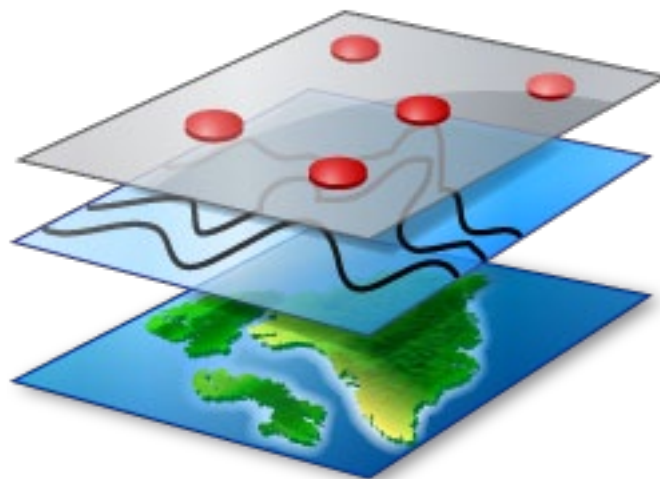
Yamani, Mariam Saeed

Yacoub, Moayad
Emirates Environmental Group
Dubai, United Arab Emirates
Email: eeg@emirates.net.ae

Conservation Workshop for the Fauna of Arabia

GIS & Systematic Conservation Planning Workshop

Stephen Holness^{1,2}, Mark Sorensen³, Mike Knight^{1,2} &
Yasser Ramadan Ahmed Othman³



¹ Park Planning and Development, South African National Parks, Port Elizabeth, South Africa

² Centre for African Conservation Ecology, Zoology Department, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa

³ Environment Agency, Abu Dhabi



Conservation Workshop for the Fauna of Arabia GIS & Systematic Conservation Planning Workshop

Workshop venue: University of Sharjah, United Arab Emirates
Time and date: 09:00 – 17:30, Sunday 31st January & Monday 1st February, 2010

Workshop objectives:

1. To collate and review the available biodiversity GIS data for the Arabian Peninsula.
2. To evaluate this data in terms of the requirements for a rapid systematic conservation assessment for the Arabian Peninsula.
3. To chart a way forward for the development of a rapid systematic conservation assessment

PROGRAM

Day 1 - Sunday, 31 January 2010	
0800-0850	<i>Registration</i>
0900-0910	Welcome and Opening <i>Mr Abdulaziz Al Midfa, Environment and Protected Areas Authority</i>
0910-0920	Introduction to 2010 Themes and Break <i>Dr Philip Seddon</i>
0920-0930	Welcome and introductions <i>Dr Mike Knight, South African National Parks</i>
0930-0950	Introduction to the purpose of the workshop <i>Dr Stephen Holness, South African National Parks</i>
0950-1100	Review of GIS data (including data brought to the workshop by participants) <i>Mark Sorensen & Yasser Ahmed Othamn, Environment Agency - Abu Dhabi</i>
1100-1130	<i>TEA/COFFEE BREAK</i>
1130-1230	Refinement of GIS data such as species distributions <i>Mark Sorensen & Yasser Ahmed Othamn, Environment Agency - Abu Dhabi</i>
1230-1300	Systematic conservation planning: Introduction, examples and data requirements <i>Dr Stephen Holness, South African National Parks</i>
1300-1400	<i>LUNCH</i>
1400-1430	Review sessions on specific inputs into conservation planning: Biodiversity data, habitat maps
1430-1530	Review sessions on specific inputs into conservation planning: Biodiversity data, species distribution data
1530-1600	<i>TEA/COFFEE BREAK</i>
1600-1630	Review sessions on specific inputs into conservation planning: Biodiversity data, additional expert inputs
1630-1700	Review sessions on specific inputs into conservation planning: Transformation and threat data, data on extent of transformation and degradation of intact natural habitats
1700-1730	Review sessions on specific inputs into conservation planning: Protected Area data, extent and type of protected areas
1730-1740	<i>Day 1 Closing</i>

DAY 2 - Monday, 1 February 2010	
0830-0900	<i>Registration continues</i>
0900-0930	Review of day one: What have we got & are there any issues from day one that need to be revisited?
0930-1100	Conservation planning process, further discussion and interrogation: features, targets, planning domain
1100-1130	<i>TEA/COFFEE BREAK</i>
1130-1300	Conservation planning process - discussion and interaction on draft products
1300-1400	<i>LUNCH</i>
1400-1430	Open plenary session: any further issues needing discussion?
1530-1600	<i>COFFEE BREAK</i>
1600-1630	Discussion on way forward and inputs into the conference presentation
1730-1740	Red List Summary <i>Caroline Pollock & Rebecca Miller</i>
1740-1750	GIS Summary <i>Dr Stephen Holness</i>
1750-1800	Closing and Thanks <i>Mr Abdulaziz Al Midfa</i>

Introduction

Geographical Information Systems (GIS) based systematic conservation planning can form the basis for prioritizing conservation implementation in a strategic and efficient way. This planning process has been successfully applied and refined in areas and habitats as diverse as the Cape Floral Kingdom, Grasslands, Forests and Succulent Deserts of Southern Africa; the rainforest of the Amazon and Papua New Guinea; marine areas of California, South Africa and Australia; and freshwater systems in South Africa and the USA (Margules & Pressey 2000; Pressey & Taffs 2001; Desmet *et al.* 2002; Nel *et al.* 2007; Klein *et al.* 2008). The opportunity exists to rapidly utilize international best practice in systematic conservation planning in the Arabian Peninsula, and avoid having to re-invent the methodologies developed over the last 15 years.

Conservation within the Arabian Peninsula has focused to date on protecting iconic species such as the Arabian Oryx and Arabian Leopard. Although there have been significant successes in these conservation efforts, this has generally been based on an ad hoc approach to prioritizing conservation actions spatially. Further, little effort has been put into understanding the conservation context across national boundaries. Previous CAMP meetings identified the need to develop an understanding of spatial conservation priorities within the Arabian Peninsula (Knight 2008; Seddon *et al.* 2009). In particular, the previous meetings had identified the requirement to understand where (and if) conservation priorities exist that cross national boundaries which may be best addressed in a Transfrontier Conservation Areas approach. Therefore a GIS and systematic conservation planning workshop was held as part of the First Conference on the Conservation of Arabian Fauna.

This document outlines the concept and benefits of systematic conservation planning, reports on the aims, process, data, analyses and initial outputs of the GIS and systematic conservation planning workshop, and charts the way forward for developing a more robust assessment for the Arabian Peninsula.

What is systematic conservation planning?

Systematic conservation planning aims to identify areas of greatest importance for conserving biodiversity in a transparent and scientifically robust manner. The process often seeks to identify optimal areas for expanding a protected area network, but can also be aimed at prioritizing areas for a range of other conservation measures such as stewardship, resource protection measures such as controls on fishery methods, or land-use controls such as zoning. Margules and Pressey (2000) identify six stages in systematic planning:

1. Compile data on the biodiversity of the planning region. Generally spatial data is collated within a GIS system on biodiversity features within a planning domain. These features can include both ecological pattern (e.g. the distribution of a particular vegetation type or species) and process (e.g. areas required to support long term ecological processes such as riparian corridors (such as wadis) or areas required for climate change adaptation).
2. Identify conservation goals for the planning region. Systematic conservation planning relies on the defining of explicit conservation objectives for a planning region. Preferably, these are quantitative targets (These are often expressed in terms of an area required for a particular habitat type, minimum viable population sizes for focus species, proportions of areas that need to be maintained to keep ecological processes functioning etc.).
3. Review existing conservation areas. The systematic conservation planning process will typically compare the features that are conserved within the existing reserve network against the conservation goals or targets for the region, and clearly identify where sufficient areas are already conserved, and where additional areas are required.
4. Select additional conservation areas. In this step conservation planning tools such as MARXAN or CPlan are typically applied to help identify an efficient set of areas required to meet the remaining biodiversity targets that are not sufficiently conserved in the existing reserve network. Although these tools are typically applied to facilitate the process, it is not necessarily a requirement that they are used. Importantly, systematic planning processes generally strive to identify an efficient network of additional areas that meet the targets at minimal cost (e.g. in the smallest area possible or at least disruption to other sectors). This stage also strives to identify priority areas in a layout that makes most sense ecologically or from a management perspective (e.g. areas adjacent to existing protected areas or within corridors may be favoured.).
5. Implement conservation actions. In this step the identified areas are subject to appropriate conservation action (e.g. reserve expansion, stewardship, and zoning).
6. Maintain the required values of conservation areas. This stage examines whether the existing and new conservation areas are indeed meeting their conservation mandate and are sufficiently protecting the biodiversity features found within them.

These steps are overlapping, interlinked and iterative. Conservation planning processes should be embedded within an adaptive management framework and should be designed in a way that allows for continued improvement and refinement i.e. learning by doing.

What are the potential benefits of systematic conservation planning:

Systematic conservation planning has demonstrated a range of benefits in other areas where it has been applied. These include:

- Systematic conservation planning provides **efficient spatial solutions to resource allocation problems**. This efficiency can be seen in terms of spatial efficiency (i.e. the ability to meet conservation or protection targets in the smallest possible area), cost efficiency (i.e. meeting the targets in a least cost design) and/or efficiency in minimizing spatial conflict with other land use activities.
- Systematic conservation plans provide an **integrated view of spatial priorities**; across sectors, agencies and non-governmental organizations. Having a map of identified priorities can serve a strong focus for strategic planning and interventions. It is particularly useful in focusing interventions into areas where conservation objectives for a variety of different species can be met (e.g. areas may exist where shorebirds, dugongs and terrestrial priority species may be conserved in a single linked reserve covering a variety of habitats).
- A systematic conservation plan can play a powerful role in **integrating conservation effort** by different specialists. The process requires integration of information from the full range of specialists (across all biodiversity groups). This cooperation is useful in forming the basis for other cooperative/integrative activities.
- Systemic conservation planning is heavily focused on ecological processes. This makes it possible to deliberately **plan for and accommodate climate change** in the planning process.
- The systematic planning process **makes best use of available data**. There is no point in having large datasets (e.g. point data for specific species) collected at great expense if these data are not integrated and assessed. Although this is not the only method for integrating different spatial biodiversity datasets, it is a robust method to do this.
- The spatial biodiversity datasets collated for a systematic conservation plan can **serve as a basis for other biodiversity planning and assessment processes**, e.g. a base habitat map may be extremely useful for species distribution modeling or the identification of Important Plant Areas.
- A target driven systematic planning process forms a **solid conceptual and operational basis for reporting** on the state of the environment at any scale. Both the specific tools (e.g. Marxan or CPlan) and the underlying concept (quantitative review against set targets) form a natural basis for the monitoring and evaluation portions required for the adaptive management of biodiversity.
- The systematic conservation planning process is very powerful in **identifying real as opposed to perceived priority areas** and features. In areas with limited resources available for conservation activity, or strong competing sectors, it is important that the priorities are correctly and transparently identified.

Aims:

The workshop planned to explore whether it would be possible to conduct a rapid systematic conservation assessment for the Arabian Peninsula. In order to do this, the workshop aimed to:

- To collate and review the available biodiversity GIS data for the Arabian Peninsula.
- To evaluate this data in terms of the requirements for a rapid systematic conservation assessment for the Arabian Peninsula.
- To chart the way forward for the development of a rapid systematic assessment.
- To develop an illustrative conservation assessment for the Arabian Peninsula that would demonstrate the potential application of the planning process.

Importantly, there were also a number of less specific/technical aims of the workshop, namely:

- Expose the participants to the logic and application of systematic conservation planning.
- Illustrate the potential benefits of sharing spatial data on biodiversity across the region.

Process:

The workshop was attended by 29 invited GIS users and others with knowledge of spatial patterns of biodiversity across the Arabian Peninsula. There were representatives from all countries of the Peninsula, except for Kuwait. Workshop participants were requested to bring spatial data on Protected Areas, habitats or vegetation, the distribution of special species, land transformation, and identified priority areas for conservation (e.g. Important Bird Areas (IBAs)). The data were supplemented by various species and protected area data collated by Kevin Budd from the CAMP meetings held in preceding years.

The workshop went through the following process:

- Dr Stephen Holness outlined what a systematic conservation planning process entails, the value it can add, and detailed recent examples from Southern Africa.
- Mr Mark Sorensen led a rapid assessment of the state of GIS biodiversity data and GIS use across the Arabian Peninsula. This was aimed at reviewing the available biodiversity GIS data for the Arabian Peninsula.
- Dr Stephen Holness reviewed the data against the requirements for a rapid systematic conservation assessment for the Arabian Peninsula. In particular this focused on the data requirements for a conservation plan including habitat maps, species distribution data, other biodiversity data, transformation, threat data and protected area data.
- The data from participants and data gathered beforehand was compiled into a compatible GIS format, and fed into a trial MARXAN conservation planning run.
- Participants then interacted with the initial conservation planning outputs, and explored how to add data into the system and the outputs of the model respond to changes in the inputs (e.g. changing targets or adding additional species).
- The initial workshop outputs were presented at the main conference, and a way forward was charted for a rapid systematic conservation assessment for the Arabian Peninsula.

Datasets:

The following datasets were used in the conservation planning process:

Base habitat map. An integrated base habitat map represents the framework around which a conservation plan is built. The workshop identified that a habitat map of sufficient quality for assessments does not currently exist. Marine habitat data especially were lacking, with the exception of Abu Dhabi Emirate, however given the general unavailability of marine habitat information, this important area was not addressed in this exercise. The WWF Ecoregions map is the best available for the whole region, and was used in the assessment. More detailed habitat maps were available for Jordan, and these were included as additional features in the assessment. Possibilities exist for the creation of an integrated habitat map through the extension of the soon to be available “ecotype” map for Saudi Arabia, as well as potential collaboration with the Important Plant Areas Program (for inputs from Yemen and Oman). The assessment used 12 WWF Ecoregions and 13 habitat units from Jordan.

Species data. Species data compiled by CAMP and other processes have given us good data on fish, larger mammals and reptiles. The data included distributions for 36 snake species, 14 mammal predators (e.g. Arabian Leopard and Sand Cat), 6 endemic fish, and 2 charismatic and endemic Arabian Peninsula herbivores (i.e. Arabian Oryx and Arabian Tahr). It is recognized both that this dataset is incomplete in terms of the number of species included, and that the accuracy of the distribution data is variable. This dataset needs to be refined and extended, systematic criteria need to be utilized to identify which species are included in the analysis (e.g. only internationally Red Listed Species of Vulnerable, Endangered or Critically Endangered status).

Ecological process data. No data on ecological processes (e.g. wadi systems, ecotones, climate change corridors) was included in the workshop assessment. This is a major gap which would need to be fixed in order to identify a set of priority areas that are likely to be persistent in the long-term.

Other priority areas. Data on Important Bird Areas (IBAs) in the Arabian Peninsula and more detailed data from Jordan were included in the analysis. The Conservation International Horn of Africa hotspot was also included. Areas identified as being important for protected area expansion were included from Jordan and Saudi Arabia. In Jordan these areas were focused on climate change connectivity between existing reserves, while the Saudi Arabian dataset was focused on sites identified to improve the representivity of the existing reserve network.

Protected Areas. The existing database available for the area (the IUCN World Database on Protected areas) was found to be both inaccurate and incomplete. More importantly, large areas that do not necessarily have protected area status (e.g. the Empty Quarter of Saudi Arabia which only has a hunting ban) were included in the World Database. The workshop was used to compile a significantly improved integrated layer of Protected Areas for the Arabian Peninsula.

Transformation data. Good quality transformation data for the Arabian Peninsula were not generally available for the assessment, although it is known that such data exist for many of the countries involved, but use of such information would involve engagement of authorities beyond those present at the workshop. The 1 km² Global Landcover dataset was used for the workshop assessment. Because of its known inaccuracy, it was not used to determine where habitat and other biodiversity features remain intact, but rather as a cost surface to push selected areas away from those with conflicting landuse. This is an area where the trial assessment would need to be significantly improved.

Analyses:

The data were compiled in ArcView 3.2 and ARCGIS 9.3.1. Marxan (Ball & Possingham 2000, Possingham et al. 2000) was used for the conservation planning analysis. The CLUZ front end program for MARXAN written by Bob Smith was used to facilitate the data inputting process. This analysis was primarily done to explore the data and demonstrate the usefulness of the systematic planning process, rather than to identify a definitive set of priority areas, due to the incompleteness and accuracy of the underlying datasets. Hence, the details of the analysis are not important, but nevertheless, the basic detail of technical aspects of the process is outlined here.

Targets of 30% of original area were used for most vegetation types. Targets for vegetation types with limited extents (e.g. Deciduous Oak Forest, Evergreen Oak Forest and Juniper Forest) were determined on the following basis. If the extent of the vegetation type was under 25 000 ha, then the full extent was set as the target. Where 30% of the vegetation type area was under 25 000 ha, and the original extent of the vegetation type was over 25 000 ha, then a target of 25 000 ha was used. Identified priority areas such as IBAs were forced into the design by setting an 80% target for these areas. Species targets were determined on the basis of the extent of the distribution of that feature, with lower percentage area targets being set for species with wide distributions and higher percentages used for species with limited distributions¹. The distribution of the most widespread species was used as the benchmark.

A cost-surface was prepared to push selected areas away from areas with transformation and competing land-uses. The basic cost was set at the area of each planning unit in hectares. Costs for transformed areas were increased by 100x this base value. Costs in a 5 km buffer around transformed areas were increased by 10x, within a 10 km buffer they were increased by 5x, and within 20 km they were doubled. The total cost for a planning unit was determined by an area weighted mean of these values.

The 'spf' values were set very high at 10000000 to force selection of areas required to meet targets for all features. Boundaries of planning units were determined in meters. The boundary length modifier was set at 1 following an iterative process to explore values which led to an appropriate level of clumping of selected features in the landscape.

Preliminary Outputs:

The initial outputs from the conservation planning workshop are shown in Figure 1. Note that this assessment should be used with extreme caution as the underlying datasets are incomplete. Much of the point of the exercise was to illustrate that the process was possible for the Arabian Peninsula. Nevertheless, the model does highlight some priority areas which are likely to be robust to the addition of more complete species data and better transformation data. Identified priorities include:

¹ The targets were calculated with the formula $50\% - (30 \times \text{Total distribution of a species (ha)} / \text{Total distribution of the most widespread species (ha)})$. This gives an effective target of 20% for the most widespread species and approaching 50% for species with limited distributions. Similar to the process used for plants, where the identified target was under 25 000 ha the target was increased to the highest possible of 25 000 ha or the extent of the distribution of that feature.

- A chain of high priority areas along the western escarpment of Jordan, Saudi Arabia and Yemen.
- A chain of priorities along the South Eastern coastal areas of Yemen and Oman.
- A crescent of high priority mountainous habitat mostly in northern Oman focused on Arabian Tahr habitat as well as some endemic fishes.
- Inland priorities exist in Oman and Saudi Arabia around the Oryx Reserve and the Empty Quarter respectively.

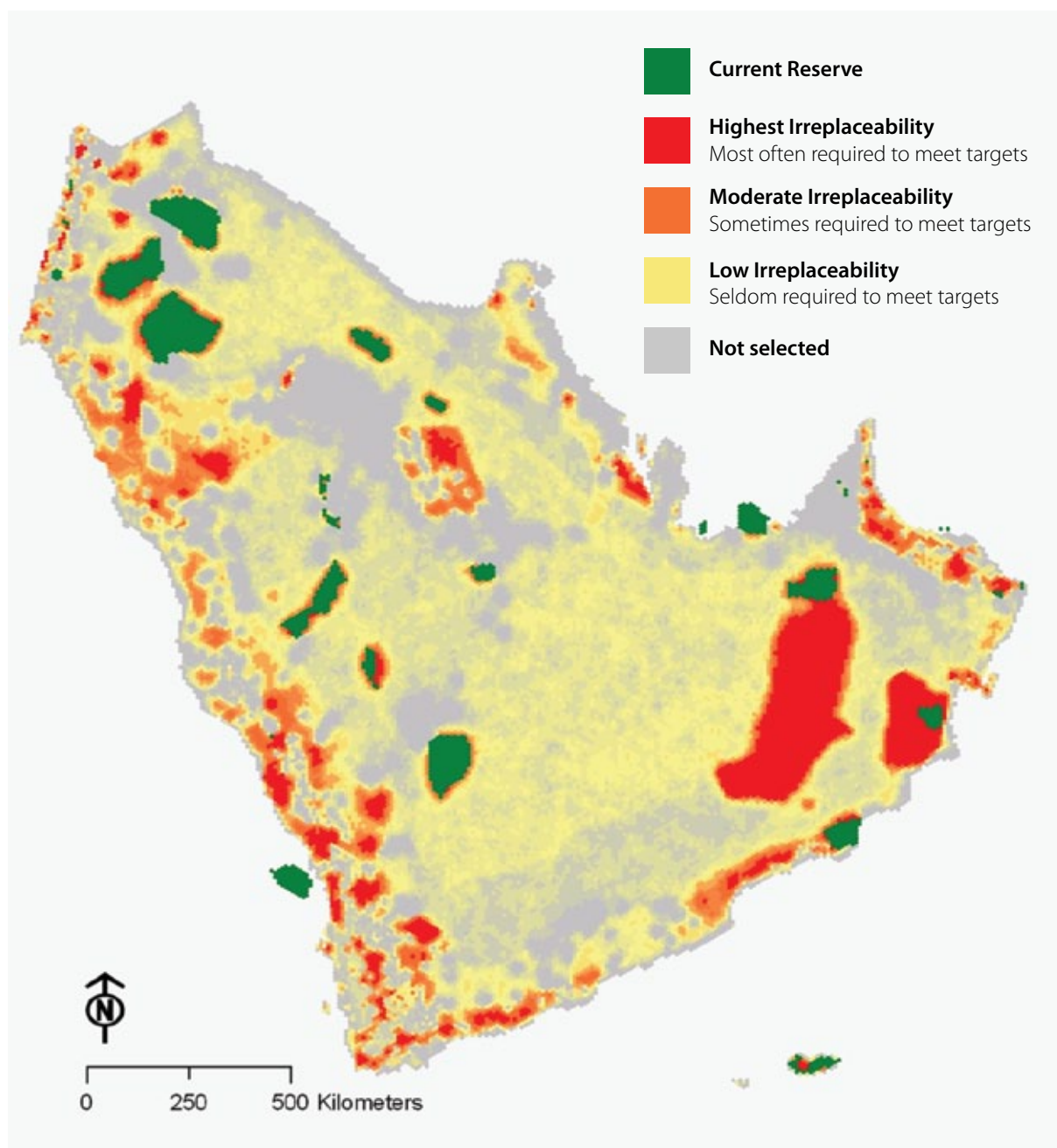


Figure 1: Initial outputs from the rapid conservation assessment for the Arabian Peninsula. Grey areas are never selected by the model to meet targets, while the dark red areas are always required. Note that output is illustrative and should be used with extreme caution as it is known that the underlying data are incomplete.

The preliminary analysis also illustrates that the reserve network on the Arabian Peninsula does not represent the range of biodiversity present. Little or no formal protection (under 10% of the target met) exists for 70 of the 86 biodiversity features present in the planning domain.

Key unprotected habitats include Al Hajar Montane Woodlands, Mesopotamian Shrub Desert, Persian Gulf Desert and Semi-Desert, Southwestern Arabian Montane Woodlands, Deciduous Oak Forest, Ever Green Oak Forest and Pine Forest. 26 of the 36 snake species included and all of the endemic fish are unprotected. The only reasonably well protected features are the Saline Vegetation, Important Bird Areas, the snake *Echis khosatzkii*, Sand Dune Vegetation and Socotra Island Xeric Shrublands. The last two features listed are the only ones where the targets have been met. Although the targets were rapidly developed, and may be too ambitious, they are nevertheless useful in illustrating that the current Protected Area network does not protect the range of biodiversity found in the Arabian Peninsula.

Way Forward:

The workshop demonstrated the potential usefulness of a systematic conservation planning process and the need for these products for the Arabian Peninsula. Feedback from both the workshop participants and from the main conference strongly supports the development of an assessment both at an Arabian Peninsula and at a national scale.

The key requirement for a successful conservation plan is the willingness for individuals and countries to share spatial data in an organized way and to facilitate access to this data. The international AGEDI program of the Environment Agency Abu Dhabi provides a potential forum for the collation and regional dissemination of this spatial data. Once spatial biodiversity data are being shared, systematic conservation planning processes are well placed to add significant value to the underlying data.

The workshop demonstrated that from a technical and data point of view, a rapid but robust assessment of spatial biodiversity priorities across the Arabian Peninsula is possible in the short-term. However, one must recognize that the key issues are not technical, but rather around political buy-in, institutional support, and a mandate. This is particularly important if there is to be a strong link to implementation. There is also the need to raise awareness and develop in-house level capacity in agencies.

A possible way forward is the development of parallel pilot rapid assessments at multiple scales. Possible projects include a more detailed national study for the UAE (or failing that for Abu Dhabi) at approximately 1:100 000 scale, and a rapid assessment for the Arabian Peninsula at approximately 1:250 000 scale. Potential synergy exists with ongoing biodiversity data compilation processes, notably the Important Plant Area Program. The spatial assessment should be supported through existing programs, and in particular the assessment should be included in the ongoing CAMP program. The potential to support pilot projects through the AGEDI program are currently being investigated.

A systematic conservation planning process would provide a regional context for any national or local conservation planning initiatives, would provide a strong spatial biodiversity focus to parallel the species focus of the CAMP processes undertaken to date, and would support trans-boundary conservation initiatives.

Acknowledgements:

The workshop and rapid assessment would not have been possible without the contributions from the workshop participants (see attached list). In particular the willingness to share data was very encouraging. Special acknowledgment must go to Kevin Budd of the Breeding Centre for Endangered Arabian Wildlife for initial data collation and support for the process.

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Participants

Al Assaf, Ali Abdulaziz
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: aliassaf2006@yahoo.com

Al Busaidi, Hamed Bin Abdulla
Ministry of Environment & Climate Affairs
Muscat, Oman
Email: hamed2050@hotmail.com

Al Daherie, Ahmed
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: ahmad2525@hotmail.com

Al Midfa, Abdulaziz
Environment and Protected Areas Authority
Sharjah, United Arab Emirates
Email: epaa@epaashj.ae

Al Jahdhami, Mansoor Hamed
Office for Conservation of the Environment, Diwan
of Royal Court
Muscat, Oman
Email: mhjahdhami@gmail.com

Al Hamshmi, Rada
Emirates Environmental Group
Dubai, United Arab Emirates
Email: eeg@emirates.net.ae

Al Safran, Salem Hussain
Ministry of the Environment
Doha, Qatar
Email: shsafran@mov.gov.qa

Boulad, Natalia
Royal Society for the Conservation of Nature
Amman, Jordan
Email: natalia@rscn.org.jo

Budd, Kevin
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

El Alqamy, Husam
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: alqamy@gmail.com

Fadheel, Abdulla Hamd
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: a_fadail@hotmail.com

Hammer, Sven
Al Wabra Wildlife Preservation
Doha, Qatar
Email: awwp.director@alwabra.com

Holness, Stephen
South African National Parks
Port Elizabeth, South Africa
Email: sholness@nmmu.ac.za

Judas, Jacky
National Avian Research Centre
Abu Dhabi, United Arab Emirates
Email: jjudas@ead.ae

Kabbara, Lina Radwan
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: lkabbara@ead.ae

Khafaga, Tamer Ali
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: tamer.khafaga@emirates.com

Khalifa, Nada Bait
Ministry of Environment and Water
Dubai, United Arab Emirates

Knight, Mike
South African National Parks
Port Elizabeth, South Africa
Email: M.Knight@nmmu.ac.za

Knuteson, Sandra
American University of Sharjah
Sharjah, United Arab Emirates
Email: sknuteson@aus.edu

Llewellyn, Othman
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: Othman.Aishah@gmail.com

Llewellyn-Smith, Robert
Environment Protection and Development Authority
Ras Al Khaimah, United Arab Emirates
Email: Rllewellynsmith@yahoo.co.uk

Mardonov, Bakhityor
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: bakhtim02@yahoo.com

Nasher, Abdul Karim
Sana'a University
Sana'a, Yemen
Email: Karimnasher@yahoo.com

Zahlawi, Nisreen
Emirates Wildlife Society - WWF
Abu Dhabi, United Arab Emirates
Email: nalzahlawi@ewswwf.ae

O'Donovan, Declan
Wadi Al Safa Wildlife Centre
Dubai, United Arab Emirates
Email: declan@shp.ae

Othman, Yassar Ahmed
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: yothman@ead.ae

Pas, An
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: an.pas@bceaw.ae

Shuriqi, Maral Khaled
Environment Protection and Development
Department
Fujairah, United Arab Emirates
Email: 1geologist@gmail.com

Simkins, Gregory
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: greg.simkins@emirates.com

Solatre, Jimson S.
Dubai Municipality
Dubai, United Arab Emirates
Email: jssolatre@dm.gov.ae

Sorenson, Mark
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: GPCI@aol.com

Stanton, David
Foundation for the Protection of the Arabian
Leopard in Yemen
Sana'a, Yemen
Email: ylrp@yemenileopard.org

Tourenq, Christophe
Emirates Wildlife Society-WWF
Abu Dhabi, United Arab Emirates
Email: ctourenq@ewswwf.ae

Vanneyre, Laurence
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: laurence@emeg.ae

First Conference on Biodiversity Conservation in the Arabian Peninsula



First Conference on Biodiversity Conservation in the Arabian Peninsula

Sharjah, United Arab Emirates

February 3-4, 2010

Organised by



Environment and Protected Areas Authority (EPAA)
Government of Sharjah
Po Box 2926, Sharjah
United Arab Emirates

In support of



Scientific Committee

Dr Philip Seddon (Otago University)
Dr David Mallon (IUCN/SSC Antelope Specialist Group)
Dr Michael Knight (South African National Parks)

Organising Committee

Abdulaziz Al Midfa (EPAA)
Hana Al Suwaidi (EPAA)
Amal Al Qatari (EPAA)
Maryam Al Hosani (EPAA)
Amal Al Hosani (EPAA)
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First Conference on Biodiversity Conservation in the Arabian Peninsula
Sharjah, February 3-4, 2010

PROGRAM

Day 1 - Wednesday, 3 February 2010	
0800–0945	Registration in Rotunda, American University of Sharjah
1000–1010	Opening Film
1010–1015	Chancellor's Welcome Dr Peter Heath, American University of Sharjah
1015-1030	Opening & Review 10 years of Conservation Workshops Mr Abdulaziz Al Midfa, Environment and Protected Areas Authority
1030–1045	Keynote Dr Simon Stuart, Chair IUCN Species Survival Commission
1045–1100	VIP Keynote HRH Prince Hassan of Jordan
1100-1130	<i>Morning Tea</i>
Session 1: Regional Perspectives (Chairman: Ahmed Disi)	
1135–1155	WWF Ecoregions Ms. Razan Al Mubarak, Emirates Wildlife Society - WWF
1155–1215	Important Bird Areas and Ramsar Sites- a Critical Network of Sites required by migratory waterbirds. Mr Sharif Al-Jbour, BirdLife International Middle East Office
1215–1235	Important Plant Areas in the Arabian Peninsula Mr Othman Llewellyn, National Commission for Wildlife Conservation and Development
1235–1255	Hotspots and species Dr David Mallon, IUCN/SSC Antelope Specialist Group
1300–1400	<i>Lunch</i>
Session 2: Regional Perspectives cont. (Chairman: Dr Mohamed Shobrak)	
1405–1425	Regional Environmental Agreements: Towards collective action Dr Odeh Al Jayyousi, IUCN Regional Office for West Asia
1425–1445	Protected Area Networks in Arabia Mr Khaldoun Al Omari, IUCN Regional Office for West Asia
1445–1505	GIS Layers Mr Mark Sorenson and Yasser Othman, Environement Agency - Abu Dhabi
1505–1525	Towards a systematic conservation assessment for the Arabian Peninsula Dr Stephen Holness, South African National Parks
1530–1600	<i>Afternoon Tea</i>
Session 3: Transboundary Conservation Areas (Chairman: Abdul Karim Nasher)	
1605– 625	Peace Parks in Southern Africa: Lessons learnt in conservation planning Prof. Willem van Riet, Peace Parks Foundation
1625–1645	Regional Scope Mr Abdulaziz Al Midfa, Environment and Protected Areas Authority
1645–1705	The Conservation of Dugongs (<i>Dugong dugong</i>) in the Emirate of Abu Dhabi Dr Thabit Zahran Al Abdessalaam, Environment Agency - Abu Dhabi
1800–2030	<i>Banquet at Sharjah Golf and Shooting Club</i>

Day 2 - Thursday, 4 February 2010

Session 4: Looking to the Future (Chairman: Dr Fredric Launay)

0900–0920	Restoration of degraded habitats in arid ecosystems: examples from the Arabian Peninsula Dr Shahina Ghazanfar, Royal Botanic Gardens Kew
0920–0950	Captive breeding & conservation Dr Kristin Leus, IUCN/SSC Conservation Breeding Specialist Group Europe
0950–1010	Arabian Leopard in Oman Dr Andrew Spalton, Office for Conservation of the Environment, Diwan of the Royal Court
1010–1030	Requirements for Strategic Plant Conservation in the Arabian Peninsula Dr Tony Miller, Centre for Middle Eastern Plants
1030–1100	<i>Morning Tea</i>

Session 5: Looking to the Future cont. (Chairman: Dr Odeh Al Jayyousi)

1100–1120	Colonization time of Arabia by the white-tailed mongoose as inferred from mitochondrial DNA sequences Dr Carlos Fernandes, Lisbon University
1120–1200	Freshwater and marine fish conservation in Arabia Dr Fareed Krupp, Senckenberg Research Institute and Natural History Museum
1200–1220	Socotra Dr Kay Van Damme, Ghent University
1230–1400	<i>Lunch</i>

Session 6: Looking to the Future cont. (Chairman: Prof. Boudjéma Samraoui)

1405–1425	Flyway and stopover conservation in the Arabian Peninsula Dr Mohamed Shobrak, Taif University
1425–1445	Population structure, migratory connectivity & inference on gene exchange mechanisms in the Asian Houbara Dr Olivier Combreau, International Fund for Houbara Conservation
1445–1505	Effect of rising seawater temperatures on bleaching in two reef building corals <i>Pocillopora damicornis</i> and <i>Pocillopora verrucosa</i> in the Red Sea, Saudi Arabia Dr Abdulmohsin A. Al-Sofyani, King Abdul Aziz University
1505–1525	Re-introductions in modern Arabia: the first steps for a grander vision? Dr Mark Stanley Price, University of Oxford
1530–1600	<i>Afternoon Tea</i>

Session 7: Summary and Closing

1600 – 1625	Open Discussion <i>Dr David Mallon</i>
1625 – 1635	Summary Dr Mike Knight
1635 – 1645	Outputs and future Dr Philip Seddon
1645 – 1655	Impressions H. E. Majid Al Mansouri, Secretary General Environment Agency - Abu Dhabi
1655 – 1700	Closing and Thanks Mr Abdulaziz Al Midfa

Executive Summary

In recognition and celebration of a decade of successful annual conservation workshops, the Sharjah Environment and Protected Areas Authority (EPAA) hosted a two-day conference on biodiversity conservation in the Arabian Peninsula. The conference, the first in the world for 2010, the International Year of Biodiversity (www.cbd.int/2010), was held at the American University of Sharjah, UAE, during 3 and 4 February. The aim of the meeting was to review past progress and current needs for biodiversity conservation throughout the Arabian Peninsula. The conference was opened by its patron, His Highness Dr Sheikh Sultan bin Mohammed al Qassimi, Ruler of Sharjah and Member of the Supreme Council, in a plenary session that featured a keynote address from Dr Simon Stuart, Chair of the IUCN Species Survival Commission and a review of 10 years of Conservation and Management Planning Workshops for the Fauna of Arabia by Mr Abdulaziz Al Midfa, Director General of the Sharjah EPAA.

Invited speakers from IUCN, WWF, Birdlife International, and from conservation agencies, universities and NGOs in the region, gave presentations designed to provide a regional perspective that highlighted the current state of Peninsula-wide biodiversity. Topics included reviews of Important Bird (IBA) and Plant (IPA) Areas, WWF Ecoregions, application of the Hotspot concept, regional conservation agreements, and protected area networks in the Arabian Peninsula. The first sessions concluded with a summary of the output of a two-day GIS Workshop hosted by the EPAA Sharjah's Breeding Center for Endangered Arabian Wildlife (BCEAW) in preparation for the conference, that sought to start the important process of collating, compiling and integrating spatial data on species and habitats as a basis for a systematic conservation assessment for the Arabian Peninsula. The final session of the first day focussed on Trans-Boundary Conservation Areas (TCBAs), a regional conservation management approach that has been developed during Conservation Workshops in 2007-09.

Day two of the conference had the theme of "Looking to the Future", aiming to identify data gaps, challenges and needs for the implementation of both national and regional conservation programmes. Presentations and associated discussions ranged over topics such as the role of captive breeding, habitat restoration, species re-introductions, and climate change, and taxonomic reviews including freshwater and marine fish, Arabian leopard, migratory birds including houbara bustard, carnivores and small mammals. These talks drew heavily on the outputs of previous Conservation Workshops and charted a course for a future, formal Regional Red List assessment process, as detailed in an IUCN Regional Red List Assessment Training Workshop held before the conference, in parallel with the GIS Workshop. During an open discussion conference delegates identified a number of specific points under the headings of "Vision for the Future", and "Doing the Doing". The conference closed with a clear commitment from all involved to sustain and expand the annual Conservation Workshops, taking a regional perspective in order to work towards integrated conservation strategies and regionally coordinated conservation action.

Outputs of the meeting will include a special issue of Zoology in the Middle East featuring selected peer-reviewed papers and short communications dealing with topics covered in the conference.

Abstracts

Abstracts and biography's have been edited for space and format

WWF Ecoregions

Razan Al Mubarak

Emirates Wildlife Society – WWF, PO Box 45553, 8th Floor Chamber of Commerce and Industries Bldg.

Abu Dhabi, United Arab Emirates

Email: ralmubarak@ewswwf.ae

The WWF Conservation Science Program has identified 1,507 ecoregions in the world comprising 825 terrestrial ecoregions, 426 freshwater ecoregions, and 229 coast and shelf marine ecoregions. Ecoregions were defined as large areas of land or water that contain a geographically distinct assemblage of natural communities that (a) share a large majority of their species and ecological dynamics, (b) share similar environmental conditions, and (c) interact ecologically in ways that are critical for their long-term persistence. Fourteen terrestrial and two marine ecoregions are present in the Arabian Peninsula. Tropical rain forests deservedly garner much conservation attention, as they may contain half of the world's species. However, a comprehensive strategy for conserving global biodiversity must strive to include the other 50 percent of species and habitats, such that all species and the distinctive ecosystems that support them are conserved. Habitats such as tropical dry forests, tundra, polar seas, desert springs and mangroves harbour unique species, communities, adaptations and phenomena. To lose examples of these assemblages would represent an enormous loss of global biodiversity and services. Because limited funding compels the conservation community to be strategic and earmark the greatest amount of resources for the most outstanding and representative areas for biodiversity, the WWF assessed the 1,507 ecoregions and identified the "Global 200" -- the most biologically distinct terrestrial, freshwater and marine ecoregions of the planet. The Global 200 include 142 terrestrial, 53 freshwater and 43 marine priority ecoregions for conservation priority in the world. The Global 200 were selected for their species richness, endemism, higher taxonomic uniqueness, unique ecological or evolutionary phenomena, global rarity of habitats, intactness and representation. Their conservation status of ecoregions was assessed in the tradition of IUCN Red Data Book categories for threatened and endangered species. As per the Global 200 WWF classification, the UAE lies in two priority Global 200 Ecoregions of the world identified by the WWF: the "Arabian Highlands and Shrublands" and the "Arabian Gulf and Sea". Within these priority ecoregions, WWF pursues ecoregion conservation, a unique, broad-scale approach to develop and implement a comprehensive strategy that conserves the species, habitats, and ecological processes of the ecoregion.

Biography: Razan Al Mubarak has been with EWS-WWF since its inception in 2001, establishing the local EWS office and its partnership with WWF. As Managing Director, she oversees all projects undertaken by EWS-WWF, leading on strategic engagement on sustainable development, ensuring financial viability and implementation in accordance with WWF International policies and standards, taking into account plans and recommendations as approved by the EWS Board. Razan is also a board member to the African Wildlife Foundation, and the managing director of the Mohamed Bin Zayed Species Conservation Fund. Razan is directly involved in the Coral Reef Conservation Project which uses latest technology and scientific thought to conserve and protect the unique and threatened coral reef habitats in the Arabian Gulf.

Important Bird Areas and Ramsar Sites: a Critical Network of Sites Required by Migratory Waterbirds

Sharif Al-Jbour

Birdlife International Middle East Office, PO Box 2295, Amman 11953, Jordan

Email: sharif.jbour@birdlifemed.org

Most populations of migratory waterbirds in the African-Eurasian region are tightly constrained by ecological factors in their breeding, wintering and/or stopover areas. Many sites are needed along the entire migration routes of these birds to maintain their populations, hence conserving their population requires effective management of each critical site individually along the flyway as part of coordinated planning and management throughout the flyway as a whole. This complex web of sites form a chain in which each link is essential for maintaining viable and healthy populations of migratory waterbirds along the entire network. Through the Wings over Wetlands (WOW) project (the largest international wetland and waterbird conservation initiative ever to take place in the African-Eurasian region for the conservation of migratory waterbirds and the sites on which they depend), a new electronic portal called the Critical Site Network (CSN) Tool is being developed, which will improve knowledge of and access to information on the critical sites required by migratory waterbirds across Africa and Eurasia. The aim of the identification of Critical Sites for migratory waterbirds is to focus site conservation measures within the flyways of each waterbird species on the most important sites for that particular population. The process uses a methodology similar to that already applied in identifying Important Bird Areas and Ramsar Sites, i.e. the application of quantitative criteria based on up-to-date knowledge of the sizes and trends of bird populations. The protection of such a network of critical sites therefore requires concerted national and transboundary conservation actions. Therefore, identifying key sites and maintaining their ecological functions and services along the entire migration route provides the basis for successful flyway scale conservation, which will help maintain waterbird populations.

Biography: Sharif Al-Jbour is the regional coordinator for IBAs (Important Bird Areas) at BirdLife International – Middle East Secretariat based in Amman – Jordan where he has been based for the past 10 years. The IBA program is global and aims at conserving birds and their habitats working together with people to identify sites that are priorities for conservation of birds and protecting them through applying appropriate conservation measures. He has been heavily involved in developing species conservation action plans at the global, regional and national levels, and acting also currently as the regional coordinator for the WOW project (Wings Over Wetlands). He is also a council member of the Ornithological Society of the Middle East (OSME), and attended the 10th Conservation Workshop of the Fauna of Arabia held at Sharjah 2009, and participated in the development of regional action plans for shorebirds of the Arabian Peninsula in coordination with the Breeding Centre for Endangered Arabian Wildlife in UAE.

Important Plant Areas in the Arabian Peninsula

Othman A. Llewellyn

Saudi Wildlife Commission, PO Box 61681, Riyadh 11575, Kingdom of Saudi Arabia

Email: Othman.Aishah@gmail.com

Important Plant Areas are the most important places in the world for wild plant diversity, that can be protected and managed as specific sites. Not surprisingly, they are also good indicators of terrestrial (but not marine) biodiversity for conservation planning. Since 2005 the IUCN SSC Arabian Plants Specialist Group has developed regional criteria for identification of IPAs and has produced a provisional list of IPAs in the Arabian Peninsula. The regional criteria are well suited to identify the sites of endangered, endemic, and relict taxa. They are less well suited to identify important sites for conservation of wild crop relatives or of the ecosystem services that plants provide: the mangroves and seagrass beds in the coastal ecosystems, and the remote or rugged sites that can serve as natural seedbanks for rehabilitation of the severely overgrazed rangelands of the Peninsula. We now have a good “first draft” of the most important sites for conservation of endangered, endemic, and relict taxa in the Arabian Peninsula. The Afromontane and Somali-Maasai regional centers of endemism are well represented, as are relict populations of Mediterranean and Irano-Turanian flora. Sites of importance for Arabian endemics of the Saharo-Sindian zone are also being identified. A future need will be to identify and fill the gaps, as many of the provisional IPAs are sites with which researchers were already familiar. A greater challenge will be to identify the areas of greatest importance to conserve in the context of global climate change: Which sites will be most important for endangered, endemic, and relict plants under the dimly foreseen stresses of the coming century, and what are the likely sites of future speciation? Predictive modeling will be a useful tool to identify new sites to be investigated. Ultimately the most important challenge to meet will be to conserve these IPAs on the ground, in the face of overgrazing, expansion of farms and urban areas, and global climate change.

Biography: Othman Abd-ar-Rahman Llewellyn is an environmental planner in Saudi Arabia’s National Commission for Wildlife Conservation and Development. His responsibilities include planning and design of protected areas, as well as providing training in environmental ethics and skills to minimize environmental impacts by users of protected areas. He is a member of the IUCN World Commission on Protected Areas and the IUCN Commission on Environmental Law, as well as the Species Survival Commission’s Arabian Plants Specialist Group. He is currently preparing Saudi Arabia’s revised protected area system plan.

Hotspots and Species

David Mallon

Manchester Metropolitan University, All Saints, Oxford Road, Manchester M15 6BH, United Kingdom
Email: d.mallon@zoo.co.uk

Conservation International has identified 32 global hotspots, defined as areas containing concentrations of endemic and threatened species. One of these hotspots covers the Horn of Africa and the mountains of the southwestern part of the Arabian Peninsula. Many endemic species of plants, birds, amphibians and other taxa are known to occur in this area. Other parts of the peninsula also contain suites of endemic species, albeit in smaller numbers; these may be considered 'regional hotspots'. However, one disadvantage of the hotspot approach is that it is unrepresentative of biodiversity in general because areas of low primary productivity do not meet the required thresholds. These so-called 'cold spots' include desert ecosystems, which within the Arabian Peninsula harbour widespread species, such as Arabian Oryx, Mountain gazelle, and reem gazelle, that would not be included in any global or regional hotspot analysis. Another issue concerns the regional status of globally widespread species. As a result of persecution, the Arabian Peninsula has become a major cold-spot for medium and large carnivores, all of which are currently regionally assessed as more highly threatened by 2–4 Red List categories compared to the global assessment. All these aspects of the biodiversity of the Arabian Peninsula need to be integrated into any regional-scale conservation strategy.

Biography: David Mallon is an Associate Lecturer in the School of Biology at the Metropolitan University of Manchester, UK. He has been a member of the IUCN Species Survival Commission for over 20 years and is currently Co-Chair of the Antelope Specialist Group and a member of the Cat and Caprinae Specialist Groups. He has been involved in the Sharjah CAMP workshops since 2001.

Regional Environmental Agreements: Towards Collective Action

Odeh Al-Jayyousi

IUCN Regional Office for West Asia (ROWA), PO Box 942230, Amman 11194, Jordan

Email: orj@iucn.org

This paper aims to review key environmental agreements such as CBD, CMS and RAMSAR in the Arab region and the role of regional organizations like Arab League, GCC, ROPME, PERSGA, UNEP, and IUCN in conserving biodiversity and achieving sustainability. In a nation-state context, the challenge is to ensure effective and synergetic implementation of environmental agreements at a regional level. Realizing the global challenges including poverty, climate change and biodiversity loss, the Arab world needs a stronger appreciation and application of the sustainability principles; sound ecosystem management is essential to build a support system for economics (our financial capital); climate change will compromise economic development and ecosystem resilience; and there is a need for a greater investment in the environment so as to support the long-term sustainability of the global economy. The economic development model in the Arab region had been informed mainly by economics but needs to be transformed by ecology. There is a need to mainstream biodiversity, eco-system services, green accounting, and environmental economics in the policy making and decision making in the Arab region. Media and education discourse need to communicate key messages like Plants, animals, and micro-organisms live together in ecosystems, which also include air, water, minerals, and nutrients. Ecosystems can provide sustainable streams of benefits to people, known as “ecosystem services”. These include providing food and timber, ensuring regular supplies of freshwater, maintaining a healthy climate, pollinating crops, preventing soil erosion, regulating diseases and pests, minimizing the impact of extreme natural events, and cycling nutrients through natural systems to enable our economies to flourish. This paper recommends more coordinated efforts to harmonize regional collective action to conserve biodiversity.

Biography: Odeh Al-Jayyousi was a university Professor in water resources and environment and Dean of Scientific Research at the Applied Science University in Jordan. He has a diverse professional experience in water policy, planning and management: City of Chicago - Department of Planning, University of Illinois - Center of Urban Economic Development, Sigma - Consulting Engineers. He has designed, conducted and facilitated training workshops and focus groups. He worked as a consultant with EU, ESCWA, WB and GTZ. He was nominated and selected for the Next Generation of Water Leadership Program (Stockholm, 1999). He participated in the formulation of the World Water Vision 21st and the formulation of the Strategy of Biodiversity and Water in Jordan. He has published over 30 articles in international journals.

Protected Area Networks in Arabia

Khaldoun Al Omari

IUCN Regional Office for West Asia (ROWA), PO Box 942230, Amman 11194, Jordan

Email: khaldoun.alomari@iucn.org

One of the key concerns for our region is the lack of a representative network of protected areas that are effectively managed. Protected areas help to conserve key elements of biodiversity, play a significant role in social and economic development, and embody many practical approaches to participatory and collaborative management. The main objective of the IUCN Protected Areas Programme is to guide and enhance the development of adequate regional approaches and models for effective protected area management, with a focus on community participation and involvement at all levels. Another objective is to build the region's capacity in protected area management, including the development of sound and regionally adequate guidelines and mechanisms. To meet this objective we will harmonize the diverse corpus of global knowledge and expertise available through the IUCN network. To further these objectives we also aim to support the regional World Commission on Protected Areas (WCPA) network in achieving its mission, objectives, and outputs. Some of the tangible results sought by this programme include: increasing the development of protected areas in the region through the reviewing of regional guidelines, training of local stakeholders, and sustainable funding of these areas; establishing a network of pilot sites documents, fed into national and regional policies and legislations and shared among all partner in the region; supporting the implementation of protected areas in significant biodiversity areas or dedicated to threatened species; committing initiatives with community welfare and livelihood through sustainable and local management.

Biography: Khaldoun Al Omari is currently Program Areas Officer for the Regional Office of West Asia. His main area of expertise is related to the development and management of protected areas and their relevance to ecotourism and local community involvement and participation in the sustainable management of natural resources. As a protected area research programme coordinator he works to ensure the ecological sustainable management of the protected areas. He has worked as a research scientist, specialising in ornithological research, and is a licensed bird ringer at both national and international levels, a natural bird sound recordist, and a raptor conservation biologist. He is also a professional trainer, research coordinator, and monitoring programs supervisor, and has project management skills and experience drafting management plans and report writing for protected areas, fund raising, research and monitoring planning and implementation.

Abu Dhabi Global Environmental Data Initiative

Mark Sorenson & Yassar Othman

*Environment Agency – Abu Dhabi, PO Box 45553, Abu Dhabi, United Arab Emirates
Email: gpci@aol.com*

Access to accurate and up to date geospatial and related information that is relevant to the biodiversity assessment and planning issue is highly variable throughout the Arab Peninsula. Ultimately, a systematic process is needed to develop an environmental information network that would help to facilitate common identification and access to appropriate information across all the countries in the region. Experience around the world suggests that such networks, to be effective, must address not only the cataloging and open dissemination of existing data sources, but also the development of a community of collaborating stakeholders that can work together to define data content and format standards, processes to ensure that data are maintained over time, political, legal and institutional frameworks support sharing of data, methods and tools, and processes for the use of common information to support and catalyze transnational biodiversity conservation measures and other factors. The Abu Dhabi Global Data Initiative (AGEDI) is a national initiative of the United Arab Emirates administered by the Environment Agency Abu Dhabi (EAD). The program has focused on the development of principles, methods and tools for the effective gathering and utilization of sound environmental information at various scales ranging from local to national, regional and international levels as well. It is also working directly with the Abu Dhabi Spatial Data Infrastructure (AD-SDI) to ensure that environmental information is available to the AD-SDI stakeholder community of more than 40 participating entities. It has also initiated a process to engage regional and international organizations for broader program alignment and mutual benefit. The AGEDI program is committed to supporting the regional biodiversity assessment and planning efforts of the Sharjah Conference through its technical infrastructure, resources and lessons learned in the development and sustainment of effective environmental information networking.

Biography: Mr. Mark Sorensen has over twenty-seven years of experience in the application of GIS and related technologies to urban and regional planning and resource science, policy, and management, to over 220 projects in 65 countries around the world. Over the past 10 years he has been largely focused on the promotion and development of national and regional spatial data infrastructure initiatives, including programs in Oman, Lebanon, Jamaica, Bahrain, Libya, Yemen, Thailand, Afghanistan, Kashmir (India), Kurdistan Region (Iraq) and Abu Dhabi. Mark received his Master's degree from the Harvard Graduate School of Design in 1982, and has been the president of the Geographic Planning Collaborative (GPC), a private sector GIS/IT consulting consortium, since 1995 and is the General Manager for GPC-GIS, a sister company based in Abu Dhabi, United Arab Emirates. Mark has served as senior advisor to the Abu Dhabi Global Environmental Data Initiative (AGEDI) at the Environment Agency Abu Dhabi since 2004, and is helping to coordinate the Agency's role in the planning and implementation of the Eye On Earth Summit, a major global summit focused on global environmental information networking to be held in Abu Dhabi in December 2010.

Towards a Systematic Conservation Assessment for the Arabian Peninsula

Stephen Holness

South African National Parks, PO Box 20419, Humewood 6013, Port Elizabeth, South Africa
Email: S.Holness@nmmu.ac.za

This presentation outlines the underlying concepts, planning stages and data requirements for a systematic conservation assessment of the Arabian Peninsula. The planning process is illustrated with practical examples from recent systematic planning undertaken in Southern Africa, including the assessment of the Maputaland-Pondoland-Albany Hotspot which deals with large sections of South Africa, Swaziland and Mozambique, and the National Protected Areas Expansion Assessment which assessed South Africa, Swaziland and Lesotho. The presentation reports back on the GIS Systematic Conservation Planning Workshop held before the conference, where the potential for conducting a rapid systematic assessment for the Arabian Peninsula was examined. The very provisional outcomes from this work session are presented, and the steps and stages required to move forward are detailed.

Biography: Stephen Holness is a specialist systematic conservation planner involved largely with spatial biodiversity assessment and prioritization. He supervises a unit which is involved with identifying spatial priorities for the expansion of the South African National Park System, as well as land use planning within the national parks. Key developments have been the development of the now widely accepted sensitivity-value analysis process for reserve zonation planning and undertaking numerous systematic conservation plans. Climate change forms a major current research and work theme. He is presently undertaking the spatial assessment of climate change for the National Spatial Biodiversity Assessment, as well as assessments of climate change risk and response strategies for protected areas in general and national parks in particular. Recent projects include the spatial biodiversity assessment for the Maputaland-Pondoland-Albany Hotspot for Conservation International, which identified spatial priorities for conserving threatened species and habitats, particularly in the context of climate change, across the hotspot which stretches over three countries.

Peace Parks in Southern Africa: Lessons Learnt in Conservation Planning

Willem van Riet

Peace Parks Foundation, PO Box 12743, Stellenbosch 7613, South Africa

Email: wvanriet@ppf.org.za

The establishment of conservation areas was originally based on aesthetic reasons in the USA and Europe. In Africa it was based on the presence of large numbers of wildlife, however recently biodiversity became more and more important. Biodiversity is the pre-requisite for Ecosystem Services. Cross Border parks can play a role in managing these essential services across boundaries and I will be presenting a case study of Southern African Peace Parks.

Biography: Willem van Riet joined the Peace Parks Foundation in August 2000 as Chief Executive Officer, and has been functioning as Vice Chairman of Peace Parks Foundation since April 2008 when he retired as CEO. He is currently working full time for the Foundation specialising in conservation, land-use planning, fundraising and GIS development. He is a past acting Chairman, and current serving member of the South African National Parks (SANParks). He is currently Chairman of the Conservation Committee of SANParks. His specialist knowledge has benefited conservation in southern Africa over the past 20 years, as he has been involved in the planning, design and development of studies and projects involving a number of national parks.

Regional Scope

Abdulaziz Al Midfa

Environment and Protected Areas Authority, PO Box 2926, Sharjah, United Arab Emirates

Email: epaa@epaashj.ae

The Arabian Peninsula has a long history in its use of natural resources, and their protection. The latter were largely very local, species focused and largely focused on hunted species. The internationally accepted formal protection of areas is a very recent event, well after other parts of the world. However, as elsewhere, increased fragmentation of the landscape has led to greater isolation of the current protected areas. This has raised the ideas of the interconnectedness of the protected areas across the Peninsula range-states. It was with this in mind that the Sharjah workshops started exploring the possibilities of trans-boundary conservation initiatives in the Peninsula. Areas were identified around conservation priorities such as the Arabian leopard, dugong and Arabian oryx, their opportunities and constraints were identified, and how to address them. In general, it was noted that the idea was largely accepted at middle management levels, but needed higher institutional and political support to breach national reservations. It was also felt that the idea needed to be promoted regionally and required a champion to do so, but would ideally be seated in a broader regional conservation programme.

Biography: Abdulaziz Al Midfa is the Director General of the Environment and Protected Areas Authority in Sharjah. He has previously worked at the National Avian Research Centre in Abu Dhabi and was the General Secretary at the Permanent Committee for the Environment in Qatar.

The Conservation of Dugongs (*Dugong dugon*) in the Emirate of Abu Dhabi

Thabit Zahran Al Abdessalaam

Environment Agency – Abu Dhabi, PO Box 45553, Abu Dhabi, United Arab Emirates

Email: tabdessaam@ead.ae

The dugong (*Dugong dugon*), is the only strictly herbivorous marine mammal and the only extant species in the Family Dugongidae. Dugongs live along the coast in tropical and sub-tropical areas, and have been severely reduced throughout much of their range as a result of hunting, habitat modifications and other types of perturbations. The Arabian Gulf and Red Sea, with an estimated population of 5000 dugongs, hosts the largest population of this species outside Australia. Dugongs are listed as vulnerable to extinction by the IUCN. With long life (~ 70 years), long gestation period (~ 13 months) and longer calving interval (3-5 years), dugongs have slow population growth making them particularly vulnerable to perturbations. Aerial and field surveys have confirmed that dugongs predominantly occur in the Emirate of Abu Dhabi. There are no records of dugongs occurring in other parts of the UAE. In this presentation the findings of the dugong research program and the conservation and management strategy of dugongs in particular, and other wildlife and habitats in the Emirate of Abu Dhabi, will be presented.

Biography: Thabit Zahran Al Abdessalaam completed his undergraduate and graduate education majoring in fisheries and marine science in the United States of America at the University of Miami, Florida and Oregon University, Corvallis, respectively. He currently works with the Environment Agency Abu Dhabi as the Director of Biodiversity Management Sector. His responsibilities include planning, coordinating and implementing fisheries and marine environmental research and development programs and activities and initiatives pertaining to biodiversity conservation and management in the Emirate of Abu Dhabi. Thabit has been actively involved in the work towards establishing marine protected areas in Abu Dhabi and has actively contributed towards the addition of The Marawah Marine Biosphere Reserve to the UNESCO's Man and Biosphere global network of Biosphere Reserves. Thabit also plays a crucial role in research on endangered species particularly dugongs and sea turtles. These efforts have greatly enhanced the knowledge base on these species and have culminated in the UAE Signing International MoUs on dugongs and sea turtles. Thabit serves as the UAE's focal point in both these MoUs. He has authored or co-authored a number of books and scientific papers on fisheries and marine environment of Abu Dhabi and the Arabian Gulf.

Restoration of Degraded Habitats in Arid Ecosystems: Examples from the Arabian Peninsula

Shahina A. Ghazanfar

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, United Kingdom

Email: s.ghazanfar@kew.org

The last five decades have seen severe damage to landscapes in several regions of the Arabian Peninsula. Great increases in livestock holdings, a need for housing and public amenities, developments for tourism, and war, have destroyed and damaged ecosystems beyond natural recovery. Coupled with that, global climate change and the continuing aridity in this region has led to an urgent need to address issues relating to degraded habitats and loss of biological diversity. The last decades have seen a failing of conservation efforts due to lack of education and implementation of laws and regulations for gazetted and non gazetted nature reserves, with the result that degradation and damage continues. In order to provide an environment for the re-establishment of habitats and their specific flora and fauna, it has become necessary to have human intervention that can lead to the recovery of habitats and biodiversity. In the Arabian Peninsula, overgrazed, non productive rangelands, that constitute a major part of the land today, are a prime example, where ecological restoration can help to bring back the lost biodiversity and a functioning ecosystem. Recovery of unproductive and damaged landscapes can be achieved through human intervention for all aspects of the environment: restoration of soil, seed collection of key species, production of plants for planting, a managed irrigation system, and a monitoring and management plan before unproductive landscapes can become sustainable functioning ecosystems.

Biography: Shahina A. Ghazanfar has worked in the Sultanate of Oman (Sultan Qaboos University), West Africa (Bayero University, Nigeria), Fiji (University of the South Pacific) and Pakistan (Pakistan Agriculture Research Council) and has made major contributions to the study of the floras of these countries. She joined the Royal Botanic Gardens Kew, UK, in 2001 as co-Editor for the Flora of Tropical East Africa (2001 to 2008) and is now Head of the Temperate Regional Team. She has a particular interest in the restoration, conservation and biogeography of the Arabian Peninsula; her interests and research extend to the study of medicinal plants and plants of economic importance, and salt loving plants of Arabia and tropical Africa. She has authored several books and written peer reviewed papers on the Arabian flora and vegetation. Her major contributions are as editor and author of the Savanna Plants of Africa (1989: Macmillan), Vegetation of the Arabian Peninsula (1998: Kluwer), Medicinal Plants of the Arabian Peninsula (1994: CRC Press), Flora of Oman (2003: Vol. 1; 2006: Vol. 2, of 4 volumes, with distribution maps, vernacular names, accompanying CD-ROM of species photographs; National Botanic Garden of Belgium). She contributed towards a major plant family, Scrophulariaceae, for Flora of Tropical East Africa (Kew: 2008), and is currently preparing a checklist of the halophytes (salt tolerant plants) of SW Asia. For the last two years she has been involved in major restoration projects in the UAE and advises on native plants that have potential for restoration of degraded habitats, and those that have potential for landscaping and horticulture.

Captive Breeding and Conservation

Kristin Leus

Conservation Breeding Specialist Group-Europe, c/o Copenhagen Zoo, PO Box 7, Roskildevej 38, DK-2000 Frederiksberg, Denmark, Email: kristin@cbsgeurope.eu

Captive breeding is one of a myriad of tools at the disposal of conservationists. It can fulfil specific tasks that should be an integral part of the overall conservation action plan for a species. Captive breeding and other types of intensive management of individuals and populations often become necessary when human caused threats (habitat destruction, exploitation etc.) have caused the population of a species to become so small and fragmented that even if the human-caused threats could be magically reversed, the species would still have a high probability of extinction purely due to random demographic and genetic events, environmental variation and catastrophes; or when the continuing, unchecked decline in population size indicates that this will soon become the case. Provided sufficient knowledge on the biology and husbandry of the species exists, breeding individuals in the relative safety of captivity, under expert care and sound management may provide an insurance against extinction, and/or a stock for reintroduction or reinforcement efforts, and/or opportunities for education, raising of awareness, scientific and husbandry research and other contributions to conservation. Important challenges include recognising when “the time is right”, identifying the precise role of the captive breeding efforts within the overall conservation action plan, setting realistic targets in terms of required time spans, population sizes, founder numbers, resources etc., ensuring sound management and cooperation and developing much needed new technical methods and tools. The above will be illustrated with captive breeding examples from the Arabian Peninsula.

Biography: Kristin Leus is employed by Copenhagen Zoo, which hosts the European Regional Office of the IUCN/SSC Conservation Breeding Specialist Group, for which she has been a Programme Officer since 2007. She also works part time as Population Management Advisor for the European Association of Zoos and Aquaria. From 1996 till 2007 she worked for the Royal Zoological Society of Antwerp, first as population manager and conservation biologist and since 2004 as Head of its Centre for Research and Conservation. She is most active in the fields of population biology, computer modelling of populations, captive population management and workshop facilitation.

Arabian Leopard in Oman

Andrew Spalton, Hadi al Hikmani and Khalid al Hikmani

Office for Conservation of the Environment, Diwan of Royal Court, Muscat, Sultanate of Oman
Email: acedrc@omantel.net.om

Recent records give a bleak picture of the status of the Arabian leopard (*Panthera pardus nimr*) in the wild in the region. However, the situation in the Dhofar mountains of Oman has provided some reason for optimism over the last 10 years. The population has been subject to comprehensive study that has revealed vital information on the ecology of this species. Current efforts are combining ecological and socio-economic initiatives to help ensure there remains an opportunity for the leopard to survive in the wild.

Biography: Andrew Spalton is Adviser for Conservation of the Environment in the Diwan of Royal Court. Arriving in Oman in 1987 to work on the reintroduction of the Arabian oryx, today he leads a team working on the conservation of endangered species including the Arabian oryx, Arabian tahr and Arabian leopard. He is also overseeing the establishment of a botanic garden, the first of its kind in the region.

Requirements for Strategic Plant conservation in the Arabian Peninsula

Tony Miller

Centre for Middle Eastern Plants, Royal Botanic Garden Edinburgh

Email: T.Miller@rbge.ac.uk

The present status of Plant Conservation in the Arabian Peninsula is summarized by considering the progress made by the Arabian Plant Specialist Group towards attaining the 2010 goals of the Global Strategy for Plant Conservation. Challenges for the next 10 years are discussed. The importance of species distributions in designing Protected Areas networks and for the modelling of species response to climate change is emphasised. The lack of individuals capable of recording the presence and absence of species in a particular habitat is highlighted as a major obstacle. The importance of new technologies for the easy recording of large volumes of geo-located biodiversity is highlighted and the importance of informatics systems for data management to optimize work flows, balancing time spent studying organisms in the field against time spent working with data is discussed. It is argued that a lack of funding for this sort of approach is likely to continue until the theoretical, practical and financial links are made between the realities of field observation and data collection, and the overwhelming need to mitigate the impacts of climatic change. Finally, the role of refugia in plant conservation in the Arabian Peninsula is discussed.

Biography: Tony Miller is Head of the Centre for Middle Eastern Plants (CMEP) which is a group based at the Royal Botanic Garden Edinburgh. CMEP research focuses on floristic, systematic, molecular, bio-informatic and conservation studies in SW Asia. A major focus of the group is the production of the Flora of the Arabian Peninsula and Socotra – which, when complete, will be the first authoritative treatment of the plants of the region. The group works closely with governmental organisations and institutes throughout the region and is actively involved in botanical, horticultural and conservation training and capacity building initiatives. Work under the auspices of the Arabian Plants Specialist Group (a group representing botanists from Arabia) has recently involved setting up an Arabian plant data base, preparing a Red List of Arabian plants, a checklist of plants of the Arabian Peninsula and a system of protected areas across the region. A notable project over the last 15 years has been the development of a conservation programme in the Socotra Archipelago.

Colonization Time of Arabia by the White-tailed Mongoose (*Ichneumia albicauda*) as Inferred from Mitochondrial DNA Sequences

Carlos Fernandes

University of Lisbon
Email: cafernandes@fc.ul.pt

Most of the terrestrial mammal species present in the Arabian Peninsula are, biogeographically, Afrotropical or Saharo-Sindian. The former elements tend to be seen as the result of direct dispersals from Eritrea-Somalia into southwestern Arabia but, given the evidence for colonization through the Sinai by Afrotropical species from other faunal groups, our view on the route(s) and time(s) of their invasions of Arabia necessarily remains hazy. The white-tailed mongoose (*Ichneumia albicauda*) is a mammalian carnivore of the family Herpestidae widely distributed across sub-Saharan Africa in a broad range of habitats from woodland to semi-deserts, and also found in southern Arabia. A recent study using phylogenetic analyses of partial sequences of the mitochondrial DNA (mtDNA) control region, examined the phylogeography of the species and contrasted it with its current morphology-based subspecies taxonomy. Here I use this mtDNA dataset and, since no specimens from the eastern Sahel facing the Red Sea have been analyzed, homologous sequences from white-tailed mongooses sampled in Eritrea, to investigate the colonization time(s) of Arabia by the species. Depending on which time intervals these estimates fall, and relating them with paleoenvironmental evidence, it might be possible to deduce the most feasible scenario for the colonization(s) of Arabia by the white-tailed mongoose. For instance, if they correspond to periods of a remarkably shallow and narrow southern Red Sea, then direct dispersal from the Horn of Africa into southwestern Arabia is a potential explanation, probably involving sweepstake rafting. Conversely, if they match with phases in which the Red Sea was significantly wide and deep and the eastern Sahara could have been substantially reduced, then episodic range continuity or migrations around the Red Sea might be a more likely hypothesis. Finally, if the inferred colonization time is very recent, the possibility of anthropogenic introductions in historic times should be taken into account. A more general aim of this paper is to contribute much-needed phylogeographic data to the subject of Afro-Arabian biogeography and to increase our knowledge on the evolutionary history of the mammalian fauna of Arabia.

Biography: Carlos Fernandes has a degree in Biology at the University of Lisbon, Portugal, in 1998, and a PhD in Phylogeography and Molecular Systematics from the University of Cardiff, UK, in 2004. Currently he is a researcher in landscape genetics at the Centre of Environmental Biology of the University of Lisbon within the program Ciência 2007 of the Portuguese Foundation for Science and Technology. His research interests relate to evolutionary history and biogeography using genetic markers, conservation genetics, landscape genetics, and mammals. He has a particular interest in Afro-Eurasian species and Afro-Arabian zoogeography.

Freshwater and Marine Fish Conservation in Arabia

Fareed Krupp

Senckenberg Research Institute and Natural History Museum, Senckenberganlage 25, 60325 Frankfurt, Germany

Email: f.krupp@senckenberg.de

Diverse Afrotropical freshwater fish assemblages once inhabited the Arabian Peninsula, but present-day aridity has resulted in an impoverished fauna. The region is home to 18 endemic species of primary and two species of secondary freshwater fishes. Several species of marine origin also inhabit inland waters. The distribution and conservation status of all freshwater-fish species has been assessed in recent years. At least four species must be considered critically endangered. Major threats are uncontrolled development, associated with water abstraction, habitat fragmentation, pollution, and introduction of alien species. The adoption of a regionally coordinated ecosystem approach towards the conservation of freshwater biota is urgently required, including protected areas, enhanced assessment and monitoring programmes, captive breeding, raising public awareness and improving environmental legislation and enforcement. With more than 2000 species, fish diversity in the Arabian Sea Region is one of the highest at a global scale and the degree of endemism is significant. While many parts of the Red Sea and southern Arabia are still in reasonably healthy condition, the Gulf environment is in rapid decline. Over-exploitation and destructive fishing methods pose the greatest threat to marine fish. In many parts of the region, populations of economically important species, such as sharks, are on the verge of collapse. In addition, human population and economic growth have contributed to increased development, associated with pollution, dredging and filling operations with negative effects on fish populations. Stock assessments and IUCN species and biotope Red Lists are urgently required as a tool for planning and management of conservation and sustainable fisheries. The lack of enforcement of existing fisheries legislation needs major attention.

Biography: Fareed Krupp is an aquatic biologist specialising in fish research and environmental management in Arabia. He has a PhD on Arabian inland water fishes and is Editor of Fauna of Arabia as well as Curator of Fishes at Senckenberg Research Institute in Frankfurt in Germany. He was based in Saudi Arabia for more than 10 years, managing regional marine conservation projects in the Gulf and Red Sea. Presently he is Project Group Leader for Tropical Marine Ecosystems at the Biodiversity and Climate Research Centre in Frankfurt, Germany.

Socotra

Kay van Damme

Ghent University, Sint-Pietersnieuwstraat 25, B - 9000 Ghent, Belgium

Email: Kay.VanDamme@UGent.be

Socotra Island is a unique island in the Indian Ocean, the largest island of the Arabian world, and part of Yemen. Its long isolation and origin, make this island a place with many endemics, species unknown elsewhere in the world, and a unique culture of local people that have protected the environment for thousands of years. Yet, as many places in the world, Socotra is also under threat. Among overdevelopment and tourism, other threats arise such as invasive species, to which the current, fragile ecosystems, are not resistant. Because of isolation, conservation on an island poses many problems unknown in conservation on the mainland. Impacts that may seem small on continental sites may be much larger in an island, especially like Socotra, having been isolated for many years and well protected by local people. The current situation is one in need for stronger protection and awareness, to sustain the biodiversity of this place for generations to come.

Biography: Kay Van Damme is a freshwater biologist and specialist in zooplankton taxonomy. Born in Ghent, Belgium, 1976, he obtained his PhD in Biology at Ghent University, Belgium. Since 1999, Kay Van Damme has been actively involved in biodiversity and conservation of Socotra Island, Yemen, where he also investigated life inside the cave systems. He played a leading role as scientific editor and author of several chapters in the book, *Socotra: A Natural History of the Islands and their People*, one of the main arguments for the recent UNESCO World Heritage Nomination of this unique island. He has written many papers in internationally peer-reviewed journals, prepared a book and several book chapters, and has described several species new to science, a new family and several new genera. He is currently Chairman of the Friends of Socotra, an organization striving for increased awareness and protection of natural and cultural heritage of the island.

Flyway and Stopover Conservation in the Arabian Peninsula

Mohammed Shobrak

Taif University, PO Box 800, Taif 21974, Kingdom of Saudi Arabia

Email: mshobrak@gmail.com

The importance of the Arabian Peninsula for migratory species is discussed through integration of the different strategies used by bird species to move, the different travel schemes, and the function of stopover sites in the annual life cycle or daily pattern of birds. Understanding these strategies is vital in order to improve conservation action; e. g soaring birds may experience bottlenecks, where conservation action may need to be priority. In addition, the different travel schemes adopted by birds have important conservation implications; ‘hopping’ birds require suitable sites at regular distances, whilst ‘skipping’ birds need larger sites where they can reliably feed. On other hand, long distance migrant “jumping” relies heavily on the existence of larger areas with sufficient food resources and limited disturbance, where birds can quickly and safely restore their body condition. However, migration routes do not always cover the same geographical areas in both directions. Some species have geographically narrow migratory ranges, whereas for others the range may be very broad. In addition, the threats affecting migratory species in the flyway through / over the Arabian Peninsula are identified and discussed. The conservation and the sustainable management of migratory species will be not achievable without all stakeholders along the flyway working together. Therefore, countries in the region are recommended to work with International bodies to improve conservation actions for migratory species.

Biography: Mohammed Shobrak is an ornithologist working as Assistance Professor and Bird Advisor for the National Commission for Wildlife Conservation and Development (NCWCD), and Head of the Biology Department of Taif University, Saudi Arabia. He received his BSc from King Saud University in 1987, and then worked with NCWCD for 21 years before moving to Taif University in 2007. While working with NCWCD he received a scholarship from the British Council to do his postgraduate studies in Glasgow University, which he finished in 1996. In 2008 he was elected by the partners in the BirdLife International Middle East to join the BirdLife Global Council. He has published a number of papers on vultures and others birds and wildlife in Saudi Arabia. He has represented Saudi Arabia, NCWCD and Taif University an several meetings for the different wildlife conventions, birds and wildlife conferences and workshops. He is considered one of the regional experts in birds and wildlife conservation.

Population Structure, Migratory Connectivity and Inference on Gene Exchange Mechanisms in the Asian Houbara

Olivier Combreau, Samuel Riou, Jacky Judas and Mark Lawrence

International Fund for Houbara Conservation, PO Box 45553, Abu Dhabi, United Arab Emirates

Email: olivier.combreau@gmail.com

Identifying biologically relevant management units is critical to the design of an appropriate conservation strategy for the Asian houbara bustard at a time when large-scale conservation projects are being put in place. A population genetic study using samples from throughout the range of the Asian houbara has revealed a phylogeographic structure suggesting the existence of three separate groups: a Central Asian group of migrants and residents, closely related to a resident population from Egypt-Sinai, and a third, relatively differentiated resident population from Yemen. This indicates some level of genetic isolation of southernmost populations and gene flow among Central Asian populations. Using satellite tracking techniques we evaluated the extent of migratory connectivity between populations, natal dispersal and fidelity to breeding sites with a view to identifying the possible mechanisms underlying exchange of genetic material. We show that substantial partitioning in migration routes and wintering grounds as well as strong philopatry are the general rules. However, the possibility of dissemination of long-migrant genes within shorter migrant Central Asian populations was observed in young adults at one year of age. Additionally, breeding en-route for both males and females appears to be a possibility: a number of migrant birds on their return migration were observed stopping for long periods on breeding grounds already occupied by shorter migrants.

Biography: Olivier Combreau is a consultant for the International Fund for Houbara Conservation in Abu Dhabi, UAE. From 1992 to 1994, he worked as an ecologist at the National Wildlife Research Centre of the National Commission for Wildlife Conservation and Development in Taif, Saudi Arabia. In 1996, he was recruited as ecologist and then as Houbara Programme Manager at the National Avian Research Centre (NARC) of the Environment Agency of Abu Dhabi, where he undertook large-scale study on houbara ecology and gained expertise in satellite tracking. From 2001 to 2009, he was been Director of NARC, in charge of developing intensive houbara captive-breeding, ecological research and conservation programmes.

Effect of Rising Seawater Temperatures on Bleaching in Two Reef Building Corals *Pocillopora damicornis* and *Pocillopora verrucosa* in the Red Sea, Saudi Arabia

Abdulmohsin A. Al-Sofyani and Yahya A. M. Floos

King Abdulaziz University, PO Box 80200, Jeddah 21589, Kingdom of Saudi Arabia

Email: sofyani@hotmail.com

The overall annual range of seawater temperature in Obhur Creek, a small embayment on the western coast of Saudi Arabia was 8.5°C, between 24.5°C and 33°C. Zooxanthellae density showed both species-specific and seasonal variations, e.g. the number of zooxanthellae in *P. damicornis* was slightly higher than in *P. verrucosa*, however zooxanthellae density was 62% to 66% lower in summer than in winter for both species respectively. Similarly, the two species differed from each other in the respiration rates of their associated zooxanthellae. The respiration rate for *P. verrucosa* was similar in summer and winter, suggesting compensatory acclimation. In contrast, in *P. damicornis* the respiration rate was lower in winter than in summer. It is concluded that in both species, the difference in zooxanthellae thermal tolerances at 35° C correspond to differences in tolerance of algal genotypes between the two species, resulting in *P. damicornis* bleaching as the process of metabolism exceeds the process of photosynthesis with increase temperature. During the winter season the metabolic rate was higher for both species due to optimum temperature of the seawater. As a result of the density of zooxanthellae and optimum temperature of the seawater 30°C, the growth of the skeleton of the two coral species was twice higher in winter than in summer.

Biography: [Biography not supplied]

Re-introductions in Modern Arabia: the First Step for a Grander Vision?

Mark Stanley Price

*Wildlife Conservation Research Unit, University of Oxford, Tubney House, Abingdon Road, Tubney,
Abingdon OX13 5QL, United Kingdom
Email: Mark.Stanleyprice@zoo.ox.ac.uk*

Countries of the Arabia Peninsula have pioneered re-introductions of the Arabian oryx and houbara bustard, both cultural icons. But many elements of regional biodiversity are highly endangered with extinction looming. Can these aspects be combined, using the detailed information available from the ten years of CAMP workshops at Sharjah, to develop a grand vision for the future of Arabia's ecosystems and ecological processes, thereby moving perceptions and attitudes from saving and restoring individual species to conserving biodiversity in a holistic manner? Some of the expected issues around this concept of re-wilding will be explored. With the track record of states and the value of iconic species held in country, and presumed social changes within the countries concerned, the case is made for encouraging development of this grand vision with the institutions and mechanisms needed to achieve it.

Biography: Mark Stanley Price is currently a Senior Research Fellow at the University of Oxford's Wildlife Conservation Research Unit (WildCRU), and Conservation Fellow at the Al Ain Wildlife Park and Resort's Centre for Arid Land Conservation. He was the first Field Manager for Oman's oryx re-introduction project, which led him to forming the IUCN/SSC Re-introduction Specialist Group, which he chaired until 2000. Time with the African Wildlife Foundation (1987-1999) and the Durrell Wildlife Conservation Trust (2001-08) drew him into the interface between in- and out-of-the-wild conservation, and the scope for moving animals and techniques flexibly between the two. Mark has just assumed the Chair of the new SSC Sub-Committee for Species Conservation Planning, and will also be working with the Re-introduction Specialist Group on updating the IUCN reintroduction guidelines and policy on the translocation of plants and animals under present conditions, including the anticipated impacts of climate change. Mark also sits on the board of Marwell Wildlife and the advisory council of the World Land Trust.

Poster Abstracts

Abstracts have been edited for space and format

Mammals of Jabal Moussa Nature Reserve: survey, status and conservation

ABI-SAID MR

*American University of Beirut, Faculty of Art and Sciences, Biology Department
Animal Encounter, AlZhour Street, Aley, Lebanon*

Mammals play a major part of the Lebanese biodiversity and their presence is essential for the wellbeing of the ecosystem. However, they are probably the least well studied faunal group in Lebanon. Mammals as most Lebanese fauna are thought threatened by habitat destruction, urbanization, over-hunting and persecution. Hence, documentation of the species present is essential for an effective conservation strategy. Jabal Moussa Nature Reserve (JMNR) is a typical Lebanese Mountainous Mediterranean Scrubland Biome with different topography and elevations ranging from 700m-1500m asl. Information on the presence of mammals in JMNR was initially assessed through information from focal group discussions and individual interviews, followed by camera trapping, rodent trapping, night drives, and transect surveys were conducted from March 2008 to July 2009. The field survey revealed the richness of JMNR in mammal diversity. Nineteen species of mammals belonging to six orders and 15 families were identified among which one rodent species new to Lebanon and 3/4 classified as threatened on the national level. This richness could be referred to its ecosystem, location, elevation differences, and closeness to urban areas. Besides, the harshness of the ecosystem makes the reserve unpopular for human activities, hence less disturbance to biodiversity. Nevertheless, threats from hunting and habitat loss still persist. Populations of most mammals were found to be healthy and good population number proposing the reserve as an in-situ breeding place for mammals to augment other Lebanese reserves. A series of conservation recommendations are presented on the basis of this survey.

Genetic assessment of the Arabian Oryx founder population in the Emirate of Abu Dhabi, UAE: an example of evaluating unmanaged captive stocks for reintroduction.

EL ALQAMY H¹, Roberts MF², McEwing R² and Ogden R²

¹ *Terrestrial Environment Research Center, Environment Agency - Abu Dhabi, PO Box 45553,
Abu Dhabi United Arab Emirates*

² *Zoological Genetics Unit, Royal Zoological Society of Scotland, Edinburgh EH12 6TS, United Kingdom*

Since being declared extinct in the wild in 1972, the Arabian oryx has been the subject of intense and sustained effort to maintain a healthy captive population and to reintroduce the species to its ancestral range. Previous reintroductions and associated genetic assessments focused on the release of closely managed zoo animals into Oman and included observations of inbreeding and outbreeding depressions. Here we describe the use of multiple unmanaged herds as source populations for a new reintroduction project in the United Arab Emirates, allowing a comparison between studbook management and uncontrolled semi-captive breeding approaches to the conservation of genetic diversity. Results of mitochondrial control region sequencing and 13-locus microsatellite profiling highlight a severe lack of diversity within individual source populations, but a level of differentiation among populations that supports the formation of a mixed founder herd. The combined release group contained a similar level of diversity to each of the intensively managed captive populations. The research includes the first genetic data for

animals held on Sir Bani Yas island, a former private reserve which holds over 50% of the world's Arabian and scimitar-horned oryx and is recognized as having huge potential for re-establishing endangered antelope species in the wild. The genetic assessment provides the first stage of an ongoing genetic monitoring programme to support future supplemental releases, translocations and genetic management of reintroduced populations.

Population growth and establishment of reintroduced Arabian oryx in Abu Dhabi Emirate, UAE

EL ALQAMY H and El Dahrie A

*Terrestrial Environment Research Center, Environment Agency - Abu Dhabi, PO Box 45553,
Abu Dhabi United Arab Emirates*

Arabian oryx was reintroduced into Abu Dhabi Emirate in 2007. A founder population of 98 animals was released in 3 groups. Population was monitored for demographical parameters and habitat utilization. The population size has reached 155 individuals in 3 years scoring a 58% overall growth. Calves' survival rates were enhanced from only 64% in 2007 and up to 77% and 94% in 2008 and 2009 respectively. Births seasonality was recorded where a peak of births is occurring on a 10 -11 month cycle. Sex ratio is highly skewed towards females due to higher mortalities among males. Males' mortality is mostly attributed to fighting induced traumas. Stable social groups have evolved and currently animals are maintaining their structure in main sub herds. Habitat utilization patterns were evaluated using raster methods utilizing daily counts data. Two distinctive patterns of animal spread was recognized during both summer and winter seasons. Relatively wide-spread movements are endeavored in the winter season while very restricted movements are seen during the summer.

Observations on foot and mouth disease in vaccinated and unvaccinated wildlife in the United Arab Emirates

BAILEY TA¹, O'Donovan D², Kinne K³ and Wernery U³

¹ *The Dubai Falcon Hospital, PO Box 23919, Dubai, UAE*

² *Wadi al Safa Wildlife Centre, PO Box 27875, Dubai, UAE*

³ *Central Veterinary Research Laboratory, PO Box 597, Dubai, UAE*

Foot-and-mouth disease (FMDV) is a contagious but usually nonlethal disease of ruminants. The virus is endemic in domestic livestock populations in the Middle East, but is rarely reported in wildlife. We present observations on two outbreaks of FMD in one unvaccinated and a second vaccinated collection of wild ungulates in the UAE. Our paper compares and summarises the features of two outbreaks of foot-and-mouth disease (FMD) in one unvaccinated collection and a second vaccinated collection of wild ungulates in the United Arab Emirates (UAE) and highlights the importance of vaccination protocols to protect wildlife in a region where infectious viral diseases, including FMD, are endemic. Site 1 (unvaccinated) was a collection of dorcas gazelles (100) and sika deer (25). Site 2 (vaccinated) was a collection comprising blackbuck (~80), sand gazelle (~20), Arabian oryx (~45), mountain gazelle (~8), impala (~48) and spekes gazelle (~36) where most animals had been vaccinated annually against FMD since 2006. Affected animals

were euthanased and submitted to the Central Veterinary Research Laboratory (CVRL, Dubai) for investigation. Necropsy and virology was conducted at the CVRL. Viral isolates were sent to the World Reference Laboratory at the Institute for Animal Health (UK) for characterisation. The majority of gazelles and deer were severely lame and approximately 50-60% of the gazelles died at site 1 over a 6 wk period. Most free-ranging blackbuck were lame and FMD was confirmed in one euthanased blackbuck female and 4 dead juvenile animals at site 2. Oral and cardiac lesions were observed and FMD virus type O was isolated. The virus was closely related to FMD strains from India (Ind-2001) and Iran (Irn-2001). The source of infection was not confirmed for either outbreak, but was suspected to be from dairy cows imported from Iran (site 1) and an adjacent infected sheep farm (site 2). Except for a study by Kilgalon *et. al.* the immunological response to any FMD vaccine has not been established in exotic ungulates. The authors concluded that a single dose of FMD vaccine may not elicit a sufficient antibody response in Arabian oryx to confer lasting protection. Our observations indicate that, although the animals at site 2 were only vaccinated annually, they were afforded good protection when exposed to the same FMD strain that caused high mortality in unvaccinated gazelle at site 1.

Wildlife Middle East News - An Initiative to raise the Awareness of Environmental and Conservation Issues Affecting Wildlife in the Middle East

BAILEY T¹, O'Donovan D², Lloyd C³ and Bailey T⁴

¹ *Dubai Falcon Hospital, PO Box 23919, Dubai, United Arab Emirates,*

² *Wadi Al Safa Wildlife Centre, PO Box 27875, Dubai, United Arab Emirates,*

³ *Nad Al Shiba Vet Hospital, PO Box 116345, Dubai, United Arab Emirates,*

⁴ *Zayed University, Dubai, United Arab Emirates*

There are great pressures on the environment and wildlife throughout the Middle East. The rapid pace of economic development, the fragility of the natural ecosystems and low population densities are factors making many indigenous species vulnerable to extinction. The Middle East is an important migration route and wintering area for a large proportion of northern Palearctic birds. In this sensitive area, habitat degradation, oil spills, pesticide use, and infectious disease outbreaks have the potential to cause immense impacts on free-living and captive wildlife populations. In some cases wildlife species, e.g. waterfowl, may carry diseases such as the highly pathogenic avian influenza virus that can cause great economic impact to poultry industries, cause disease in other birds (e.g. falcons), as well as being dangerous to humans. Factors hindering the ability of the veterinarians, biologists and wildlife managers to work in the region are discussed. The authors describe a information newsletter they have established which is contributing to the development of a network between zoo and wildlife professionals and aims to be an important source of regional information on zoo and wildlife management, husbandry and care. The objectives and a review of the first three years of operation of Wildlife Middle East News will be presented.

Captive breeding program of the Arabian leopard (*Panthera pardus nimr*) – an overview

BUDD JA

Breeding Centre for Endangered Arabian Wildlife, PO Box 29922, Sharjah, United Arab Emirates

Captive breeding plays a pivotal role in conserving endangered species by providing a healthy “safety net” population with which to buffer dwindling numbers in the wild. According to IUCN Red List criteria, the Arabian leopard (*Panthera pardus nimr*) is critically endangered. Captive breeding is an essential component of conservation for this species. Many experts are of the opinion that the Arabian leopard will not survive in the wild without the reintroduction of animals from captive breeding programs. The captive breeding program has been operating on a regional level since 1999, although the first Arabian leopards registered in the studbook were caught in 1985. The current living population consists of 37.34 (71) leopards, 19 of which are wild caught and a large number do not actively participate in the breeding program. The program focuses on ensuring a genetically sound population that closely resembles the wild population. An overview of the current status of the captive population is given. Current and predicted trends within the population are compared with recommended trends and graphically illustrated using dedicated population management software, PM2000.

A framework for the Conservation of the Arabian leopard *Panthera pardus nimr*

BUDD JA¹, Breitenmoser U², Mallon D³ and Breitenmoser-Würsten C⁴

¹ *Breeding Centre for Endangered Arabian Wildlife, P.O. Box 29922, Sharjah, United Arab Emirates*

² *IUCN/SSC Cat Specialist Group, Switzerland*

³ *IUCN/SSC Antelope Specialist Group, Manchester, United Kingdom*

⁴ *KORA*

According to IUCN Red List criteria, the Arabian leopard *Panthera pardus nimr* is critically endangered. Urgent conservation action is required to secure its survival. Since 2000, the Arabian leopard has been a priority species at the annual CAMP workshops held at the Breeding Centre for Endangered Arabian Wildlife (BCEAW), Sharjah. Strategic planning for the conservation of endangered species includes 1) compilation of baseline data (status report), 2) definition of common goals and activities at the range level (conservation strategy) and 3) the definition of tasks and activities for each range country (action plan). Baseline data for the Arabian leopard was compiled into a regional status report that was published in 2006 as a special edition of the Cat News, the quarterly journal of the IUCN Cat Specialist Group. These reports form the basis of a range-wide Conservation Strategy. The development of visions and goals for conserving the Arabian leopard, setting of objectives to fulfill these goals and assigning actions that will ensure the objectives are met was achieved in a participative workshop using a logistic framework approach. The scenario for the recovery of the Arabian leopard is discussed, highlighting the important points in strategic conservation planning.

Indirect impacts of distant breakwaters on coral communities in Dubai, United Arab Emirates

BURT JA

Faculty of Science, New York University-Abu Dhabi, PO Box 129 188, Abu Dhabi, United Arab Emirates
Email: John.Burt@nyu.edu

Large areas of coral reef in Dubai have been lost to direct burial and by sedimentation associated with coastal construction projects. Such developments may also have indirect impacts on coral communities by modifying coastal hydrodynamics. I used a Before/After-Control/Impact design to assess the indirect effects of a 200 m long breakwater on corals by comparing coral communities at a control reef and an impacted reef 700 m in the lee of a breakwater. Each reef was sampled biannually for one year before and after breakwater construction using permanent photoquadrats. On the control reef, coral cover increased significantly over the course of the study, and community structure remained stable. Coral cover on the impacted reef declined from 50% to 18% after breakwater construction, and there were significant declines in the number of live colonies, and mean colony size. Community composition changed significantly as well; *Acropora* spp. were eliminated, and faviids and poritiids increased in proportional abundance on the impacted reef. There was no change in sediment abundance on the control reef, but there was an increase in fine silts following breakwater construction on the impacted reef. This resulted from reduced wave action rather than sedimentation produced by construction, indicating the importance of indirect effects of coastal developments on reefs. Overall, these results indicate that breakwaters can have indirect impacts for distances extending hundreds of meters from its footprint as a result of changes in wave action, and that such indirect impacts should be considered during the development of coastal management plans.

A study on phoretic mites

AL-DEEB MA, Muzzaffar SB and Enan MR

Department of Biology, Faculty of Science, United Arab Emirates University, PO Box 17551, Al Ain, UAE

A study on phoretic mites associated with *Oryctes agamemnon* (Coleoptera: Scarabaeidae) was conducted in Al-Ain in UAE. The purpose of the study was (1) to document the presence of phoretic mites, (2) to make a genetic profile, and (3) to study host mite load and body distribution. *Oryctes agamemnon* beetles were collected from date palm farms and examined under stereoscope. Mites were counted on different beetle body parts. The molecular technique, randomly amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR), was employed to make a genetic profile. The results showed that a phoretic mite species, *Sancassania* sp. (Acaridae: Astigmata), was associated with *O. agamemnon* adults and larvae. Most of the mites were found under the elytra and in the sub-elytral space. By developing the reaction products with agarose gel electrophoresis, it became evident that DNA fragments were amplified with all the primers used. The banding pattern can be used in the identification of the UAE *Sancassania* spp. The presence of this mite in desert ecosystem indicated that more phoretic mites may exist in the desert. This finding was the first record of *Sancassania* in UAE. It also added a new genus to the UAE biodiversity list. This phoretic mite and other mites in general need to be studied and conserved.

Amputation of the front leg of a wild-caught caracal (*Caracal caracal schmitzi*) following trauma caused by a gin trap

Digeronimo PM¹, Budd J² and PAS A²

¹ University of Pennsylvania, School of Veterinary Medicine, Philadelphia, PA, USA

² Breeding Centre for Endangered Arabian Wildlife, P.O. Box 29922, Sharjah, UAE

Email: an.pas@bceaw.ae

A locally wild-caught caracal was brought to the Breeding Centre for Endangered Arabian Wildlife (BCEAW) with trauma to the front leg consistent with injuries caused by a gin- or leg-holding trap. The wound was several days old, severely infected and infested with maggots. The leg had to be amputated below the elbow. The animal recovered well and will become part of the breeding program at the BCEAW. This case illustrates the severe implications of the use of trapping devices and the negative impact on the remaining population of caracal in the UAE.

Three cases of mortality in young wild-caught Arabian Tahr (*Hemitragus jayakari*) removed from their mother before weaning age.

Digeronimo PM¹, Strick J² and PAS A²

¹ University of Pennsylvania, School of Veterinary Medicine, Philadelphia, PA, USA

² Breeding Centre for Endangered Arabian Wildlife, P.O. Box 29922, Sharjah, UAE

Email: an.pas@bceaw.ae

Three wild-caught Arabian tahr kids were privately kept for several days before being delivered to the Breeding Centre for Endangered Arabian Wildlife (BCEAW, Sharjah, UAE). Within a week, each showed worsening signs of secondary infections (cryptosporidiosis and pasteurellosis) associated with malnutrition and decreased immunity. Despite intensive medical management, all tahr kids developed severe clinical signs (e.g. chronic diarrhoea, dyspnoea, and collapse) and had to be euthanased. This illustrates how young animals that are poached and prematurely separated from their dam are at greater risk of infectious disease and have decreased survivability.

The Dibatag antelope (*Ammodorcas clarkei*): in-situ conservation efforts for a threatened species in Ethiopia by Al Wabra Wildlife Preservation (AWWP)

HAMMER C, Deb A, Wilhelmi F and Hammer S

Al Wabra Wildlife Preservation, PO Box 44069, Doha, State of Qatar

In 2002, the alarming status of the Dibatag antelope (*Ammodorcas clarkei*), one of the least known antelope species, had caught the attention of the Al Wabra Wildlife Preservation (AWWP) owned by Sheikh Saoud Mohd. Ali Al-Thani. A field project was launched to contribute to sustainable conservation measures for this elusive endemic antelope in the Ogaden Region of Southeast Ethiopia- a biodiversity hotspot, known for its long history of civil war, political unrest and turmoil. Intensive field surveys in the Ogaden Region estimated a population density in this region to be about 0.03 individuals/km² equivalent to 2.300 individuals in 2005. Numerous

hitherto unknown facts about the species were obtained and published through this project. In addition to establishing a headquarter and information centre, a large number of capacity building and drought relief services were provided to the local community. Hunting on Dibatag also dropped significantly within the regular surveillance area. The declining population numbers of the species, as well as the ongoing war within the restricted habitat of the Dibatag, make ex-situ captive breeding an urgent necessity for the conservation of the species. Therefore, the second phase of the AWWP project aims to establish Ex-Situ Breeding for the Dibatag Antelope. The objective is to form a breeding nucleus for the ex-situ breeding population using abandoned young Dibatag in the field, to be kept, bred and studied at AWWP. Although, the Conservation Breeding Specialist Group (CBSG) of the IUCN Species Survival Commission strongly endorses the proposal The current political situation in the Ogaden does not allow any access to the research site condemning the project to an “on hold” status.

Conservation of the threatened Arabian Bustard in Tehama – Yemen

JUDAS J and Paillat P

National Avian Research Center, PO Box 45553 Abu Dhabi, UAE

The Arabian Bustard *Ardeotis arabs* inhabits the arid environments of the Sahelo-Sudanese belt from Senegambia to Eritrea, with a range extension on the Tehama plain on the south-western side of the Arabian Peninsula. Historically, the species was found all along the Red Sea coast from Jeddah in Saudi Arabia to Aden in Yemen, but has by now probably already been extirpated from Saudi Arabia. Population size and distribution range in Yemen has also been considerably reduced in the last decades. Surveys conducted by our team since 2005 highlighted the different threats faced by the species in Tehama - Yemen. Poaching of adult bird illegally trade toward Saudi Arabia for falcon training, change in agricultural practices, egg collection by children or farmers, increasing number of feral dogs, disturbance of breeding females on nest, result in reduced adult survival and low breeding success, which will undoubtedly lead to continuous decline of the population, and will finally end-up with local extinction if no conservation actions are taken. Public awareness campaigns targeting schools and officials already show encouraging results in the perception of the species by local communities. On-going ecological research (satellite tracking, habitat use, population monitoring) will help to develop and implement other conservation measures.

A Comparative Study of Vegetation Structure and Regeneration between two Monitoring Surveys in Dubai Desert Conservation Reserve

KHAFAGA TA

Dubai Desert Conservation Reserve, Dubai, UAE

The research into the vegetation of the Dubai Desert Conservation reserve (DDCR), Dubai – United Arab Emirates, is designed to implement a continuous practical and efficient monitoring program and to apply analytical tools for easy data interpretation. This information and data is indispensable for management of the DDRC. The objective of the study was to compare the structure and the regeneration patterns of the vegetation between two monitoring surveys (2004

and 2008) in the Dubai Desert Conservation Reserve. The study policies were to implement continuous practical and comparative vegetation monitoring program and to apply analytical tools for the data interpretation which mainly emphasize the assessment of density, cover and diversity of the flora. Mapping the vegetation and defining lineage between different floral communities, using multivariate analysis combined with GPS techniques was also an objective of the study. The results showed an incredible increase in species abundance and diversity when compared to the first monitoring study, the data indicates a good habitat recovery and it was attributed to the removal of the camel farms that were previously located within the reserve, which gave the vegetation and the habitats a good chance to recover.

The modern problems of Biodiversity Conservation of Jebel Hafeet (UAE)

KORSHUNOV VM

Management of Nature Conservation, Department of the President's Affairs, Al Ain, UAE

Natural complex of Jebel Hafeet as a matter of fact is insular ecosystem. Substantial number of plants and animals species from the nearby mountain system of Oman and surrounding it desert is concentrated here. The system of nature protection, developed by us and the actualized, allowed to a great extent to conserve of biodiversity this unique ecosystem. By main problems stay intensified of anthropogenic transformation of landscape and not full study of flora and fauna species composition of Jebel Hafeet.

Conservation Workshops for the Fauna of Arabian 2000-2009

AL MIDFA A¹, Mallon D² and Budd K³

¹ *Environment and Protected Areas Authority, PO Box 2926, Sharjah, UAE*

² *IUCN/SSC Antelope Specialist Group, United Kingdom*

³ *Breeding Centre for Endangered Arabian Wildlife, PO Box 29922, Sharjah, UAE*

In 2000, having recognizing the transboundary nature of biodiversity issues and that networking and information sharing are pivotal in addressing major regional and global challenges, such as biodiversity conservation and climate change His Highness Dr Sheikh Sultan bin Mohammed Al Qassimi, Supreme Council Member and Ruler of Sharjah hosted the first Conservation Workshop for the Fauna of Arabia. The ten workshops that have taken place between 2000 and 2009 have been attended by a total of 316 people from 41 countries, including all those in the Arabian Peninsula, and several from the rest of the Middle East. The initial aim of the workshops was to review the current distribution and status of various taxonomic groups at the regional level, assess threats and recommend necessary conservation actions. So far, 203 species have been assessed. During these workshops other issues affecting biodiversity conservation in the Arabian Peninsula have been raised, one of these was the need for protected areas. Protected Areas have therefore been at the centre of workshops since 2007, and have included: reviewing the current Protected Area Network in the Arabian Peninsula; evaluation of management effectiveness; and identifying priority sites for establishment of transboundary conservation areas.

Mugger crocodile (*Crocodylus palustris*) Study in Iran

MOBARAKI A¹ and Abtin E²

¹ Department of Environment, Wild life and Aquatic affairs Bureau, PO Box 14155-7383, Tehran, Iran

² Department of Environment, Sistan and Baluchestan Provincial Office, Zahedan, Iran

A small population of Mugger crocodiles is distributed in southeastern Iran, in Sistan and Baluchestan province. The area is known as the western most global range of the species. The main characteristic of the population is that it has been divided to several sub-populations along the main rivers and existing habitats as well as being scattered in the area. The crocodiles, with an estimated population size of about 200-300 (Mobaraki 2000) individuals, occupy a vast range of water bodies (Mobaraki 2003). Their noteworthy habitats are along 3 main rivers of the area, Kaju- Sarbaz and Bahukalat, and the natural ponds along these rivers are considered as their main habitats. The other important habitats for the crocodiles are artificial water bodies constructed by local people for rain and run off water storage. These habitats especially small dams, support considerable numbers of crocodiles. In the past year also based on some observations Nahang River along Iran-Pakistan border in northern part of Baluchistan has recorded as the new site for the Muggers in Iran. Nesting season was reported to start in mid May but according to the recent findings in 2009 it seems that nesting could take place from mid April. Crocodiles use any available resources as food, such as fish, birds, insects, dogs and even villager's livestock but they are mainly dependant on existing fish stocks. One of the most specific and important behaviors of Mugger is burrowing which is mostly used as refuge to avoid heat and cold and may be other purpose. Migration or movement between water bodies in different distances is another considerable behavior of Muggers in the area. The number of observed hatchlings in different nest and nursery sites indicates of high mortality of hatchlings. In the conducted studies in the past years the main habitats have been identified and biometric data on crocodiles like the length and weight have been collected by capturing of crocodiles. The longest recorded one was 274 cm in Pishin dam but in the past year we could record larger ones too. Fortunately there is not any hunting on crocodiles in Iran and local people based on their cultural beliefs respect crocodiles and never cause any harm to them. But natural factors like drought and flooding are the main threats causing considerable loss to crocodiles. The area was faced to extreme drought for 6 years following with harsh floods in 2004 and after ward. Drought season provided many problems to the crocodiles leading to death and loss of reproduction. In this period the main and in some parts the only existing habitat was Pishin Dam reservoir which supported the main part of the crocodile population. Flooding, each time, cause that some crocodiles to be fallen in the overflow pool of the dam causing some injuries and death. In the past years these crocodiles were captured and released to the reservoir (Abtin and Mobaraki 2007). More over some activities like dam construction causes population fragmentation. As a management option, the main part of crocodile habitats has been designated as "protected area" named Gandoas well as "International wetland" (Ramsar site). Mugger crocodiles are listed as an "Endangered Species" and there is a fine of 32 million Rials for each one killed. In IUCN Red list of threatened species Mugger crocodile is listed as "Vulnerable" and the main threatening factors of this species are habitat destruction and fragmentation.

Sea Turtle study in Iran

MOBARAKI A

Department of Environment, Wildlife and Aquatic Affairs Bureau, PO Box: 14155-7383 Tehran, Iran
Email: amobaraki@yahoo.com

I.R. of Iran has the longest coastline on the northern shores of the Persian Gulf and Oman Sea. Some parts of the coastlines in the mainland are sandy beaches, which are suitable for the nesting of sea turtles. More over there are about 30 small and large Islands which some of them are very important nesting sites for the sea turtles in the region. Mond protected area Islands (Nakhiloo and Ommolkaram) and Sheedvar and Hendourabi are supposed to be the most important sites in the country (Mobaraki 2004). We had records of more than 100 emerging tracks for some of the sites (maps and photos). Critically endangered Hawksbill sea turtles (*Eretmochelys imbricate*) is the most abundant nesting turtle species in the Persian Gulf area in case that the popular nesting species in the Oman sea area in Green Turtle (*Chelonia mydas*). Except of the nesting populations of the species there are different feeding populations too. Green turtles consist of the most abundant and popular foraging species in the area. These populations mainly use the island waters as the feeding habitats all year long. Other species like Hawksbill and Olive Ridley also have reported as feeding populations of sea turtle in both Oman Sea and the Gulf areas. Sea turtles were relatively unstudied species in the country and some existing information was for the long years before. The main nesting season for the Hawksbill turtles is from early April to late may which the peak of nesting in the western part of the Gulf seems to be later than the eastern parts. In the past years most of the important nesting sites were visited in nesting season and the preliminary information on their reproduction biology like the clutch size, diameter and weight of eggs, size of nesting turtles and hatchlings have collected for each year and sites (tables)(Mobaraki 2004, 2006). All the collected data was analyzed by using the statistical programs. More over some behavioral studies also conducted and the gained results indicates multiple immergences, diurnal nesting and multiple nest construction as the main behaviors for the Hawksbills. The existing nesting sites for the very few Green turtles along Oman sea area also were identified which are severely threatened by natural threats like collapse of the cliffs (Mobaraki 2002). The first sea turtle tagging program in the country started in 2005 by the helps of MOU- IOSEA which is supposed to be a continuous program in different sites. Based on this program, about 250 turtles have been tagged in different years and sites (Mobaraki and Elmi 2005). All threatening factors of sea turtles also have been identified and related data collected. Except of usual natural threats like different predators and the waves, egg poaching, fisheries by catch, boat strikes, habitat destruction and different kinds of pollutions are the main anthropogenic threats. As a cooperative work with Canberra University, We have started genetic works on the populations of the different sites and based on the results the main haplotypes of the populations, 11 haplotypes, have been identified by sequencing of about 90 samples from 4 main rookeries of, sheedvar, Hendourabi, Nakhiloo and Ommolkaram Islands.

The use of GIS for mapping the presence of *Uromastyx leptieni* and the identification of potential habitat.

PAS A

Breeding Centre for Endangered Arabian Wildlife, PO Box 29922, Sharjah, UAE

Email: an.pas@bceaw.ae

The presence of active Dhab (*Uromastyx leptieni*) burrows was recorded with the use of a GPS over an area of about 35 hectares near the Breeding Centre for Endangered Arabian Wildlife (BCEAW). The typical gravel planes are considered suitable habitat for *Uromastyx*, which need solid ground to be able to dig deep burrows. The burrows were displayed on a map of the area with the use of *Idrisi Taiga* software. In GIS a map of a larger area around the BCEAW was used to identify similar habitat which would warrant research into the presence of *Uromastyx*. GIS software showed to be a useful tool to find areas where it is more likely to encounter this reptile due to the specific habitat it requires, this way helping to focus on certain areas for research and protection.

Disease risk assessment for a potential release of Arabian Tahr (*Hemitragus jayakari*) in a protected area.

PAS A

Breeding Centre for Endangered Arabian Wildlife, PO Box 29922, Sharjah, UAE

Email: an.pas@bceaw.ae

If any serious attempt wants to be made to reintroduce ungulates in protected areas, an in depth disease risk assessment will have to be an integral part of the planning (Norton 1993). Animals kept in captivity might have become asymptomatic carriers of disease not present in the wild and released animals might be susceptible for diseases present at the release area. A semi-quantitative Stoplight Hazard Analysis as outlined in the Disease Risk Handbook 5th edition (Armstrong *et. al.* 2003) is used here to quantify and order particular diseases according to their importance for a reintroduction programme. The most important diseases are described further in more detail also as outlined in the same workbook and suggestions for prevention and pre-release screening are given.

Sharjah Aquarium raising marine awareness

PORTER K

Sharjah Aquarium, PO Box 39939, Sharjah, United Arab Emirates

The focus of this poster is to show how Sharjah Aquarium has raised awareness of the local marine environment found at Al Khan, Sharjah. Many people are unaware that a diverse range of marine species occurs in close proximity to Sharjah City. Our aim is to inspire people to care more about conserving ocean life. The Sharjah Aquarium was inaugurated by His Highness Dr. Sheikh Sultan bin Mohammed Al Qasimi, Ruler of Sharjah and Member of the Supreme

Council in June 2008 and focuses on the marine life of Sharjah's Arabian Gulf and Gulf of Oman coasts. The Aquarium displays UAE native marine life including coral reef, mangrove and open ocean species. To date the aquarium has welcomed over 1 million visitors. In May 2008 the Aquarium created a marine protected area in front of the main aquarium building. An artificial reef has also been created. The Aquarium organised, in October 2008, a 3 hour beach and underwater clean up of Al Khan beach, which resulted in over 1000 volunteers assisting in improving the marine environment. Through this work and new educational and research initiatives Sharjah Aquarium is becoming a centre for marine awareness in a region undergoing a great and dramatic pace of development.

Leptien's Spiny-tailed Lizard (*Uromastix aegyptia leptieni*) in the Dubai Desert Conservation Reserve

SIMKINS GD and Ingram R

Dubai Desert Conservation Reserve, Dubai, UAE

Leptien's spiny-tailed lizard (*Uromastix aegyptia leptieni*), endemic to the UAE and Oman, are large herbivorous lizards found on gravel terrain and inter-dune compact soils. They can grow up to 75cm long and usually live in loose colonies. As Spiny-tailed lizards are part of the herbivore community in the Dubai Desert Conservation Reserve (DDCR) and were directly affected by low vegetation density and off-road driving in the past, it was decided that a baseline survey of their numbers, distribution and density needed to be conducted. The survey was conducted during October 2008 and May 2009 and focused on the burrows of the Spiny-tailed lizards. Transects across the gravel plains were surveyed and burrows were classified into three categories (Active, Inactive and Abandoned) according to the presence or absence of activity. The survey was divided into two areas the Al Maha Reserve AMR and the rest of the DDCR. The results showed a healthy population of lizards in the DDCR with 448 active burrows and a further 48 inactive. A high number of abandoned burrows (740) were also found and has been attributed to both relocation and predation. As expected, the majority of the DDCR population (48%) was found within the AMR where the population density was much higher as result of a more suitable habitat due to longer protection from overgrazing and off-road driving. The results from this survey form a good base for the continued monitoring the Spiny-tailed lizard population as well as a platform for more detailed studies of the species in the DDCR.

The Ecology and Conservation of Freshwater Fish in the UAE

SMART E

Emirates Wildlife Society (EWS)-World Wide Fund for Nature (WWF), PO Box 45977, Dubai, UAE.

In the UAE, only two species of native primary freshwater fish are found; *Cyprinion microphthalmum muscatensis* and *Garra barremiae*. *Garra barremiae* is the most abundant species, found in wadis throughout the Hajar mountain range in the East, while *Cyprinion* is restricted to the Southern regions on the border with Oman. This research focuses primarily on the ecology of *Garra barremiae*, particularly the environmental adaptations the fish use to survive in the harsh conditions of arid environment freshwaters. Ex-situ research on the

morphology of *Garra* inhabiting two contrasting habitat types (pools and riffles) in a single wadi system has been conducted, examining length, weight and mental disc variations. Initial results suggest that although length does not vary between pools and riffles, there was a significant difference between weight of individuals in the two habitat types. Mental discs were larger in fish inhabiting riffles. These preliminary results show evidence that the fish are possibly adapting to their environment within their lifetime. Data was collected on the reproductive activity of *Garra* during an annual cycle. These observations were compared with corresponding physical and chemical characteristics of the habitat types during the sampling period. Results indicate a potential size at maturity >32mm, with variations in the size of reproductively active males and females. A correlation between reproductive activity and physio-chemical conditions of the habitats indicates an influence by seasonal conditions. The implications for conservation of both the fish species and its habitat are considered, as well as ideas for further ex-situ and in-situ research.

Chytrid Fungus (*Batrachochytrium dendrobatidis*) detection in captive and wild amphibians of the United Arab Emirates

SOORAE PS & Quarqaz M

Environment Agency – Abu Dhabi, PO Box 45553, Abu Dhabi, UAE

Chytridiomycosis is an infectious disease of amphibians, caused by the chytrid *Batrachochytrium dendrobatidis*, a non-hyphal zoosporic fungus which has been linked to dramatic population declines or even extinctions of amphibian species in western North America, Central America, South America, eastern Australia, and Dominica and Montserrat in the Caribbean. The fungus is capable of causing sporadic deaths in some amphibian populations and 100% mortality in others. The disease is contributing to a worldwide decline in amphibian populations that has affected 30% of the amphibian species of the world. A UAE sampling survey using skin swabs has covered captive amphibians (5 non-native species) in pet shops and zoological gardens and a native toad survey (2 species namely Arabian toad (*Bufo arabicus*) and Dhofar toad (*Bufo dhofarensis*)) which is ongoing in wild populations mainly in the Northern Emirates. To date there has been no Chytridiomycosis detected in either the captive or wild populations.

Genesis and Evolution of the Foundation for the Protection of the Arabian Leopard in Yemen

STANTON DB

Foundation for the Protection of the Arabian Leopard in Yemen, PO Box 7069, Sana'a, Republic of Yemen

Since August 2007 the Yemeni Leopard Recovery Programme (YLRP) has striven to raise the profile and relevance of Arabian Leopards in the Republic of Yemen. Having achieved notable successes including the April 29, 2008 cabinet decree naming the Arabian Leopard as Yemen's National Animal, the YLRP has progressed from being an unofficial volunteer initiative to an officially registered, professionally managed foundation – the Foundation for the Protection of the Arabian Leopard in Yemen (moassassat hemayat al nimr al araby fi al yemen). The foundation continues to make steady progress in achieving its goal of 'ensuring an expanding

population of wild Arabian Leopards in Yemen' in the face of numerous obstacles ranging from ignorance to indifference to outright hostility towards leopards and those who seek to conserve them. The success of the foundation in achieving its goal is years away from being realized, if ever, with the coming decade being seen as pivotal in the battle to prevent the extinction of this country's National Animal.

The rehabilitation of migratory raptors at the Breeding Centre for Endangered Arabian Wildlife (BCEAW), Sharjah, UAE

STRICK J¹, Vercammen P¹, Judas J² and Combreau O³

¹ Breeding Centre for Endangered Arabian Wildlife, PO Box 29922, Sharjah, UAE

² National Avian Research Centre, PO Box 45553, Abu Dhabi, UAE

³ International Fund for Houbara Conservation, PO Box 45553, Abu Dhabi, UAE

Over the past ten years, several migratory raptors have been admitted to the BCEAW. These birds were found and brought in by the public, or landed on the premises of the BCEAW. They had become weakened and undernourished during their long migration. They were rehabilitated at the BCEAW and released whenever possible. The fate of these birds usually remains unknown and it is often unsure if they survive after their release. In collaboration with the National Avian Research Centre, Al Ain, a rehabilitated Greater spotted eagle (*Aquila clanga*) was equipped with a solar powered satellite transmitter. One year after release, the bird is still being tracked. This shows that the rehabilitation of rescued and rehabilitated birds can be successful and at the same time that valuable e data can be gained in a non-invasive way.

Wadi Wurayah in the Fujairah Emirate, UAE: a unique freshwater ecosystem and biodiversity hot spot in the Arabian Peninsula.

TOURENQ C¹, Shuriqi MK², Smart E¹, Sawaf M¹, Al Hamudi M², Perry L¹ and Ali Khassim²

¹ Emirates Wildlife Society (EWS)-World Wide Fund for Nature (WWF), PO Box 45977, Dubai, UAE.

² Environment Protection and Development Department, Fujairah Municipality, Fujairah, UAE.

Despite being regarded as a vast deserts and infertile area in the world, the United Arab Emirates host a unique and remarkably adapted fauna and flora. Up to date, more than 1,500 species of insects, 13 species of terrestrial molluscs, 646 species of marine invertebrates, 724 species of plants, 435 species of birds, 221 species of fish, 67 species of reptiles, 64 species of mammals, and 2 species of amphibians have been identified in the country. Unique permanent freshwater ecosystem in the country, Wadi Wurayah in the Emirate of Fujairah, shelters a rich diversity of rare and endangered mountainous and freshwater habitats and species. Over 300 species of plants grow in the area, including the country's unique orchid, *Epipactis veratrifolia*, as well as wetland species. Twenty species of mammals have been recorded or suspected in the area, including 19% that are considered endangered worldwide by the IUCN and 33% are of conservation concern locally. So far, 74 species of bird (of which 5% are considered endangered worldwide by the IUCN and 25 % are of conservation concern for the UAE). The wadi hosts 17 wild reptile and amphibian species of which 5 are endemic to UAE mountains and northern Oman. Endemic to the Arabian Peninsula and considered endangered by IUCN, the Garra

fish (*Garra barreimiae*) is found as well in the wadi. So far 74 invertebrate families, including 19 species new to science. Of the main threats identified, the most serious and recurrent ones are: habitat fragmentation, wildlife poaching and persecution, habitat degradation and recently the introduction of non-native species. The Emirates Wildlife Society-World Wide Fund for Nature in collaboration with the Fujairah Municipality initiated a project that achieved to declare the whole catchment basin as the first official mountain protected area of UAE with the aims to establish a sustainable protected area integrating local tradition and lifestyle with the conservation of inimitable biodiversity and habitat by providing a model of unique economical incentive to the region.

Conference Recommendations

The following recommendations were made in plenary session discussions during the *Conference on Biodiversity Conservation in the Arabian Peninsula*, held in Sharjah, UAE, February 2010

In plenary discussions conference delegates:

- recognised that natural ecological boundaries transcend political boundaries;
- agreed that nationally focussed conservation programs alone cannot address the range of threats facing Arabia's wildlife;
- stressed that the only means to ensure effective conservation of biodiversity in the Arabian Peninsula is through improved cooperation between neighbouring countries;
- urged support for the development of a Regional Vision and Conservation Strategy;
- highlighted the need to make biodiversity a much higher priority at all levels of government planning

There was strong support from the conference for:

- Supporting a regional institution to collate and synthesise and disseminate regional spatial conservation data;
- Continuing the annual Sharjah workshop series to provide a regional forum:
 - to conduct formal internationally-recognised Regional Red Data List Assessments of Arabian species;
 - to enhance the regional development and management of effective protected area networks
 - to provide a forum for specific training, data sharing, and coordinated planning to increase regional capacity for biodiversity conservation

It was recognised there was a need to:

- Produce habitat map for the Arabian Peninsula
- Collate information on the distribution of species across the Arabian Peninsula
- Use the habitat map and the species distribution maps to conduct a Systematic Conservation Assessment for the Arabian Peninsula
- On the basis of this conservation assessment, work towards a Regional Conservation Strategy that may include:
 - the restoration of traditional forms of resource management, e.g. hema;
 - the development of Trans-Boundary Conservation Areas

Participants List

Abi-Said, Mounir Rachid
Animal Encounter
Beirut, Lebanon
Email: mabisaid9@gmail.com

Abouleish, Mohamed
American University of Sharjah
Sharjah, United Arab Emirates
Email: mabouleish@aus.edu

Abtin, Elham
Department of the Environment,
Zabol, Iran
Email: ala_saly@yahoo.co.uk

Abu-Abdoun, Ideisan I.
University of Sharjah
Sharjah, United Arab Emirates
Email: abuabdoun@sharjah.ac.ae

Abu Dayyeh, Ayoub
Energy Conservation & Sustainable Environment
Society

Adams, Dominic
URS Corporation
Abu Dhabi, United Arab Emirates
Email: dominic_adams@urscorp.com

Afan, Donald Senense
Environmental Resources Management (ERM)
Abu Dhabi, United Arab Emirates
Email: Donald.Afan@erm.com

Al Abdessalaam, Thabit Zahran
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: tabdessalaam@ead.ae

Al Amoudi, Ali Awad
Takreer
Abu Dhabi, United Arab Emirates
Email: ali@fea.gov.ae

Al Assaf, Ali Abdulaziz
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: aliassaf2006@yahoo.com

Al Abri, Mahmood Bader Salim
Veterinary Services, Royal Court Affairs
Muscat, Oman
Email: mbsabri@rca.co.om

Al Busaidi, Hamed
Ministry of Environment & Climate Affairs
Muscat, Oman
Email: hamed2050@hotmail.com

Al Cibahy, Ashraf
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: aalcibahy@ead.ae

Al Daherie, Ahmed
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: ahmad2525@hotmail.com

Al-Deeb, Mohammad Ali
UAE University
Al Ain, United Arab Emirates
Email: m_aldeeb@uaeu.ac.ae

Albuainain, Adel

Al Midfa, Abdulaziz
Environment and Protected Areas Authority
Sharjah, United Arab Emirates
Email: epaa@epaashj.ae

Alhababy, Adel
Hodeidah University
Sana'a, Yemen
Email: alhababy@yahoo.com

Al Hamoodi, Ahmed Mohamed Saeed

Al Hariri, Anwar
Public Commission for the Protection of Marine
Resources, Environment & Wildlife
Manama, Bahrain
Email: alhariri63@hotmail.com

Al Jahdhami, Mansoor Hamed
Office for Conservation of the Environment, Diwan
of Royal Court
Muscat, Oman
Email: mhjahdhami@gmail.com

Al Jawdar, Hind
Emirates Foundation for Philanthropy
Abu Dhabi, United Arab Emirates

Al-Jbour, Sharif
Birdlife International, Middle East Office
Amman, Jordan
Email: sharif.jbour@birdlifemed.org

Al Jayyousi, Odeh
IUCN Regional Office for West Asia
Amman, Jordan
Email: Odeh.ALJayyousi@iucn.org

Al Jumaily, Massa Mahdi
Sana'a University
Sana'a, Yemen
Email: dr.masaa@hotmail.com

Al Hadid, Leena
Consulate Jordan

Al Hamour, Shaima

Al Hamshmi, Radya
Emirates Environmental Group
Dubai, United Arab Emirates
Email: eeg@emirates.net.ae

Al-Mahdhoury, Saleh Siad
Office for conservation of the Environment, Diwan
of Royal Court
Muscat, Oman
Email: almahdhoury@hotmail.com

Al Mansouri, Majid
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: malmansouri@ead.ae

Al Marar, Khalifa Mohammed Khalifa
Department of Planning & Survey
Sharjah, United Arab Emirates

Al Marashi, Habiba
Emirates Environmental Group
Dubai, United Arab Emirates
Email: eeg@emirates.net.ae

Al Mubarak, Razan Khalifa
Emirates Wildlife Society-WWF
Abu Dhabi, United Arab Emirates
Email: ralmubarak@ead.ae

Al Nabhani, Hilal Bin Mohammed
Ministry of Environment & Climate Affairs
Muscat, Oman
Email: nabhani-h@hotmail.com

Al Omari, Khaldoun
IUCN Regional Office for West Asia
Email: khaldoun.alomari@iucn.org

Al Qaisi, Lamees Noori
Sharjah, United Arab Emirates
lameesnoori2004@yahoo.com

Al Quarqaz, Myyas
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: malquarqaz@ead.ae

Al Rasbi, Khalid Juma Mohammed
Omani Wild Animals Breeding Centre
Muscat, Oman
Email: tayamooo@hotmail.com

Al Safran, Salem Hussain
Ministry of the Environment
Doha, Qatar
Email: shsafran@mov.gov.qa

Al Sagheer, Omar Ali Saeed
Yemen Society for the Protection of Wildlife
Sana'a, Yemen
Email: omar.alsaghier@undp.org

Al Shamlan, Mohammad Mubarak
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: MS_2041080014@hotmail.com

Al Shamsi, Nasser Mohammed
Etisalat
Email: emiratesson@yahoo.com

Al Shiraki, Rashid Mohammed
Federal National Council
Abu Dhabi, United Arab Emirates

Al-Sofyani, Abdulmoshin A
King Abdulaziz University
Jeddah, Saudi Arabia
Email: sofyani@hotmail.com

Al Tamimi, Mohammed A.
Emirates Heritage Club
Abu Dhabi, United Arab Emirates
Email: ben_ghanem1@hotmail.com

Al-Thukair, Assad Ahmed Mohamed
King Fahd University of Petroleum & Minerals
Dhahran, Saudi Arabia
Email: thukair@kfupm.edu.sa

Allen, Neil
Sharjah Aquarium
Sharjah, United Arab Emirates
Email: nallen@sharjahaquarium.ae

Ali, Mariam
Environmental Consultant
Email: mariam.rashid@gmail.com

Ali, Neelofar
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: neeloali@yahoo.com

Ali Khan, Jody
Wild Planet Productions
Dubai, United Arab Emirates
jonathanalikhan60@yahoo.com

Ali Khan, Jonathan
Wild Planet Productions
Dubai, United Arab Emirates
Email: jonathanalikhan60@yahoo.com

Almutawa, Mijbil S.
The Scientific Centre Management Company
Kuwait City, Kuwait
Email: mijbil@tsck.org.kw

Arras, Peter
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: peterarras@arcor.de

Ataya, Manal
Sharjah Museums Department
Sharjah, United Arab Emirates
Email: mataya@sharjahmuseums.ae

Bailey, Thomas
Dubai Falcon Hospital
Dubai, United Arab Emirates
Email: tom.bailey@dfh.ae

Balasubramanya, Vinita
United Arab Emirates
Email: vinita.balasubramanya@gmail.com

Bartholomew, Aaron
American University of Sharjah
Sharjah, United Arab Emirates
Email: abartholomew@aus.edu

Bashir, Danya
BSA Sharjah
Sharjah, United Arab Emirates

Bashir, El Sadiq
Qatar Bird Club
Doha, Qatar
Email: elsadiqbashir126@hotmail.com

Behbehani, Salah
The Scientific Centre Management Company
Salmiya, Kuwait
Email: salah@tsck.gov.kw

Bell, Stephen
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: stephen.bell@emirates.com

Bento, Rita Costa San Miguel
Emirates Diving Association
Dubai, United Arab Emirates
Email: research@emiratesdiving.com

Berger, Jean-Paul
Lycée Francais International Georges Pompidou
Dubai, United Arab Emirates
Email: jp.berger@jpb-imagine.com

Bkheet, Mona
UOS
United Arab Emirates

Borisov, Alexander
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: alex@ewbcc.ae

Boshoven, Anniek
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Boug, Ahmed
National Wildlife Research Centre
Taif, Saudi Arabia
Email: boug2010@gmail.com

Bousserouel, Zied
Sharjah Electricity and Water Authority
Sharjah, United Arab Emirates

Bull, Andrew
United Arab Emirates

Budd, Jane
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: jane.budd@bceaw.ae

Budd, Kevin
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Burt, John
New York University - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: John.Burt@nyu.edu

Byatt, Jeremy R.
Bee'ah
Sharjah, United Arab Emirates
Email: jbyatt@beeah-uae.com

Caliendo, Valentina
United Arab Emirates

Cardas, Lorea
Email: loreatxu@gmail.com

Campagne, Cecile
United Arab Emirates
Email: cecile_campagne@hotmail.com

Chalmers, Valerie
Dubai Natural History Group
Dubai, United Arab Emirates
Email: valeriechalmers@hotmail.com

Chapman, Rachel
University of Sharjah
Sharjah, United Arab Emirates
Email: rchapman@sharjah.ac.ae

Chemouni, Fares
United Arab Emirates

Cokayne, Aimee
Tourism Development & Investment Company
Abu Dhabi, United Arab Emirates
Email: acokayne@TDIC.ae

Combreau, Olivier
International Fund for Houbara Conservation
Abu Dhabi, United Arab Emirates
Email: olivier.combreau@gmail.com

Cramerstetter, Walter
Cramer Consulting
Al Ain, United Arab Emirates
Email: cramerwa@hotmail.com

Dafir, Houda
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: houdadafir@msn.com

de Kock, Meyer
Al Bustan Zoological Centre
Sharjah, United Arab Emirate
Email: bustan55@eim.ae

Desouqi, Lutfi
Ministry of Environment & Water
Dubai, United Arab Emirates
Email: ladesouqi@moew.gov.ae

Disi, Ahmad
Jordan University
Amman, Jordan
Email: ahmadmdisi@yahoo.com

Duralia, Tom
Dubai, United Arab Emirates
Email: tom.duralia@gmail.com

Easton, Brett
Talent Partners
Abu Dhabi, United Arab Emirates
Email: brett.easton@talentpartnersintl.com

El Alqamy, Husam
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email:alqamy@gmail.com

El Keblawy, Ali
UAE University
Al Ain, United Arab Emirates

El Kefi, Lamjed
Intermass Eng.
Sharjah, United Arab Emirates
Email: lankefi@eim.ae

El Shamsy, Mona
United Arab Emirates

Els, Johannes
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Eriksen, Hanne
Abu Dhabi, United Arab Emirates
Email: hjoman@eim.ae

Eriksen, Jens
The Petroleum Institute
Abu Dhabi, United Arab Emirates
Email: hjoman@eim.ae

Faburada, Mercy D.
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: mercy@emeg.ae

Fadheel, Abdullah Hamd
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: a_fadeil@hotmail.com

Fernandes, Carlos
University of Lisbon
Lisbon, Portugal
Email: cafernandes@fc.ul.pt

Feulner, Gary
Dubai Natural History Group
Dubai, United Arab Emirates
Email: grfeulner@gmail.com

Furniss, Grant
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: grantfurniss@gmail.com

Gamal, Taha Hussein Abdo
Government of Sharjah, Database & Information
Management Department
Sharjah, United Arab Emirates
Email: taha.hussein@sip.ae

Ghazanfar, Shahina
Royal Botanic Gardens, Kew
Richmond, United Kingdom
Email: s.ghazanfar@rbgkew.org.uk

Gough, Sarah
Dubai Falcon Hospital
Dubai, United Arab Emirates
Email: sarah@dfh.ae

Habib, Altaf
Dussmann Gulf LLC
Email: altafokz104@gmail.com

Hafiz, Abdul Rasheed
United Arab Emirates

Hamidan, Nashat Abdul Fattah
The Royal Society for the Conservation of Nature
Amman, Jordan
Email: nashat@rscn.org.jo

Hammer, Catrin
Al Wabra Wildlife Preservation
Doha, Qatar
Email: awwp.mammal@alwabra.com

Hammer, Sven
Al Wabra Wildlife Preservation
Doha, Qatar
Email: awwp.director@alwabra.com

Hareb, Mariam Mohammed Saeed
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: mariam@emeg.ae

Healy, Jodie
Emirates Natural History Group
Al Ain, United Arab Emirates
Email: enviromailaa@gmail.com

Heller, Thomas Mark
Royal Botanic Gardens, Kew
Richmond, United Kingdom
Email: t.heller@kew.org

Hickman, Neil
Expo Centre Sharjah
Sharjah, United Arab Emirates
Email: neil@expo-centre.ae

Hill, Jenny
WS Atkins & Partners Overseas
Email: jenny.hill@atkinsglobal.com

Holness, Stephen
South African National Parks
Port Elizabeth, South Africa
Email: sholness@nmmu.ac.za

Hornby, Richard
Nautica Environmental Associates
Abu Dhabi, United Arab Emirates
Email: richard.hornby@nauticaenvironmental.com

Hossaini, Reem
United Arab Emirates

Howlett, Judith
National Avian Research Centre
Abu Dhabi, United Arab Emirates
Email: jhowlett@ead.ae

Hussein, Amal
Talent Partners
Dubai, United Arab Emirates
Email: amal.hussein@talentpartnersintl.com

Hyland, Kevin
Dubai, United Arab Emirates
Email: kevinwpo@emirates.net.ae

Ibrahim, Rami
Al Bataeh Municipality
Sharjah, United Arab Emirates
Email: rami.ibrahim@shjmun.gov.ae

Jackson, Vanessa
i-GUIDE
Sharjah, United Arab Emirates
Email: iguide08@gmail.com

Javed, Salim
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: sjaved@ead.ae

Jongbloed, Marijcke
France
Email: baschallas@free.fr

Jabado, Rima
UAE University
Al Ain, United Arab Emirates
Email: rimajabado@hotmail.com

Jowkar, Homan
Blue Awareness NGO
Dubai, United Arab Emirates
Email: info@abngo.com

Judas, Jacky
National Avian Research Centre
Abu Dhabi, United Arab Emirates
Email: jjudas@ead.ae

Kabbara, Lina Radwan
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: lkabbara@ead.ae

Karom, Khalid
Dorsche Gruppe
Abu Dhabi, United Arab Emirates
Email: dc.pgd@dorsch.ae

Kasperek, Aygun
Heidelberg, Germany

Kasperek, Max
Zoology in the Middle East
Heidelberg, Germany
Email: kasperek@t-online.de

Kayasseh, Philippe
UBS
Dubai, United Arab Emirates
Email: philipe.kayasseh@ubs.com

Keogh, Nicola Jayne
Royal Botanic Gardens, Kew
Richmond, United Kingdom
Email: n.keogh@kew.org

Khafaga, Tamer Ali
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: tamer.khafaga@emirates.com

Khalaf, Norman Ali Bassam
Gazelle: The Palestinian Biological Bulletin
Sharjah, United Arab Emirates
Email: jaffacity@yahoo.de

Khalifa, Nada Bait
Ministry of Environment & Water
Dubai, United Arab Emirates

Khamis, Abdulqader Saeed
Public Commission for Environment & Wildlife
Manama, Bahrain
Email: qaderk@pmew.gov.bh

Khan, Mohammad Ali Reza
Dubai Municipality
Dubai, United Arab Emirates
Email: drrezakhan@gmail.com

Khan, Razib Reza
Excel Sports
Dubai, United Arab Emirates
Email: raz@excelsportsuae.com

Khassim, Ali
Environment Protection and Development
Department
Fujairah, United Arab Emirates
Email: engali6299355@yahoo.com

Knight, Mike
South African National Parks
Port Elizabeth, South Africa
Email: M.Knight@nmmu.ac.za

Knuteson, Sandra
American University of Sharjah
Sharjah, United Arab Emirates
Email: sknuteson@aus.edu

Korshunov, Vladimir
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: korshunvlad@mail.ru

Krupp, Fareed
Senckenberg Research Institute and Natural History
Museum
Frankfurt, Germany
Email: Friedhelm.Krupp@senckenberg.de

Kunnil, Prajith
Mott MacDonald Ltd
Email: PK.Prajith@gmail.com

Lancaster, Susan
HTC, Sharjah
Sharjah, United Arab Emirates

Lang-Lenton, Barbara
Tourism Development & Investment Company
Abu Dhabi, United Arab Emirates
Email: barbarale@hotmail.com

Launay, Frederic
IUCN/SSC Re-introduction Specialist Group
Abu Dhabi, United Arab Emirates
Email: flaunay@ead.ae

Leus, Kristin
IUCN/SSC Conservation Breeding Specialist Group,
European Office
Copenhagen, Denmark
Email: kristin@cbsgeurope.eu

Llewellyn, Othman
Saudi Wildlife Commission
Riyadh, Saudi Arabia
Email: Othman.Aishah@gmail.com

Llewellyn-Smith, Robert
Environment Protection and Development Authority
Ras Al Khamiah, United Arab Emirates
Email: Rllewellynsmith@yahoo.co.uk

Lottering, Andries
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Mallon, David
IUCN/SSC Antelope Specialist Group
Manchester, United Kingdom
Email: d.mallon@zoo.co.uk

Mardonov, Bakhityor
Management of Nature Conservation
Al Ain, United Arab Emirates
Email: bakhtim02@yahoo.com

Maunder, Michael
Al Ain Wildlife Park and Resort
Al Ain, United Arab Emirates
Email: michael.maunder@awpr.ae

May, Heidi
Al Bustan Zoological Centre
Sharjah, United Arab Emirates
Email: bustan55@eim.ae

Mayo, Nahed Suleiman
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: nahed@emeg.ae

McCann, Sean Patrick
Tourism, Development & Investment Company
(TDIC) - Qasr Al Sarab Desert Resort & Spa
Abu Dhabi, United Arab Emirates
Email: smccann@tdic.ae

McKeown, Sean
HE Sheikh Butti Maktoum's Wildlife Centre
Dubai, United Arab Emirates
Email: smckeown@eim.ae

Medammal, Zubair
Calicut University
Kerala, India
Email: drzubairm@gmail.com

Medani, Gamal
Ministry of Environment & Water
Dubai, United Arab Emirates

Miller, Tony
Royal Botanic Gardens
Edinburgh, Scotland
Email: T.Miller@rbge.ac.uk

Mirsadeghi, Mani
Blue Awareness NGO
Dubai, United Arab Emirates
Email: mani@mirsadeghi.com

Mobaraki, Asghar
Department of Environment
Tehran, Iran
Email: amobaraki@yahoo.com

Mohamed, Lamy Faisal
Emirates Foundation for Philanthropy
Abu Dhabi, United Arab Emirates
Email: lmohamed@emiratesfoundation.ae

Mohammed, Hunayda
United Arab Emirates

Mohammed, Osama Badri
King Khalid Wildlife Research Centre
Thumamah, Saudi Arabia
Email: obmkkwrc@yahoo.co.uk

Moukayed, Meis
American University of Dubai
Dubai, United Arab Emirates
Email: mmoukayed@aud.edu

Nasher, Abdul Karim
Sana'a University
Sana'a, Yemen
Email: Karimnasher@yahoo.com

Mousa, Mohamed Taher
UAE University
Al Ain, United Arab Emirates
Email: mohamed.mousa@uaeu.ac.ae

Muzaffar, Sabir Bin
UAE University
Al Ain, United Arab Emirates
Email: s_muzaffar@uaeu.ac.ae

Natoli, Ada
Conservation Genetics
Email: ada.natoli@gmail.com

Nicholson, Angela
URS Corporation
Email: angela_nicholson@urscorp.com
Nollet, Melissa Fransceska
Email: melissa_nollet@hotmail.co.uk

Obaidalla, Qusai M.
Dubai International Arabian Horse Championship
Dubai, United Arab Emirates
Email: qusai.obaidalla@dwtc.com

O'Donovan, Declan
Wadi Al Safa Wildlife Centre
Dubai, United Arab Emirates
Email: declan@shp.ae

Othman, Yassar Ahmed
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: yothman@ead.ae

Paillat, Patrick
National Avian Research Centre
Abu Dhabi, United Arab Emirates
Email: paillat@emirates.net.ae

Paipai, Eleni
Halcrow International Partnership
Email: paipaie@halcrow.com

Pas, An
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: an.pas@bceaw.ae

Perry, Lisa
Emirates Wildlife Society - WWF
Abu Dhabi, United Arab Emirates
Email: lperry@ewswwf.ae

Porter, Kerwin
Sharjah Aquarium
Sharjah, United Arab Emirates
kporter@sharjahmuseums.ae

Raouf, Mohamed A.
Gulf Research Centre
Dubai, United Arab Emirates
Email: raouf@grc.ae

Razack, Nasreem Abdul
Alphamed Company
Abu Dhabi, United Arab Emirates
Email: Nasreemabdulrazack@yahoo.co.in

Resueno, Annabel Dimapilis
The Scientific Centre Management Company
Kuwait City, Kuwait
Email: annabel@tsck.gov.kw

Reimer, Robert Walter
UAE University
Al Ain, United Arab Emirates
Email: bob.reimer@uaeu.ac.ae

Richards, Christina
Change Associates
Email: christina.richards@gmail.com

Riou, Samuel
National Avian Research Centre
Abu Dhabi, United Arab Emirates
Email: sriou@ead.ae

Roosenschoon, Peter
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: warthogg10@yahoo.com

Saji, Anitha
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: asaji@ead.ae

Samara, Fatin
American University of Sharjah
Sharjah, United Arab Emirates
Email: fsamara@aus.edu

Sambas, Anas Zubeir
Saudi Wildlife Commission
Riyadh, United Arab Emirates
Email: newlook01@gmail.com

Samraoui, Boudjéma
University of Guelma
Algeria
Email: bsamraoui@yahoo.fr

Sawaf, Moaz
Emirates Wildlife Society - WWF
Abu Dhabi, United Arab Emirates
Email: msawaf@ewswwf.ae

Schneider, Eveline
United Arab Emirates

Seddon, Philip
Zoology Department, University of Otago
Dunedin, New Zealand
Email: philip.seddon@stonebow.otago.ac.nz

Serhal, Assad
Society of the Protection of Nature in Lebanon
Beirut, Lebanon
Email: spnorg@cyberia.net.lb

Shahzad, Quratulain
American University of Sharjah
Sharjah, United Arab Emirates
Email: g00028000@aus.edu

Shaikh, Sharlene
URS Corporation
Abu Dhabi, United Arab Emirates
Email: sharlene_shaikh@urscorp.com

Shepley, Mike
Forth International
Dubai, United Arab Emirates
Email: forth@eim.ae

Shobrak, Mohamed
Taif University
taif, Saudi Arabia
Email: mshobrak@gmail.com

Shuriqi, Maral Khaled
Environment Protection and Development
Department
Fujairah, United Arab Emirates
Email: lgeologist@gmail.com

Simkins, Gregory
Dubai Desert Conservation Reserve
Dubai, United Arab Emirates
Email: greg.simkins@emirates.com

Smart, Emma
Emirates Wildlife Society-WWF
Abu Dhabi, United Arab Emirates
Email: esmart@ewswwf.ae

Sobhan, Istiak
Dubai Municipality
Dubai, United Arab Emirates
Email: istiak_sobhan@yahoo.com

Solatre, Jimson S.
Dubai Municipality
Dubai, United Arab Emirates
Email: jssolatre@dm.gov.ae

Sorenson, Mark
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: GPCI@aol.com

Soorae, Pritpal Singh
Environment Agency - Abu Dhabi
Abu Dhabi, United Arab Emirates
Email: psoorae@ead.ae

Soroor, Doaa Hamdi
Ministry of Environment & Water
Dubai, United Arab Emirates

Spalton, Andrew
Office for Conservation of the Environment, Diwan
of Royal Court
Muscat, Oman
Email: spalton@mac.com

Stanley Price, Mark
University of Oxford
Oxford, United Kingdom
Email: Mark.Stanleyprice@zoo.ox.ac.uk

Stanton, David
Foundation for the Protection of the Arabian
Leopard in Yemen
Sana'a, Yemen
Email: ylrp@yemenileopard.org

Steer, Maureen
United Arab Emirates
mosteer@gmail.com

Strick, Jackie
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Stuart, Simon
IUCN Species Survival Commission
Email: simon.stuart@iucn.org

Suleiman, Eisa
United Arab Emirates

Swanson, William
Centre for Conservation and Research of
Endangered Wildlife
Cincinnati, United States of America
Email: bill.swanson@cincinnati.zoo.org

Tatwany, Hany
King Khalid Wildlife Research Centre
Thumamah, Saudi Arabia
Email: hany.tatwany@gmail.com

Tavkar, Amruta
United Arab Emirates

Thesye, Isabelle
Breeding Centre for Endangered Arabian Wildlife
Sharjah, United Arab Emirates
Email: breeding@epaa-shj.gov.ae

Tourenq, Christophe
Emirates Wildlife Society-WWF
Abu Dhabi, United Arab Emirates
Email: ctourenq@ewswwf.ae

Whelan, Robert
University of Wollongong
Dubai, United Arab Emirates
Email: robwhelan@uowdubai.ac.ae

Wilson, Keith DP
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: kdpwilson@gmail.com

Wranik, Wolfgang
University of Rostock
Rostock, Germany
Email: wolfgang.wranik@uni-rostock.de

Wronski, Torsten
King Khalid Wildlife Research Centre
Thummah, United Arab Emirates
Email: t_wronski@gmx.de

Vasudevan, Raju Palanthinkara
Hatta Conservation Area
Dubai, United Arab Emirates
Email: drrajuvasudevan@yahoo.com

van Damme, Kay
Ghent University
Ghent, Belgium
Email: Kay.VanDamme@UGent.be

van Harten, Antonius
UAE Insect Project
Email: tonyvanharten@gmail.com

Van Riet, Willem
Peace Parks Foundation
Stellenbosch, South Africa
Email: wvanriet@ppf.org.za

Vanneyre, Laurence
Emirates Marine Environmental Group
Dubai, United Arab Emirates
Email: laurence@emeg.ae

Zahlawi, Nisreen
Emirates Wildlife Society - WWF
Abu Dhabi, United Arab Emirates
Email: nalzahlawi@ewswwf.ae