



IUCN  
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# The nature of drylands

*Diverse ecosystems, diverse solutions*



## The Nature of drylands:

*Diverse ecosystems, diverse solutions*

IUCN

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### Disclaimer

Opinions expressed in this publication do not necessarily reflect the views of IUCN, its Council or its members.

The aim of this booklet is to feature cutting-edge work on drylands being undertaken by IUCN Members. However with over 1,000 Members and thousands of Commission experts, we could only skim the surface. If you are interested in dryland conservation, we would be happy to hear from you.

### Paper

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### IUCN - The International Union for Conservation of Nature

Founded in 1948, IUCN brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 1000 members in all, spread across some 140 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

IUCN builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

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# The nature of drylands: Diverse ecosystems, diverse solutions

## Foreword from the IUCN Director General

It is with great pleasure that I have been asked to provide an introduction to *The nature of drylands: Diverse ecosystems, diverse solutions*. Not surprisingly, this booklet illustrates the incredible diversity of drylands and dryland issues. It also provides an insight into the far-reaching work of IUCN's membership in dryland areas of the world.

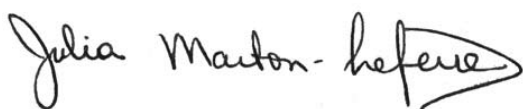
Drylands cover over 40% of the earth's land surface, and are home to more than a third of the world's population – many of whom are the poorest of the poor. Whilst drylands also support some of the world's biggest cities, such as Mexico City and New Delhi, millions of rural dryland dwellers are directly dependent on local dryland ecosystem services for their daily survival. Climate change will have a disproportionate effect on dryland areas, contributing to desertification, and to increasing the vulnerability of people who live there. We need to put the conservation of dryland ecosystem services at the heart of development policy if we want to reduce poverty, and achieve the Millennium Development Goals.

By pooling its wide-ranging expertise in ecosystems, conservation and sustainable management of natural resources, IUCN aims to contribute to solutions that conserve the extraordinary biodiversity found in drylands, while at the same time ensuring that people's livelihoods are improved in a sustainable way. Although this sounds ambitious, there are fortunately an enormous number of talented people and organizations working on these issues (some of whom you will read about in this booklet), as well as the political will enshrined in the Millennium Development Declaration. A clear focus on how drylands contribute to local and national economies, and how this can be enhanced through development initiatives that benefit people and nature, is of highest priority.

First of all we need to change the widespread view of drylands as wastelands. Dryland ecosystems provide water, food, fodder, fuelwood, shelter and medicinal plants for many of the world's poor. Drylands also produce a number of globally important commodities such as gum arabic, frankincense, and cashmere. Ecotourism, when properly managed, is an important growth industry in drylands that can benefit both local people and wildlife. In addition drylands provide an important food insurance policy - over 30% of our major food crops - including wheat, barley and other cereals as well as livestock - originate in drylands, and provide a precious resource of genetic diversity in wild crop relatives. Many dryland medicinal and other useful plants and animals are already contributing to both local and global economies, but these values are rarely reflected in decisions taken about drylands.

Whilst we of course need to address climate change, the greatest strength and opportunity in drylands are the people that live there. It is essential to empower local people and fulfil their rights if the many threats to dryland ecosystems at local levels are to be resolved. These rights are the basis for sustainable drylands conservation, and need to be coupled with concerted efforts at national, regional, and international levels to support dryland conservation, and to combat desertification.

At the World Conservation Congress in Barcelona, IUCN will adopt a new programme of work for 2009-2012, which will be extremely relevant to the world's drylands, and will guide the Union's work on dryland conservation and development issues over the next four years. The challenge, as with conservation elsewhere, is great, but we have made progress and IUCN will continue to build on and add value to the work of our Members and partners to address the most pressing problems in drylands today. This short booklet illustrates the expertise of the Union which we will use to attract greater attention and improve understanding on the inter-linkages between dryland ecosystems, desertification and livelihoods, and lead to more effective conservation and development solutions that benefit both the biodiversity and the people that live the world's drylands. ■



# The IUCN Drylands and Livelihoods Initiative

IUCN's vision for drylands includes a world where dryland ecosystems are sustainably managed and provide people with the foundation for their well-being. However given the diversity and wealth of projects being undertaken to conserve and sustainably manage dryland ecosystems (of which just a fraction are represented in this booklet), what value can IUCN add to this already substantial effort?

As our mission clearly states, IUCN will 'influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and ensure that any use of natural resources is equitable and ecologically sustainable'. IUCN can do this in a number of ways, first by building on what has been achieved in the past, and then by adding value and developing current work carried out throughout the world by IUCN members, commissions and staff. It is through developing and mobilizing cutting-edge knowledge, fostering partnerships, delivering policy advice based on practical experience, and creating increased awareness and attention to the world's drylands, that IUCN can make a difference. But this will only be achieved by working effectively with all interested parties.

IUCN is well-suited to this task, having worked on many dryland issues through its thematic and regional programmes, its members and commissions. IUCN has worked with the UN Convention to Combat Desertification (CCD) since its inception, and has a long history of experience and expertise on the conservation and sustainable management of biodiversity and ecosystem services. It is also practiced in making this information available to the public and to decision-makers. However there is still an urgent need to improve understanding of how dryland ecosystem services underpin livelihoods, and how best they can be sustainably managed as the basis for reducing poverty, adapting to climate change, and slowing the rate of biodiversity loss. In light of this need, and in responding to requests from the IUCN membership, it is now time for IUCN to move the drylands agenda forward by using its convening power to improve knowledge and governance over dryland issues, as well as to help empower all stakeholders to work on a united front.

IUCN's emerging drylands strategy focuses on sustainable and equitable management of biodiversity, improved climate change policies and adaptation practice that reflect the needs of dryland biodiversity and people, implementation of sustainable energy systems, improved livelihoods and poverty reduction, and integrating ecosystem conservation values with economic policy. The strategy is informed by the major issues that the world's drylands face and is consistent with the IUCN Programme 2009-2012. The draft IUCN Strategy on Drylands and Desertification will be discussed with Members and Partners at the World Conservation Congress in Barcelona in October 2008. Only by working together and sharing our vast and diverse expertise on the sustainable management of dryland ecosystems will the big environmental issues of today be solved. ■



# Another green revolution in the Sahel

Chris Reij, IUCN Commission on Ecosystem Management



There has been, since the middle of the 1980's, a spectacular environmental revolution amongst the farmers in the densely populated Maradi and Zinder regions of Niger. A formerly barren landscape of at least 5 million hectares has been magnificently re-greened because these farmers began to consistently protect and manage their trees and bushes, which would then regenerate spontaneously on their farms.

The scale at which they have done so is amazing. A recent study, using a combination of high-resolution satellite images, aerial photos and field visits, has revealed the extent of the re-greening, which has today been recognized as one of the most spectacular environmental transformations in Africa.

This on-farm re-greening has, among other things, led to more complex and productive farming systems which are more resilient to drought. Twenty years ago much of the land in these areas was almost barren, but now they have 20, 40 or more trees/ha (small and big). According to the farmers this has reduced wind speed and damage to their crops. When the land was almost barren they had to plant three or four times before the crop would succeed, but now after the re-forestation they often plant only once. This means that the grow-

ing season for the crops is longer. Several tree species, and in particular *Faidherbia albida* and *Proposis africana*, enhance soil fertility and improve crop yields.

Local community initiatives at re-greening can be found all over the Sahel region. Another example is found in the Yatenga Region of Burkina Faso, where farmers employ traditional conservation methods of digging *zai* holes in which they plant trees. Manure, and other organic fertilizer is used to fill up the holes and this attracts termites, which furrow through the manure while feeding on it, creating tunnels through which rainwater can reach and water the trees. Through this inexpensive traditional method, trees have re-grown successfully in areas that were otherwise barren and thought to be unproductive and beyond rehabilitation. With over 100 people/km<sup>2</sup> the soil fertility had markedly reduced due to increased soil erosion, and expansion of cultivation in marginal lands. Drought, poverty and famine in these Sahel regions exacerbated the situation. The *zai* method served as a means of rehabilitating barren land and ensuring that water and nutrients could be concentrated in one spot. This method led to an increase in agricultural income and an improvement

in livelihoods, as well as environmental rehabilitation and conservation.

In other West African Sahel countries, farmers also protect and manage natural regeneration on their farms. Many examples have gone unnoticed and are undocumented. A Sahel Re-greening Initiative is now being developed to identify grass-root success on-farm re-greening stories in the Sahel to use them as starting points for scaling-up.

The current thinking about responses to the food crisis in the Sahel is focussed on a conventional package, which includes the expansion of irrigation, increasing fertilizer input, improved crop varieties and mechanisation. Building and strengthening tree-based systems does not yet seem to be part of the equation.

The Sahel Re-greening Initiative is supported by an international alliance of NGOs and research institutes and will be implemented in four Sahel countries by national alliances of NGOs in cooperation with relevant ministries. It is possible to make Africa's degraded drylands productive again. Experience shows that dryland degradation can be reversed if farmers invest in the protection and management of on-farm natural regeneration and if governments create policies which induce farmers to invest in their resources. ■

# Are external inputs the only hope for Sahel dryland agriculture?

Joost Brouwer, IUCN Commission on Ecosystem Management

Some people say that agricultural production in the Sahel cannot be improved without external inputs because farmers have been farming there for thousands of years, have tried everything, yet production remains low. Agricultural research, such as for the Green Revolution in Africa, must therefore concentrate on greater external inputs.

While it is true that very large increases in yields can only be achieved using external inputs, two points must not be forgotten. First, many dryland farmers in the Sahel, and in other semi-arid areas of Africa, cannot afford to buy external inputs and will not be able to do so for the foreseeable future. And even if food prices continue to rise as they did during the first half of 2008, resulting in increased income and allowing farmers to buy such inputs, they are often hesitant to do so due to risk: a poor rainfall season can mean a wasted investment. Therefore agricultural research in the Sahel must look at increasing yields not only through

using external inputs, but also through making more efficient use of locally available inputs.

Second, while farmers may have tried 'everything', certain things escape their notice. In general, farmers have little knowledge of what happens underground (e.g. leaching of nutrients), what happens at night (when certain pest insects are active), and what is too small for the eye to see. In addition, they usually do not measure very precisely. If a particular level of extra inputs increases the yield from 0 to 500 kg/ha, the effect is more dramatic than if the same extra inputs elsewhere increase production from 500 to 1200 kg/ha. However, the latter would be the more efficient way of using those inputs. It is through knowing what a farmer cannot see, measuring what a farmer does not measure, and combining this with the farmer's know-how, that agricultural scientists and farmers together may increase the yields and efficiency of zero or low external input agriculture.

## Increased production without increased external inputs

There already exist a number of examples of increased agricultural production through increased knowledge, rather than through increased external inputs. *Zai* is a traditional pit planting technique from semi-arid parts of Burkina Faso. The technique is often used to rehabilitate degraded land, where the pits collect runoff and allow easier establishment of sown crops as well as spontaneous vegetation. Farmers often put some manure (or other organic matter) in the planting hole to provide nutrients and to attract termites, which help open up the soil. Various studies have shown that introduction of the *Zai* technique can lead to an increase in agricultural production if only local inputs are used. *Zai* resulted in a 3 to 4 fold increase in grain yield on-farm when compared to flat planting. The water use efficiency was improved by a factor of about 2. Adding manure as well resulted in a further doubling of grain yields.





I analyzed on an individual plot basis the results of a manure application experiment that the International Livestock Research Institute (ILRI) carried out in the ICRISAT Sahelian Center in Niger. Soils on-site are extremely sandy but still show huge differences in rainfall infiltration, from as low as 30% to 300% only 5-10 m away. This is related to differences in soil crust formation and microtopography.

Calculations on the ILRI experiment showed that by twelve months after the application of 9-10 tonnes/ha of cattle manure (which is at the high end of what is normally used in farmers' fields), the average (wet and dry plots) nutrient store between 1.5 and 2 m depth had increased by 1,070 kg/ha of organic carbon; 91 kg/ha of nitrogen, and 19 kg/ha of phosphorus (averages of four plots). In other words, 25% of the carbon, 36% of the nitrogen and 95% of the phosphorus had leached to that depth in a 12-month period, with similar amounts probably leaching beyond 2 m in depth. Examining the individual plots, we observed that the lowest, wettest plots suffered the greatest leaching losses of cattle as well as sheep manure and urine. In addition, sheep manure and urine appeared to be a much more efficient organic fertiliser for acid, leached depressions than cattle manure. There are therefore distinct possibilities for in-

creasing manure use efficiency in the Sahel by applying different types of manure at varying rates, based on differences in microtopography of the farmer's field. Independent on-farm measurements corroborate this. It may also be useful to shift some of the manure from over-manured areas around wells where animals are watered, to less fertile parts of the field.

### Improving the efficiency of subsistence agriculture

Simple ways can be found to improve the efficiency of subsistence agriculture, for instance using a home-made rain gauge to calculate how much water has infiltrated into the soil in a particular plot or field. When a certain point has been reached, by also taking into account crop transpiration, the farmer can divert any additional water to another field, or let it continue to the fields of his colleagues downstream.

It is important to remember that in these very variable, semi-arid environments, many farmers wish to avoid risk as much as to obtain high yield. Here water and nutrients alternate in limiting crop production from year-to-year and from day-to-day, over distances ranging from hundreds of kilometres to just a few metres. What

works in drier years may not work in wetter years, and vice versa, so farmers will not want to put all their eggs in one basket.

In summary, to improve agricultural efficiency in the Sahel, it is important to:

- Focus on more than just increasing the level of external inputs.
- Combine farmer and researcher knowledge to improve the efficiency of low external input agriculture.
- Take account of variability in space (within-field soil and crop growth variability), and variability in time (rainfall), when developing new farmer management options.
- Increase farmer knowledge so that they can make decisions most suited to their own goals and environment. They know that what works in one place in one year may not work in another place or in another year.

Agricultural research is conservation research, as more efficient and sustainable subsistence agriculture reduces the pressure on the ecosystems around farmers' fields. ■

# Against daunting odds women in Nguru, Nigeria, flex their voices for water conservation

James Workman, IUCN Water Programme

The soft-spoken mother, Khadija Ahmed, holds no academic degree. She is no international expert. But she understands better than most the forces that were silently sapping life from her Nguru homeland. Water stress grew from unpredictable climate changes that were desiccating the River Hadeija. When she was young, that tributary of the Komadugu Yobe River used to flow with a seasonal pulse until reaching Lake Chad. It had once been the lifeline for millions of people in Nguru in North-east Nigeria. Unfortunately, in recent decades, new dams, diversions, escalating water extraction and irrigation eroded the fragile soils, degraded the floodplains, spread an infestation of noxious weeds, and reduced the Hadeija River's powerful pulse to an anaemic, steady trickle.

Top-down large-scale interventions, unsustainable water use, and ignorance of the specific bio-climatic characteristics and management requirements of drylands led to food insecurity, degradation and conflict in hometowns such as Ahmed's. Officials failed to recognize the interdependence of water users within the entire watershed: what happens upstream affects downstream users; land management affects water resources; aquifers and surface waters are closely interlinked.

Though no agronomist, Ahmed sees the tiny dry season farm plots shrivel under stress, which radically reduced the maize, millet, rice, wheat, sorghum, cotton, groundnuts, and beans people grew. Though no hydrologist, she knew water scarcity was one major constraint to ensuring food security in drylands (and that according to the Millennium Assessment, the availability of water is expected to decline further due to population increases, and land cover and climate change). Though no politician, she understands how human water management affects ecosystems and nature - particularly in the world's drylands - which in turn affects the livelihoods of villages such as hers.

Knowledge alone is not enough. Ahmed needs well-connected allies, and an opportunity to bring change. Through its Water Programme in thirty developing countries, IUCN's challenge has sought people like Ahmed to co-develop sustainable solutions and initiatives. Rather than bypass people on the ground to engineer an outcome with a technocratic fix, IUCN puts its extensive network of members, scientific commissions, government and private sector partners to work for Ahmed. She is at the centre of any and all water management decisions. She is the fulcrum. From there, IUCN further contributes towards the conservation of water biodiversity by promoting, influencing and catalyzing sustainable use and equitable sharing of resources according to the expressed needs of people like Ahmed.

The IUCN Water Programme works in many arid and semi-arid landscapes in which water is often the most valuable resource. Integrated water and drylands management are closely interlinked. Improved grazing and sustainable land management directly affects the watershed and river flows. Sustainable dryland management requires a whole set of knowledge and skills to cope with the highly seasonal availability of water and erratic rainfall. To mitigate risks, dryland resource use often requires management of large areas and diversified livelihoods.

Some call Ahmed's arid home a '*forgotten landscape*', too often overlooked by green-seeking environmental and development organizations. Yet the world's drylands are likely to be most affected by climate change, given the existing water stress. Against this reality IUCN is pioneering new ways to further develop and implement a focused Union-wide Water Programme and influence global debate and decisions on conservation and sustainable use of water. The most effective approach has been the development of multi-stakeholder dialogues, led by farmers, fishermen and pastoralists like Ahmed, learning how to allocate who needs how much water, why and when.

That is why IUCN and its partners backed up people like Ahmed in local Water User Associations. Hundreds of such associations have been spontaneously forming in recent years to help guide water



use and decisions in a dozen stressed watersheds worldwide. In Africa these include the Lake Tanganyika basin, and the Pangani, Senegal, Okavango, and Komadugu Yobe River basins.

Ahmed observes that no aspect of life – health, food, livelihoods, hygiene – can be separated from water. So she began to speak up in the dialogue forums, first to other women, then to men who, to her surprise, began to listen and agree with her. Adjusting to this kind of participation in an IUCN supported venture was difficult for Ahmed at first; she was one woman facing nine men around a single table. But she was encouraged both by the many hundreds of women who supported her, and by the fact that the men appreciated her unique perspective.

Ahmed amicably but firmly vouches for Nigerian women, "we are the majority in the country, especially in the rural parts, and deeply involved in every aspect of fishing, herding and farming, from planting, to harvest, to selling at market. We should not be empty handed." Based on her example, and the connections she has forged with other WUAs throughout the Komadugu Yobe River basin, they won't be. ■

[www.iucn.org/water](http://www.iucn.org/water)

## IUCN Water Programme and the grapple between modernity and dryland conservation

The IUCN Water Programme is actively involved in, and supports, a wide range of water-related projects in different locations around the world. It works at the regional, national and local levels in various IUCN operational regions across Asia, Middle East, Africa, Europe, and America. This is because water is vital for all living organisms and major ecosystems, as well as for human health, food production, and economic development. Hence water scarcity adversely affects all these areas.

What is happening in Nguru is reflective of how drylands globally are grappling with modernity and the resultant loss in biodiversity and ecosystem services. Drawing of water has damaged much of Nigeria's wetlands including the Hadeija-Nguru wetlands. This is a Ramsar site that is famous for breeding birds, plants and animals. A large number of farmers, fishermen, and pastoralists depend on the biodiversity in this area for their livelihood, and it also provides wild resources to the surrounding villages.

IUCN's efforts have borne fruit in many regions.

In the small Barra de Santiago - El Imposible basin in El Salvador, lack of water, inequity, environmental degradation, erosion, pollution and saltwater intrusion are some of the problems that led IUCN and other partners to support the initiation of projects that would improve access, quality and distribution of water and ecosystem services. This was accomplished through building capacity and encouraging dialogue on water-related problems with relevant representatives including locals from the grassroots, and helping develop a sound sustainable management plan.

In the township of San Francisco Menéndez, nearly one-third of major illnesses are related to poor water quality, and an estimated 70% of lands suffer from erosion. In Tacana, Guatemala, Mexico, an area renowned for the production of biological coffee, deforestation led to flooding and mudslides. Sugar cane plantations also led to pollution of the water, and large-scale farming led to degradation of avail-

able lands. IUCN helped support projects in these areas that conserved, restored and optimized the benefits of the freshwater, soils, and ecosystems through capacity building, awareness-raising, and sustainable management.

Through IUCN (and other stakeholders) regional water programme covering West Asia/Middle East and North Africa (Regional Water Resources and Dryland Programme – REWARD), due attention has been given to poverty alleviation, community development and gender-related issues through a range of demonstration projects involving the local communities. As part of REWARD's regional networking and together with other regional institutions, such as the Arab Water Council, UNEP, the Global Water Partnership and CEDARE, IUCN will launch a Forum for Dialogue on sustainable ground water management through a series of regional meetings.



# Maximising synergies between CBNRM initiatives and the UNCCD in Southern Africa

IUCN Eastern and Southern Africa Regional Office

**S**outhern Africa's drylands are home to almost 50 million people in a range of countries: South Africa, Botswana, Lesotho, Malawi, Swaziland, Mozambique, Zimbabwe, Namibia, most of Tanzania, some of Angola, Zambia and Madagascar. The global Multilateral Environmental Agreement on Drylands, the United Nations Convention to Combat Desertification (UNCCD) uniquely calls for a bottom-up approach in policy development and implementation, where countries develop strategies that deal with the root causes of desertification while taking into consideration the interlinkages of desertification and poverty.

Community Based Natural Resources Management (CBNRM) projects have reversed and prevented desertification and degradation, supported wildlife hunting or ecotourism management projects, alleviated poverty, helped establish local institutional structures for resources management, restored degraded areas by commercializing non-timber forest products (veld products), and impacted policy formulation in all SADC countries. Despite this, SADC countries do not well represent CBNRM in their reporting to UNCCD and experience of CBNRM in over 20 years of successful projects in these countries are not well integrated into national UNCCD strategies, and are almost non-existent in SADC sub-Regional Adaptation Programmes (SRAP). Case studies in some of these countries revealed that CBNRM and UNCCD could enjoy greater synergy as both believe in local community active participation, sustainable use of resource management, diversification of rural incomes and employment opportunities, ca-

capacity building and streamlining policy formulation to meet such objectives.

## A number of case studies clearly reveal the success of CBNRM work in SADC

Most communities involved in CBNRM programmes highly appreciate local natural resources and have improved skills for monitoring, sustainable cultivation and harvesting, and choose not to rely entirely on government and government-related institutions.

In Botswana, CBNRM allowed the community to shift from cattle management to wildlife-based incomes that has led to greater local appreciation of wildlife and has reduced wildlife-human conflict. The community has also planted economically important tree species (*marula*) and received training in sustainable harvesting techniques.

In Malawi extensive woodlots have been established to mitigate for deforestation in the area, and animal species are starting to move back into the forests where they had become locally extinct. There are also reports that rivers are starting to become perennial again. CBNRM interventions can have very positive impacts in reducing the environmental components of desertification while benefiting the communities.

The UNCCD identifies a direct link between desertification and poverty and CBNRM projects in South Africa have helped alleviate poverty and diversify household income streams, again underlying the synergy that exists between the two. For example, the total contribution of the national CBNRM programme to net national income and increased capital value of wildlife in northwest Namibia from 1990 to 2003 was

approx. US\$60 million, almost matching the total investment in CBNRM by government and donors of approximately US\$66 million.

Income is also generated by conservancies, which provide employment for the local community. This extra income is then invested in craft and agriculture and to improve community infrastructure such as schools and community gardens. Diversifying rural incomes and employment opportunities is also one of the key strategies of the UNCCD. The income generated by CBNRM projects should be earmarked to local desertification, drought issues and general natural resource management issues, to further enhance its contribution to UNCCD implementation.

The UNCCD places a major emphasis on the participation of local communities in the implementation of desertification response strategies. In this regard most CBNRM case studies suggest that substantial strides have been made towards the strengthening of local institutions and empowerment of local communities. Capacity building of local institutions for sustainable land and resource management is a critical element of the UNCCD.

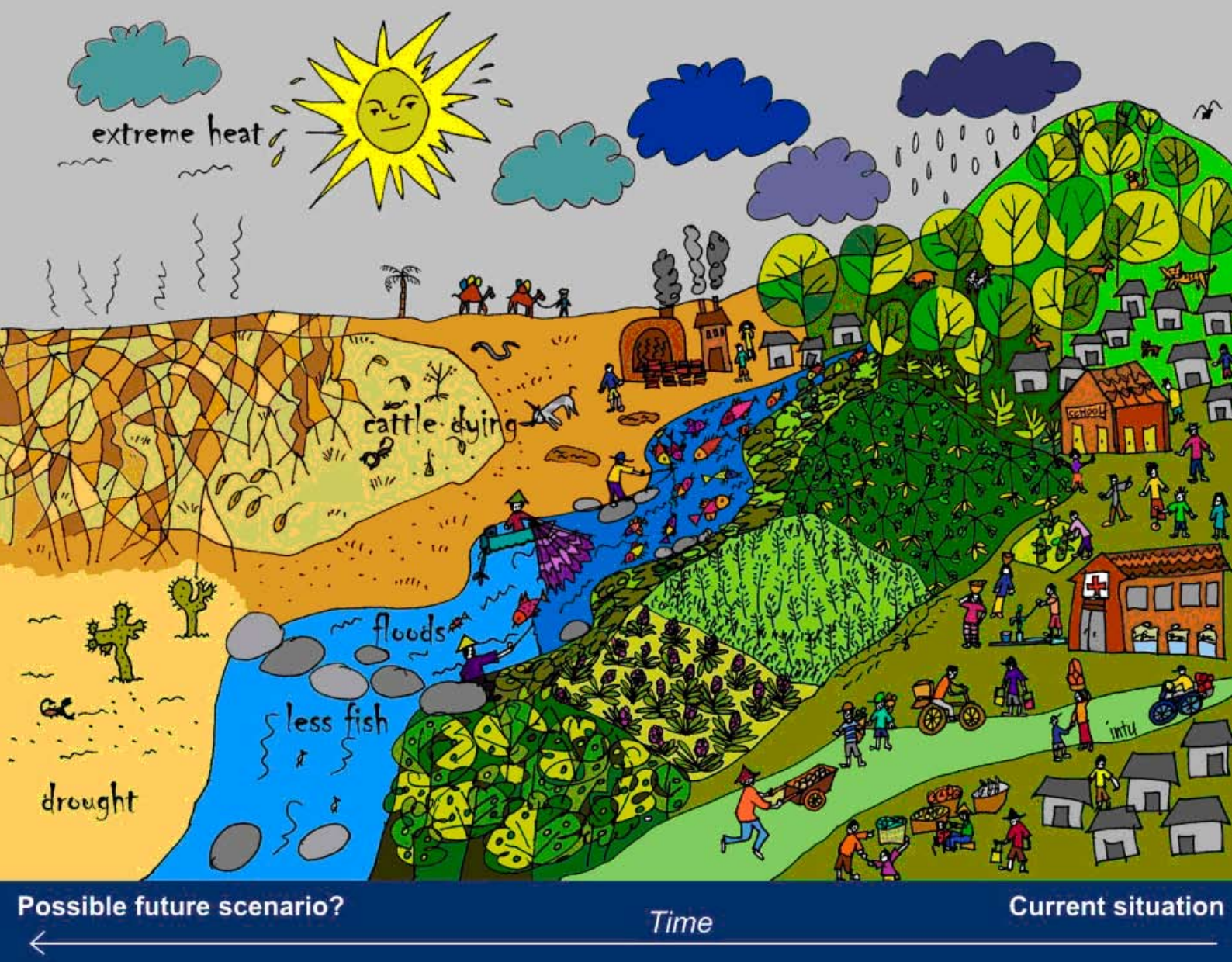
The discrepancy in the recognition of CBNRM in UNCCD and the NAPs and SRAP is easily explained – they all have a different focus – local, national and regional that needs to be better integrated. The focus of the National Action Plans should shift from national planning to local implementation and CBNRM could be of great benefit. The UNCCD should in addition assist with the provision of appropriate legislative frameworks that enable locally sustainable land management.

At the same time, the CBNRM community needs to actively engage with national and regional UNCCD initiatives and demonstrate their success with both the improvement of rural livelihoods and the reduction of desertification. In this regard national CBNRM projects need to provide information of successes to the UNCCD focal point proactively and in time for national UNCCD progress reports.

From the case studies it became clear that there is poor contact between the CBNRM community and UNCCD initiatives. Creating synergies between CBNRM and the UNCCD could therefore be a critical step in moving national and sub-regional desertification strategies from policy to action. ■

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## Urgent need for climate change adaptation

Béatrice Riché, IUCN Forest Conservation Programme

A Pan-African project funded by the Ministry for Foreign Affairs of Finland and implemented by IUCN in Zambia highlights the need for local communities to become more aware of their traditional coping strategies in the face of climate change.

"Droughts have destroyed almost all our crops this year. Our livelihood mostly depends on agriculture, so we need to find other means of survival..." stated villagers around the Dambwa Local Forest in Zambia, during a community-based climate change risk assessment exercise.

The community around the Dambwa Local Forest, located in the dry Southern Province of Zambia, was one of the seven communities in this country to participate in climate change vulnerability assessments.

The results of the analyses revealed that communities are well aware of climatic changes but the factors underlying these changes are not commonly known. Communities are normally aware that cli-

matic changes affect crop production and that cutting trees affects their local climate, but they are less aware of global debates and opportunities for example regarding carbon markets. Most climate change is caused by activities in the First World, yet climate change is felt most acutely and extensively in the developing countries and by their communities.

IUCN therefore helps communities become more aware of global climate change, build on their traditional climate coping strategies, assess risks and opportunities and then feed the findings into national adaptation plans and projects, so that these are built on community grounded knowledge.

Communities have strategies to cope during the times of extreme climate events, but these come often with high socioeconomic and environmental costs, such as increased poverty and deforestation.

Community-level projects, mainly those dealing with ecosystem or natural resource management, can either improve adaptive capacity of communities or constrain it.

However, a lack of climate change awareness and understanding amongst decision makers and development project planners, and a low capacity to assess and address vulnerability, hinders the inclusion of climate change adaptation in decision making, project development and national policies.

The findings of the community-based analyses together with the international scientists' latest predictions on climate change in Eastern and Southern Africa lead to a decision by Finland to fund a 3-year, full-size pan-African project (including Mozambique, Zambia and Tanzania) on climate change adaptation. The project aims to ensure that climate change related policies and strategies lead to adaptation activities that emphasize the role of forests and water resources in supporting people's livelihoods and associated farming systems. ■

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# Tunisian women integral to sustainable management of biodiversity

Leila Bahri, Union nationale de la femme tunisienne, IUCN Member

**N**orth African countries share a common environment and history that is entwined with that of the Mediterranean Sea. Arid conditions are the norm, except for a narrow, more humid stretch along the Mediterranean coast, where the main economic activities are located. Principal concerns in the region are water scarcity, desertification, soil erosion and land degradation. Poor irrigation methods and pollution from industrial and domestic wastewater has resulted in poor water quality. Unsustainable use over the past decades has led to reduced water pressure, salinization and salt water encroachment into the interior.

Climate change poses an additional threat to fresh water availability, already scarce in North Africa, as well as an increase in sea levels and salinization of agricultural zones. Less water and overexploitation of the land combined with increased economic activity has affected the vegetation cover of the region.

The loss of woodlands and overgrazing has led to a significant decrease in biomass and grassland species, and an increase in less palatable exotic species. Yet, grasslands provide key fodder resources for the livestock on which the local population depends. Grassland species in the North Africa drylands are increasingly threatened by genetic erosion, or have disappeared. For example, two leguminous plants, *Hedysarum humile* and *H. flexuosum*, have disappeared in Tunisia and can only be found in small, isolated pockets in Morocco and Algeria.

Indiscriminate land clearing transforms water courses, exposing the ground to water and wind erosion. Local people are already experiencing the harmful effects of environmental change, which affect economic activity and social equilibrium. The

deterioration of the coastal region affects tourism, which is a major or in some cases the main source of income for countries in the region.

The loss of biodiversity and soil, and the advancing Sahara has increased urban migration, particularly towards the coastal zones. As the standard of living is already low for most of the population, the problems of access to water and to energy for these immigrants increases the risk of internal conflict and social instability.

## The evolving role of women

The deterioration of the environment and natural resources impact women in particular who are the primary providers of water and energy (principally fuel wood) for the family.

In agriculture, women constitute more than half the number of farmers, and are involved in planting, harvesting and production but rarely in resource management. Here women do not inherit land, making access to land and credit facilities difficult. Tunisian women, however, are adapting to climate change and natural disasters. For example, they make and wear woollen dresses adapted to the climate, and prepare food that rehydrates as well as nourishes the body. Women use wild plants for family medical care; to dye wool; to produce clothes, carpets and beauty items; and also to sell for food.

## Women fleeing to urban areas

Today's generation of women is more educated and have rejected the harsh and subservient lifestyle of the older rural generation, leading to a desire to live a different life in urban areas. Latest census figures reveal that 14% of rural women migrate to urban areas in search of work. If this continues, pressure on the urban and coastal zones of the country will increase.

To stem this tide, the important role of women in the community, in preserving the environment and in adapting to natural disasters needs to be appreciated. But it will be very difficult to conserve biodiversity without a clear adaptation strategy aimed at halting unsustainable use of natural resources, economic stagnation, increased urban migration, and loss of cultural heritage.

## Way forward for Tunisian women

Women are often the bearers and protectors of indigenous knowledge, as well as the creators of new methods of managing biodiversity and the environment. However, for a long time they have been forced to assume a secondary role in society. To improve things, women need equal access to economic activities, commercial opportunities, property rights and natural resources. New technologies to improve rural living conditions are necessary so that women can use their knowledge to improve their standard of living and adapt to changing environmental conditions. It is also essential for women to develop a sense of identity and to validate their position in society.

The IUCN 2008-2012 Programme for Sustainable Management of Natural Resources in North Africa was developed by UNFT and other North African members, with the support of the IUCN Centre for Mediterranean Cooperation. This programme includes projects which will help the communities to adapt to environmental and climatic change, using new technologies for sustainable use of natural resources. ■

[www.unft.org.tn/](http://www.unft.org.tn/)



# Centre and garden for the conservation of threatened plants, Egypt

Kamal H. Batanouny, IUCN Commission on Ecosystem Management

**D**rylands are home to important medicinal plants, this is also the case for Egypt. Slow growth rates and unsustainable use have led to a situation where many medicinal plants have been depleted. While cultivation is not part of the Bedouin culture that is based on livestock herding, the Bedouins of El Hammam, 65km west of Alexandria, recognized the need to grow medicinal plants and engaged in the establishment of a centre and garden for the conservation of threatened plants. The objectives of the centre range from the *ex situ* conservation of rare and threatened plants and awareness raising, to documenting traditional knowledge for the benefit of the local population. The Centre is cultivating more and more plants and attracts numerous visitors as well as hosts scientific meetings. Seedlings of threatened plants are used to replenish plantations and are also given to interested people.

This project was implemented by the Academy of Scientific Research and Technology with funds from the Swiss Development Cooperation through IUCN, in collaboration with the Egyptian Botanical Society and its President Kamal H. Batanouny. Building on the results of the Centre, a Small Grants Project (GEF) will now be implemented in the area. ■



## Management of dry areas in Jordan

Mahmoud abu Setta, Director, Rangeland Directorate, Ministry of Agriculture, IUCN State Member

**J**ordan is mostly covered by drylands, ranging from arid areas to deserts, where livestock grazing has been the major activity. During the past six decades, these areas have been severely degraded due to unsustainable use, coinciding with a decline and erratic fluctuations in rainfall. This has led to the desertification of large tracts of land.

The government has implemented a number of initiatives aimed at improving the socio-economic development of the inhabitants living in drylands through the implementation of rangeland development, wildlife protection, infrastructure and water harvesting projects. The *Badia*, or Jordanian desert, remains the greatest challenge to development.

Currently drylands in Jordan are used in a number of ways:

1. Grazing. This is the most widespread use, noting that free-grazing has resulted in overgrazing.
2. Rain-fed agriculture. Large tracts of the best grazing land are being annually ploughed for cereal cultivation.
3. Irrigated agriculture. More than 45,000 ha of drylands are exploited through irrigated agriculture using underground water.
4. Urbanization.
5. Nature conservation. There is a burgeoning ecotourism industry in the desert to observe wildlife.
6. Mining. Large tracts are used for phosphate, oil shale, gas and stone mining.

### Rangelands

Rangelands in Jordan cover 8 million ha., constituting about 90% of the total area of the country. They can be sub-divided into three natural ecological zones:

1. Desert rangelands. These cover an area of 7 million ha. and receive less than 100 mm of rain/year. These lands are mostly owned by the State. These are mainly pastoral areas in the eastern and southeastern parts of the country.
2. Steppe rangelands. These areas cover 1 million ha and receive annual rainfall ranging between 100-200 mm/year. 90% of this area is privately owned.
3. Mountainous rangelands. These have an area of approximately 45,000 ha and receive more than 200 mm of rain/year.

### Challenges facing drylands in Jordan

Numerous challenges and issues confront dryland management and conservation in Jordan. These include:

1. Cultivation of the rangeland for crop production and ownership issues.
2. Overgrazing. Large numbers of animals grazing in rangelands over long time periods reduce the number of edible plants, while at the same time increase the numbers of unpalatable plants.
3. Early grazing, which does not allow plants sufficient time to complete their life cycle.

4. Firewood collection.
5. Inadequate legislation.
6. Lack of participation of users of rangelands in decision-making.
7. Other unfriendly uses in the dryland environment (mining of phosphate, rock and sand).
8. Groundwater depletion.
9. Increasingly harsh climatic conditions (low and erratic rainfall distribution).

### Development efforts in the desert

In conclusion, a multifaceted approach towards solving the many problems facing the drylands in Jordan is needed. To date the following projects have been undertaken and are being further developed:

1. Restoration of degraded rangeland ecosystems. A number of projects have been implemented aimed at the protection, development, and management of controlled grazing in the rangelands through the establishment of range reserves. 33 rangeland reserves have been established by the Ministry of Agriculture in addition to a number of areas managed by cooperatives.
2. Watershed management. There are many agricultural projects designed to conserve soil and water, and to increase agricultural productivity.
3. Water Harvesting. Jordan suffers from water shortages, especially in desert areas. In the past the focus was to dig artesian wells in order to meet the needs for water of nomads and their animals. Today, projects aim to harvest rainwater and floods through the establishment of dams and "hafirs" (a local name for water reservoirs) to collect water to be used by livestock.
4. Nature conservation. Jordan is home to a number of threatened species including gazelles and oryx, and captive-breeding and reintroduction projects are being undertaken.
5. Human, social and economic development initiatives. The government provides educational and health services needed by the population such as water, electricity, communication and others facilities, in addition to development projects and small enterprises leading to family income-generation. ■



# Protecting Yemen's unique heritage

Paul Scholte, IUCN Commission on Ecosystem Management, IUCN Species Survival Commission

The entire country of Yemen is dryland, and with 40% of its population living below the poverty level, Yemen is one of the developing countries which have contributed the least to the emission of greenhouse gases, but are among the most vulnerable when faced with the effects of climate change. Redistribution of precipitation and increasing frequency and intensity of droughts with possible increases in air temperature entail negative consequences, particularly for its natural resources and thus its inhabitants. A more arid climate will result in further desertification, along with significant declines in wetland areas. Such changes will have important consequences for plants and animals with restricted distributions, facing increased risks of extinction.

Studies undertaken on the island of Socotra, Yemen's "jewel in the crown" that this year has been declared a UNESCO World Heritage Site, suggest that two-thirds of the island's precipitation originates from mist captured by the native vegetation, although some models predict that by 2080 the extent of this native vegetation will decline by almost half. This will not only reduce the area's biodiversity value, but will also undermine its capacity in capturing mist, thus jeopardizing the provision of increasingly scarce freshwater.

Therefore there is an urgent need for mitigation measures to protect the vegetation that is already under increasing pressure by grazing and (fire-) wood extraction. Only then can protected areas continue playing their vital role.

## Yemen hosts globally important biodiversity

Situated at crossroads between the Afrotropical, Oriental and Palearctic regions, Yemen has been identified by several global studies (WWF's "Global 200 Ecoregions", CI's "Conservation Hotspots", and IUCN/WWF's "Centres of Plant Diversity") as hosting globally important biodiversity.

Conservation has always been of high importance in Yemen, where some of the world's first protected areas were found. Community protected areas, 'mahjur' and 'waqf', have played an important role in protecting natural vegetation in often intensively cultivated and grazed areas. These patches of natural vegetation have for centuries provided services to local communities, including fresh water.

To address increasing pressure, the Government of Yemen has, since 1999, gazetted five protected areas: the Socotra Archipelago ('island of the dragon blood trees'), the 'forgotten forests of Arabia' (Bura'a and Hawf), the Aden Wetlands and the cultural landscape of Outmah. In some of these areas, notably Socotra, Aden Wetlands and Bura'a, conservation management, mostly through collaboration with local communities, has started. These initiatives have been supported by several international partnerships (GEF, UNDP, as well as bilateral cooperation). These areas represent the highlights of the natural wealth of Arabia, but several more sites dispersed over the country have been identified that merit protection status. Ultimately, they may form the backbone of a representative protected area system in Yemen. Local communities have expressed their strong willingness to support these initiatives.

## Importance of protected area's services, including fresh water

Much underestimated by the conservation community, several protected areas in Yemen (most notably Hawf, Bura'a, and Skand on Socotra) comprise watersheds that provide essential services to surrounding communities, including firewood, medicines and, most important, fresh water. Hawf protected area provides water for tens of thousands of people in the 30 km long coastal plain East of Al Gheidha. Skand protected area encompasses the catchment of the water provision of Hadibu, capital of Socotra with 12,000 inhabitants and Mouri with several thousands of people.

## Lack of (financial and other) resources to cope with the increasing pressures

In addition to the increasing pressures, both local (with increasing local community aspirations) and global (climate change), protected areas in Yemen cope with a serious lack of funding and management capacity. This holds notably for Hawf and Outmah protected areas, but even for the high-profile Socotra Archipelago, as long-term funding is not secured, despite significantly increased national funding over the last three years.

## The proposal of Yemen

At the CBD - COP-9 (Bonn, 2008) the Government of Yemen and the respective local communities committed themselves to double, over the next 5 years, the

area presently under formal protection (terrestrial  $\pm$  5,000 km<sup>2</sup>, marine  $\pm$  18,000 km<sup>2</sup>).

In addition, the Government will increase its support for conservation, by:

1. The creation of an island-wide administration on Socotra (2008-10), assuring the planning, supervision and coordination of the archipelago.
2. An increase in employment of Environment Protection Authority (EPA) – protected area personnel on Socotra (1997: 4, 2007: 28, 2008: 54, 2009: 71).
3. An increase in EPA personnel for other protected areas.

## What is needed from the international community?

To reach this goal and more importantly, assure its long-term sustainability, the Government of Yemen calls for support of the international community in assisting Yemen with:

1. Understanding biodiversity and ecosystem services
  - a. Inventories resulting in a prioritization of conservation efforts.
  - b. Surveys on ecosystem services (e.g. water provision, role in agricultural production) resulting in detailed management proposals.
2. Institutional capacity building
  - a. Targeting decentralized, community supportive capacity of the Environmental Protection Authority
  - b. Formulation and creation of endowment funds.
3. Long-term funding
  - a. Seed-money for the replenishment of conservation endowment fund(s).
  - b. Development of ecosystem services' payments and users' fees.
  - c. Development of other long-term funding options.
4. Community assistance activities
  - a. Empowering communities in protected area management.
  - b. Tapping nation-wide resources for their management. ■



# The Inner Mongolia Grassland Ecosystem Research Station: research for conservation

Xingguo Han, Institute of Botany of the Chinese Academy of Science, IUCN Member

The Inner Mongolia Grassland Ecosystem Research Station (IMGERS) was established in 1979 and is part of the Institute of Botany of the Chinese Academy of Sciences (CAS), an IUCN affiliate member since 1986. The work of IMGERS is focused on (1) long-term monitoring of the key biotic and abiotic factors driving typical steppe ecosystem processes, (2) studies on structure, function, biodiversity, and ecosystem responses and feedback to global change, and (3) development of practical techniques and methods for grassland ecosystem management, particularly sustainable resource utilization and grassland restoration.

## Why Inner Mongolia?

IMGERS is located in the Xilin River Basin in Inner Mongolia, where typical steppe ecosystems of northern China are found. These Eurasian steppe grasslands are rich, housing some 650 species of flowering plants. The area is dry (with mean annual precipitation about 358mm, mainly occurring from June to August) and cold (with mean annual temperature around  $-0.4^{\circ}$ ). Average elevation is approximately 1100 m. With its sandy, silty, loamy soils, the region is one of the most important pasturelands in China. It is therefore essential to have an important research station in this region. IMGERS boasts infrastructure including facilities housing its administrative offices, a meeting room for up to 60 participants, and comfortable lodging (including broadband internet) for visiting investigators. In addition, long-term housing is available for site staff, graduate students, and researchers. Two buildings contain 22 laboratories equipped with state-of-the-art equipment. Moreover, various ongoing research or monitoring programs maintain on-site facilities such as weather and stream monitoring stations which support long-term ecological research. The site provides a unique outdoor laboratory in a typical steppe ecosystem for basic biological studies, ranging from taxonomy to ecosystem processes.

## Our mission and on-going research

The station is dedicated to a three-fold mission composed of long-term monitoring, ecological research, and dissemination of the results.

## Long-term Monitoring

Through long-term monitoring of water, soil, atmosphere, and biological and ecological elements of the grassland ecosystem, IMGERS has collected a vast amount of key biotic and abiotic data since 1979. This has been made available to the scientific community and the public through a number of databases. These databases include hydrological changes in the Xilin River Basin, biological and soil dynamics in typical grasslands, and meteorological records. IMGERS has set up six long-term experimental plots encompassing 800 ha, which include two plots studying typical local dominant grasses (mainly *Leymus chinensis* and *Stipa grandis*), a restoration plot, a grazing plot, a rodent observation field, and a plot studying meteorological phenomena.

## Research

Ecological research is the central activity of IMGERS. Researchers including scientists from the Institute of Botany as well as visiting investigators conduct field research on a wide spectrum of taxa, ranging from studies on individual organisms to landscape and global-scale processes. Ongoing research includes physiological ecology; population and community ecology of plants and insects; and ecosystem, landscape and grassland restoration ecology. Studies of ecosystem dynamics emphasize productivity, nutrient cycling, below-ground processes, biodiversity and ecosystem functioning. As of 2000, over 400 scientific books and articles in peer-reviewed journals have been published. Much of this work is supported by the National Science Foundation of China, as well as the Ministry of Science and Technology of the People's Republic of China, the Chinese Acad-

emy of Sciences, and other agencies, including welcome support from abroad. In total, over 60 scientists have active research projects on-site.

Current research efforts have focussed on vegetation structure and succession, biogeochemistry, ecophysiology, biodiversity and greenhouse gas dynamics of the region. Results from these studies are essential for a number of reasons. They improve knowledge on the structure and function of temperate grassland ecosystems, the impact of grazing, the life-history strategies and physiology of various native grasshopper species (which are key grassland pests), as well as provide input into developing effective management strategies for controlling rodent pests.

## Spreading the message

Based on the results of long-term monitoring and research, IMGERS then disseminates best practices for grassland ecosystem management to a broader public, in order to support sustainable development through ecological conservation and to improve socio-economic levels in northern China. A model that integrates ecological development, natural resource use and socio-economic development has been produced and applied in the region.

## Restoration and management of the grasslands of northern China

The ultimate goal of IMGERS is to provide the facilities and opportunity to researchers and the public at large to contribute to the sustainable development of the grasslands of northern China and elsewhere. This important area, both biologically and economically, has attracted and continues to attract enormous interest locally as well as from abroad. However it will only be when the research results are used to improve current practices that the mission of IMGERS will be achieved. ■

[www.ibcas.ac.cn](http://www.ibcas.ac.cn)

Experiment of Fire Ecology



# Rejuvenating drylands in Pakistan

Arjumand Nizami, Sahibzada Irfanullah, Intercooperation, IUCN Member

Most of the people living in the drylands of southern Pakistan are extremely poor, and they depend on livestock rearing and subsistence agriculture for their livelihoods. It is normally difficult to access these rural areas as infrastructure is not developed, and livelihood options such as off-farm jobs are limited. Rainfall is scarce and unpredictable, and extreme weather causes crop loss through scorching and freezing. Small land holdings are rare; women's mobility is limited, and many of the landless share resources.

The local people depend highly on natural resources and livestock. These are ecologically fragile areas and the people are locked into dependency on low productivity drylands and use-patterns which result in natural resource degradation. For example, overstocking is widespread, whilst cultivated rainfed lands are increasingly being abandoned due to prolonged droughts. These challenges are particularly evident in Karak district and Kurram Agency of the North West Frontier Province (one of the four provinces in Pakistan).

Since people's livelihoods heavily depend on these drylands value efforts to reverse degradation, as this has a direct effect on their income. As populations have increased, the pressure on pastures has resulted in the severe degradation of natural resources.

Thirty million people live in the drylands of Pakistan, and these drylands cover almost 75% of the country. In one year, the country receives less than 250mm of rainfall. The communities of Karak and Kurram have experience in growing drought-resistant crops, trees and shrubs for food and fodder. Cropping is characterised by a prolonged fallow period for free grazing. During the cropping season, animals are taken to the foothills for grazing.

The provision of financial support by the Government is limited because these dryland areas are not prioritized in national development strategies. The Forest Department, however, runs a few programmes in the area such as tree planting, fencing and manual watering of the areas.

The Soil Conservation Department constructs and rehabilitates walls and water tanks for farmers. Agriculture research stations are constrained by insufficient funds. Regional development projects distribute free seedlings among communities for planting on communal lands. The situation prevailing in these areas calls for strategies that are tailor-made to the changing environmental and socio-economic parameters. Interventions must be simple, cost-effective and build on indigenous practices while addressing the local farmers' needs.

## Working hand-in-hand with the local community

The Farm Forestry Support Project, implemented over the past nine years with financial support from the Swiss Agency for Development and Cooperation (SDC), initiated rehabilitation work in the drylands of North West Frontier Province. This entailed improving the existing silvo-pastoral system with hillside ditches, sand dune stabilisation, and surface water resource development with the help of the local community. The objective was to increase productivity cost effectively and to improve the resources that support livelihoods so that they could act as avenues for income generation. Dryland rehabilitation activities through the Farm Forestry Support Project started in 2004 after consultation with the local people who also contributed financially. Local NGOs helped mobilise the farmers.

## Rehabilitation of silvo-pastures

On limited patches of land, ditches and pits were dug to help drain rainwater into the planted land. The patches were built so as to retain as much rainwater for plant growth as possible. The men and women of the community helped in the selection of the species to plant. A 60% plant survival rate of plants was recorded and the tree density increased from 14 to 218 per hectare. Local annual and perennial grasses also grew in abundance, increasing from 12% to 45%, and soil fertility improved due to moisture conservation.

## Surface water resources

Rainwater harvesting and storage in natural or artificial ponds is carried out in many arid areas of Pakistan. Locally called *toba*, these ponds provide water for livestock and household uses where there is acute shortage of water. The Farm Forestry Support Project assisted the construction of water ponds to develop forest plantations and fruit orchards. These ponds consisted of earthen catchments to which water was diverted from seasonal and perennial streams and mini-catchments, and in addition helped meet many local needs, especially for women.

## Lessons learned from the Farm Forestry Support Project

- Communities need to keep land fallow for 2-3 years to allow full regeneration, while ensuring that the landless, who often depend on livestock (particularly small ruminants), are not affected.
- Land tenure is crucial for any land rehabilitation activity.
- Involving grassroots organisations is a key ingredient in successful community involvement, and they must have a gender-sensitive approach as women suffer the most in a resource-scarce environment. Women, for example, chose species for replantation which had more fodder and fuel value, as well as those that provided better raw material for handicrafts.
- The interventions were cost-effective and could thus be easily replicated.
- The extensive nature of the drylands in Pakistan demands the involvement of Government in such rehabilitation interventions.

Thanks to the Farm Forestry Support Project there has been a marked increase in vegetative cover (trees, shrubs and grasses), and this means that the women in the area use less time to fetch fuelwood and look for fodder. It has also meant that the local people have time to develop products for sale. Many of the wells in the area have also been rehabilitated and provide water for the community. There is need to support replication of similar projects in the drylands of Pakistan to improve livelihood security. ■

[www.intercooperation.org.pk](http://www.intercooperation.org.pk)



# Strengthening traditional wisdom and resilience in India's Thar Desert

Kanupriya Harish, Jal Bhagirathi Foundation, IUCN Member

**R**ajasthan is the largest state in India. Although the state covers 10.5% of the country's geographical area, it shares just 1% of its water resources. The Marwar region of western Rajasthan includes the districts of Barmer, Jodhpur and Pali. These districts constitute a major part of the Thar Desert, an area characterized by low and erratic rainfall (varying from about 260-480 mm/year), poor sandy soils, deep, often saline ground water, sparse vegetation, and strong sun and winds. Droughts of varying intensity, particularly in the western part, are a recurring phenomenon.

People have inhabited the Thar Desert for centuries and have developed a variety of ways to survive in this rather inhospitable environment. They maintain a system of traditional water and natural resource management characterized by four key elements: the Agor (water catchment area), *Gouchar* (community grazing land), *Orans* (protected and sacred community forests), and *Talabs* or *Nadis* (community ponds). This system was developed and maintained by local community institutions as a common resource, ensuring its upkeep and equitable distribution of resources.

Other traditional systems have been the construction of *Tankas* (underground rainwater harvesting tanks) which can be either private or community owned, and are used for harvesting water and also as storage tanks to store water transported from elsewhere in times of need. Traditionally the community developed their

own systems around these *Tankas* that were related to its construction (size, location and contribution in labour), maintenance and water distribution.

These systems have the potential to meet the challenge of water management in the region and possess adaptive capacity to adjust to climate change. However over time they have been marginalized, resulting in the gradual breakdown of the system and leading to increased vulnerability of the communities. There has been an increasing dependence on the government to address the drinking water crisis, which has been unable to address the magnitude of the problem.

In addition, the combined pressure of large human and animal population on water and land resources has caused a severe depletion of scarce resources. The once green and vibrant catchment areas comprised of pasture and forests, which played such an important role in traditional land and water management, have been denuded. The majority of the population does not have access to safe drinking water and proper sanitation. As a result a large number of people (predominantly women and children) are affected by preventable water-borne diseases and spend a high proportion of their day seeking water. Young children, especially girls, spend more time fetching water than attending school, resulting in lowered education rates. Also schools need to close when faced with water shortage. Limited availability of water has also created competition among

groups and communities for their access and use. During prolonged periods of water stress households sell their livestock at bargain prices in order to use less water, meaning they receive a low return on their investment and loss in future income.

The Jal Bhagirathi Foundation (JBF) works towards strengthening the capacity of desert communities to manage their scarce water resources through traditional best practices. JBF's programmes, activities and strategies all aim towards one goal: involving, empowering and making the village community self-reliant. The Foundation in partnership with the UNDP and the Italian Development Cooperation has over the past six years supported the construction of 300 village community water structures in nearly 200 villages (see next page, the example of the village of Chiradia).

The Foundation follows a participatory approach and emphasizes strengthening village level institutions to effectively manage natural resources, especially water. A four-tiered system of community institutions from the village water user association (the *Jal Sabha*) to the programme level (the *Jal Parishad*) ensures the active participation of the community is ensured from the formulation of the project to the actual implementation. A community fund (*Jal Kosh*) has been set up in each village to ensure maintenance of the structures. It raises funds through a nominal water tariff charged for water transported from the village pond to community or individual tanks.







An impact evaluation of project activities, carried out by the Institute of Development Studies of Jaipur in 2005, showed the following encouraging results:

- Increase in availability of drinking water: 95.0%
- Households individually benefited: 97.6%
- Community benefited: 95.1%
- Reduction in distance for fetching drinking water: 68.3%
- Increase in drinking water availability for livestock: 80.5%
- Sample household participated in decision-making: 80.5%

Another evaluation completed by UNDP in April 2008 revealed that minority groups, and other marginalized communities, own 90% of the water harvesting structures built. Also, expenses have been reduced by at least 140% for the average household, as water catchment and storage capacities eliminate the need to purchase water during most of the year. In periods of low rainfall they can now buy tanker water relatively cheaply from nearby village sources.

JBF believes that the answer to living in such a harsh environment is to strengthen traditional practices, as local communities have the knowledge and resilience to sustainably live in drylands. ■

## The exemplary village of Chiradia

Chiradia village lies in the district of Barmer and has 250 households numbering 1,347 inhabitants. It is a heterogeneous community made up of different castes. For drinking water requirements, Chiradia relies on a small well and the village *nadi* that was excavated some hundred years ago by Tulsa Bharti Maharaj. Given the small size of the *nadi* and siltation over the years, even when the *nadi* was full it could only provide water to the community for 6 months of the year. At other times tankers of water were purchased from neighbouring villages some 12 km away at rates of 250- 600 rupees. The village also receives piped water supplied by the government, but lack of water pressure prevents the water from reaching the village. On average each household in Chiradia spent 6,000-7,000 rupees on water each year. Less fortunate ones had to take loans when the water situation becomes desperate.

In order to overcome their water woes the Chiradia community sent a proposal to rehabilitate their *nadi* to the Jal Bhagirathi Foundation, noting that each household was willing to contribute, depending on their ability to pay. "Work done on a water body is sacred", and the entire village wanted to participate. The JBF team then initiated the formation of the Chiradia *Jal Sabha* and agreed to excavation work worth 4,00,000 rupees, with the village paying a quarter of this sum.

As work began on the *nadi*, some villagers began taking the silt being removed for use on their own land. This created some conflict, as the entire village had contributed to the project, and a protest halted work on the *nadi* for a day. The *Jal Sabha* then intervened and a decision was reached that no individuals would use the soil, which would be used for the communal good to channel water into the *nadi*.

The capacity of the village *nadi* has been increased from 30,000 to 46,000 m<sup>3</sup>. During the first year after just an average monsoon, the *nadi* did not fill up to capacity, and the water only lasted for 25 days. This occurred because by excavating the silt, more porous soil at the bottom of the *nadi* was exposed. However the community, although initially disheartened, found a solution to the problem by bringing clay from a neighbouring village to line the *nadi*. They are also aware that it will take 2 or 3 monsoon rains before the *nadi* is fully recharged and functional.

The community's vision, planning and implementation techniques could have a far-reaching impact on the area, as this project has already generated interest in neighbouring communities.

# Protecting the Desert Thorn Forest ecosystem in the face of increased mining in the drylands of Kachchh, West India

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A tour of India without visiting its largest (about 50,000 km<sup>2</sup>) and most remote district Kachchh (covering a quarter of the area of Gujarat State) is, in our unbiased opinion, pointless! Here, one can sample Gujarat's most exquisite crafts, watch hundreds of flame-coloured Indian wild asses galloping at 70 km/hour, and observe an impressive assemblage of unique dryland species.

But it is not only tourists who appreciate Kachchh. Industrialists too are increasingly enamoured with its vast reservoirs of mineral resources: limestone, lignite, bentonite, and bauxite. In fact, they are already mining and developing ports and jetties, thermal power stations, salt industries, and cement factories in the area. This adversely affects the native thorn forest vegetation in the region, and has led to a series of legal battles between the Indian Government and conservationists of Gujarat, with the Narayan Sarovar Sanctuary in West Kachchh at the centre of the conflict. The Sanctuary conserves one of the last remaining stretches of Desert Thorn Forest, dominated by thorny leguminous plant species, some of which are listed in the *IUCN Red List of Threatened Species*.

The Desert Thorn Forest in the Sanctuary is home to many rare plant and animal species. The State Forest Department of Gujarat has reported a total of 225 species of flowering plants including such useful species such as gum arabic *Acacia senegal*, the toothbrush tree *Salvadora persica*, and the medicinal "guggal" *Commiphora wightii*. 228 species of vertebrates have been censused including the Indian wolf, golden jackal, desert fox and cat, caracal, chinkara or Indian gazelle, great Indian bustard, lesser florican, long-billed vulture and Indian white-backed vulture.

In 1993, the Indian Government attempted to reduce the Sanctuary area to a mere 95 km<sup>2</sup> in order to allow increased mining activity. Conservationists legally protested, eventually leading to the Sanctuary encompassing 444 km<sup>2</sup>. Despite this, large-scale mining is still carried out by private industries and Government agencies. Field surveys carried out as part of an environmental assessment have shown this to have adverse effects on native biodiversity. In addition to the direct impacts of habitat loss and decline in forest cover and species diversity, open-cast limestone mining also releases large clouds of dust, which condense in the cool nights of this arid region and settle on plants, harming vegetation and other wildlife. However, native inhabitants from Jatt Muslim, Koli and Jadeja communities, living in villages around the industrialised sites, suffer the most through respiratory infections from the dust, and by losing ownership over their ancestral agricultural land. The increasing pollution has worsened environmental quality, which has led to health issues for both people and livestock.

There have been some efforts to curb this ecosystem degradation. For example, a Management Plan has been developed that suggests zoning of activities by which 55 km<sup>2</sup> of the sanctuary will be delineated as a Wilderness Zone, a *sanctum sanctorum* where protection and habitat management would be the prime management objectives. The remainder of the 389 km<sup>2</sup> would be delineated as a Management Zone, which would include a Restoration Zone (7 km<sup>2</sup>), Eco-tourism Zone (4 km<sup>2</sup>) and Eco-development Zone (31 villages). The Management Plan also calls for adopting some mitigation and control measures against the ongoing mining around the boundary of the sanctuary, by: (1) demarcating a 50 m buffer for environmental monitoring, (2) developing a 200 m wide greenbelt of indigenous tree cover, (3) establishing a statutory committee of officials from the State Forest Department, (4) sensitizing local people against deleterious mining activities through awareness campaigns, (5) regulating funds in an effective manner for protection and habitat improvement activities and (6) imposing an Ecology Tax levied on mineral extraction by miners in the region. However, the scarcity of field staff and limited funds with the State Forest Department may restrict implementation of these recommendations.

Local people are also being sensitized to the dangers of unfavourable mining. Furthermore, the upcoming Special Economic Zone (SEZ) will likely exert enormous pressure on the Desert Thorn Forest ecosystem and adversely affect dependent wildlife.

Industrialization is therefore at the cost of this remnant ecosystem of regional, national and international importance.

At this juncture, we need to critically evaluate developmental needs in the region and examine whether development is required at the cost of this remnant ecosystem. Such an assessment should include an economic valuation of ecosystem services afforded by biodiversity and natural conditions of the region. It could also include local participatory mapping of resources. ■

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# Paying to sustainably manage watersheds and grasslands, India

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In India two-thirds of cultivatable land are drylands, supporting a large number of poor communities and producing a significant amount of food. Projections suggest that the second phase of agricultural growth in the country will be in drylands. An estimated 50% of the country's drylands, which provide livelihoods for farming, pastoral and artisan communities, are affected by various land degradation processes and need restoration. Water management has been recognized as essential in order to avoid rapid degradation of these essential ecosystems.

A watershed (also known as a 'catchment') is the area of land that feeds water into a river. Ecosystems such as grasslands and forests provide 'watershed services', which are key in creating water security for downstream water users. With climate change, industrialization and growing population, ecosystem services are increasingly important for agricultural and ecological security.

Watersheds have improved livelihood support systems in India. For example, Rudramata, a large reservoir fed by a large catchment area, and Lakshman Sagar, a medium-sized reservoir, have provided services in terms of water for irrigation, domestic use and recharging of ground water, and also provide habitat for wildlife. Migratory birds from other regions use the watersheds for feeding and breeding, and the watershed provides seasonal work and income for community labourers, which in turn limit urban migration in search of jobs and income during drought.

## Paying for ecological services

Grasslands are important ecosystems that support both people and wildlife and ensure watershed health. Watershed programmes are therefore an excellent means of ensuring food

and ecological security. The concept of 'Pay for Watershed Ecosystem Services' (PWES) by pastoralists and farmers proposes that water users pay for maintaining watersheds, in return for water security and other benefits.

Payments for watershed services are an important innovation in water management. Currently, local communities in the rural grasslands and watershed areas in India, depending on their income levels, pay 10% to 20% of the amount invested in protecting ecological systems. The tax collected from water users is put into a revolving fund governed by village *panchayat*. This scheme has encouraged villages to sell crop, animal, and craft products to earn money to pay for the watershed services, which has slowly improved the rural economies and their socio-economic status.

Unfortunately, there is not as yet a defined institutional framework and mechanism for the PWES system in India. There is a need for the scientific community to collect data of where this PWES system is being used effectively and by whom. A framework is then needed on how to charge for ecosystem management, taking into consideration culture, location, and the wealth of the local community. Knowing this would help local administrators decide whether it were even possible for local people in some areas to pay for ecosystem services from their meagre earnings.

Also, given the caste system in India and the different cultures in different regions, various models of the PWES system will need to be developed in order to be applicable. Each model will need to consider the resource base, land use system, economic status and social construct at the farm level if PWES is to work.

This PWES system is linked to socio-economic and ecological security at a local to regional scale. Increased knowledge and understanding of the complex ecological systems that deliver specific goods and services, and better definition of scales of valuation of these goods and services at a local to regional scale is needed.

How much to pay for ecological services in the drylands, and how to market them, are also crucial questions. Proper valuation is needed to ensure that incentives remain for their protection and sustainable use by local communities.

Some of the important watershed ecosystem services that require valuation include: clean water, vegetation cover, biodiversity, agriculture and grazing, improved socio-economics, erosion control, carbon sequestration, recreational and eco-tourism and sustainable regional development. ■

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## Integrated development in the Banni Grasslands, India

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An article about the Kachchh district of Gujarat State in India has already been presented in this booklet (see Protecting the desert thorn forest ecosystem of Kachchh, West India, page 16) which provides some background about this fascinating area. However grasslands, another important ecosystem in this area, must not be forgotten.

The only vast stretch of grassland available in the Kachchh district is the Banni, which covers 2,600 km<sup>2</sup>. Once referred as Asia's finest grasslands, it accounts for approximately 10% of the grazing ground available in Gujarat, and is located on the northern border of the Kachchh district.

Banni encompasses 48 villages and once supported 31 species of palatable grasses and tree species such as *Acacia*

*nilotica*, *Prosopis cineraria* and *Salvadora* spp. Today the abundance of palatable grass and trees has decreased significantly due to the introduction of the invasive species *Prosopis juliflora*.

Livestock is the mainstay of the inhabitants of Banni and the area has historically been renowned for its cattle-breeding, although more recently income has been generated through the sale of milk and milk-based products. Grasslands of Kachchh support over 1.7 million head of livestock, which makes a considerable contribution to the State's milk and wool production. However due to a series of consecutive droughts, increased salinity, invasion by *Prosopis* as well as overgrazing, the socio-economic condition of the inhabitants has been severely compromised.

To improve conditions for the pastoralists living in the region, the Government of Gujarat has focussed on developing an integrated grassland management plan, including the development of alternative resources for the local inhabitants. This five year project started in May 2008 and aims to develop Banni as a self-sustaining region through enhanced fodder security, reduction in livestock migration, and increased income generation at the village level. This will also help improve ecosystem and grassland biodiversity conservation. Further, the research component of the project will develop a much-needed regional grassland management plan for Banni. ■

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# Two visions for the world's drylands

Mike Mortimore, IUCN Commission on Ecosystem Management

Uriel Safriel, IUCN Commission on Ecosystem Management

IUCN interviewed two leading global drylands experts, Drs Mike Mortimore and Uriel Safriel, both Members of IUCN's Commission on Ecosystem Management. Both experts have an academic background (Mortimore is a geographer, and taught at universities in the north of Nigeria, and Safriel is Professor of Ecology at the Hebrew University of Jerusalem in Israel). Both have been involved in linking dryland science with policy (Mortimore's work is well-known with a number of international institutions and Safriel is the country focal point for the United Nations Convention to Combat Desertification and co-lead author of the Dryland Systems chapter of the Millennium Ecosystem Assessment Report). Both have also spent their lives trying to bring together local knowledge on how to live in some of the most unforgiving, constantly changing ecosystems on earth, and help people improve their standard of living through protecting the environment that provides their support base. Not surprisingly they share a common vision about the world's drylands, with a few interesting takes on where their personal experiences have led them along different paths.

**IUCN:** Many people would argue that drylands are remote places that are literally deserted – few people, wide-spread poverty, no biodiversity hotspots and of low economic interest.

**Safriel:** This is a wrong notion, emanating from confusing drylands with deserts. Drylands have low rainfall and high evaporation, where year-round productive agriculture cannot be practiced without irrigation. Given this definition, drylands comprise 41% of the surface of global land (of which deserts are subsets, covering 17% of the land). More important, 35% of people on earth live in drylands (with 29% in non-desert drylands). So it is misleading to suggest that there are “few people” in drylands. It is also paradoxical to suggest that drylands are of low economic interest, as so much of the oil that drives global economy and politics originates in the desert drylands. As to biodiversity, given that all Mediterranean regions in the world are drylands, one can not support the notion that drylands are biodiversity-poor. Drylands, including deserts, support biodiversity that is of great medicinal and other significance. It is sadly correct, though, that drylands have the highest poverty rate.

**Drylands, including deserts, support biodiversity that is of great medicinal and other significance**

**Mortimore:** Drylands, far from being remote and uninhabited, occupy huge areas of the world's land surface. They contain major cities and produce vital food commodities, livestock, and other ecosystem services. If we fail to achieve the Millennium Goals in the drylands, we shall fail globally. In trying to better equip dryland peoples with the means to manage them sustainably, we have an opportunity to achieve BOTH sustainable ecosystems and the reduction of poverty.

**If we fail to achieve the Millennium Goals in the drylands, we shall fail globally**

**IUCN:** Two UN conventions, the Convention on Biological Diversity (CBD) and the Convention to Combat Desertification (CCD) differ in their delineation of drylands. Why is this? And what should be in your opinion included in the definition?

**Mortimore:** Definitions are not devised as an end in themselves, but for functional purposes. There are two major scientific approaches to defining drylands: the FAO's scheme based on the length of the growing period, which is highly relevant to agriculture, and a system based on aridity ratios, used by UNEP. Both can be easily used in conjunction. Unfortunately, given the geo-politics of international conventions, too many countries have a motive for claiming dryland status, with little account taken of how much of the country consists of drylands. Being a politically charged issue, access to these resources will always be disputed. My concern is that such sterile debates should not frustrate us in our efforts to improve the opportunities of dryland peoples and give them all a fair stake in the world's wealth.

**Safriel:** To me this only highlights the inefficiency of the UN system. Several times members of the CBD Secretariat presented in side events of CCD conferences, and none were able to explain why they use their definition, which is incompatible with that of the CCD. The blame is of course on the Parties, not the Secretariats; it seems they simply don't care.

**IUCN:** The Millennium Ecosystem Assessment (MA) stated that 10-20% of the world's drylands are degraded – or affected by desertification. However, the figure of 70% of the drylands being degraded is still cited frequently. Why such a big discrepancy?

**Safriel:** The reason lies in the poor definition of desertification by the CCD which says “desertification is land degradation in the drylands”, but increasingly uses the term “land degradation and desertification”. When something like desertification is ill-defined, it is also inappropriately measured. People interpret the definition as they like, and then measure in the field what suits THEIR interpretation of “desertification”. The MA therefore

**When something like desertification is ill-defined, it is also inappropriately measured**

carefully worded another definition of desertification (but did not dare to explicitly conflict with the CCD). Accordingly desertification is “a persistent reduction in biological productivity in the drylands”. However in many cases reduced productivity was only temporary, due to natural climatic variations, yet was called “desertification”. The figure of 70% is used despite warnings that it is exaggerated, simply in order to attract attention and gain financial and other support. Surely, all drylands that are used by people are at risk of desertification, when defined by the MA definition, and this is more important than debating

**The figure of 70% is used despite warnings that it is exaggerated, simply in order to attract attention and gain financial and other support**

how much is already desertified.

**Mortimore:** There are two reasons. First is a global deficit in accurate and sufficiently detailed data, with the result that almost anyone can produce a set of figures based on estimates. Or the reckless projection of site data by soil scientists and fertilizer advocates to implausible levels in order to argue a case for specific policy strategies. The position is improving, but still every week a new report appears, recycling old figures without a hint of the self-critique that in other disciplines would be regarded as essential. The second reason is that the drylands have for too long been assumed synonymous with the idea of ‘desertification’, a concept that also lacks rigorous definition.

**IUCN:** How are the world's drylands going to be affected by climate change? Are the drylands becoming drier?

**Mortimore:** We must discard the simplification that all drylands will be similarly affected by climate change. Scenarios are incomplete and



quite variable, for example increasing rainfall recently suggested for eastern Africa and decline for southern Africa. And total rainfall is only part of the story: increased variability, changes in seasonality, hydrological changes, and of course temperature add complexity. However, what can be said is that while climatic variability may vary from place to place, drylands have always had to adapt to uncertainty in one form or another.

**Safriel:** Well, I would simplify it, and say yes, definitely!

**IUCN:** What are the opportunities and challenges as regards adaptation and mitigation interventions in the face of climate change?

**Safriel:** Opportunities lie in the carbon market in general and in the Clean Development Mechanism (CDM), in which industrial countries only invest in carbon projects in developing ones (provided the CDM survives). This is because while the ability of drylands to sequester carbon per unit area is low, the overall area is huge. Also, the next Kyoto Protocol may lead to including soil carbon in the carbon trading, through which soil conservation by combating desertification will yield additional income to dryland people. Another economic opportunity is the commercialization of solar energy, with increasing economic viability due to higher fossil fuel prices and payments for reducing emissions. At the same time, the challenge of agricultural adaptation to climate change in the drylands is enormous. It is a big question to what degree agricultural species can be further bred or genetically engineered to produce in drylands under increasing conditions of drought and salinity. This may lead to developing alternative livelihoods, such as tourism and aquaculture.

**Mortimore:** Dry forests and even grasslands sequester carbon at low rates but potentially over enormous areas, and intensive farming practices sequester more carbon than extensive systems. Under the Kyoto Protocol it seems like a good idea for the North, through its carbon markets, to pay dryland right-holders to maintain land under woodland, although this presents some truly disturbing scenarios. First, it would probably be rich rather than poor people who benefit as they are already large-scale landholders, or can acquire additional land under 'flexible' land rights legislation that overrides customary tenure. Smallholdings are too small.

A second objection is that empowerment, not dependency is generally agreed to be the prime goal for smallholders in natural resource management policy. To exchange a farming or stock-raising enterprise that is autonomous – though poor – for a pattern of dependency on external credits or subsidies is inconsistent with this, in the same way as creating dependency on international corporations for GM seeds. Third, the snares that await the administration of such schemes (transaction costs, corruption, control) have scarcely been explored.

**IUCN:** Biofuels seem to be the latest new hope for developing and greening the drylands, could biofuels be a solution?

**Mortimore:** Large-scale biofuel production in drylands occupied by smallholders amounts to the sale of plant nutrients in exchange for financial payments on a scale that makes the colonial export of nutrients in groundnuts or cotton look trivial by comparison. And these nutrients will be burnt! Yet the greatest need of primary production systems in drylands, after rainfall, is plant nutrients. In fact it has been shown that in the Sahel, where rainfall is the main determinant of plant biomass, nutrients are the major constraint. While one might think that by selling biofuel farmers could buy chemical fertilizers, these are not an adequate substitute for natural nutrient and biological cycles in the soil. Even the strongest advocates of subsidised fertilizers realise that chemical and organic fertilizer use must be integrated. Biofuel production is not the answer either to smallholders' needs or to environmental degradation in drylands.

**Safriel:** The problem of agriculture in the drylands is that of marketing, including transportation infrastructure, credit mechanisms and market information dissemination. These deficiencies will make biofuel agriculture more vulnerable and non-sustainable than food agriculture. Also, as with food agriculture, it will soon become obvious that producing biofuel product is cheaper in non-drylands than in drylands, unless it is acceptable that the dryland farmer can be paid less than a non-dryland farmer. Furthermore, the movement to biofuel will reduce the food security for many dryland farmers.

**Pastoralism has been shown time and again to be the most rational, efficient and sustainable land use system in the arid sub-zone between the farming regions and the desert**

**IUCN:** Pastoralism is in many of the drier areas the most common livelihood activity – is there a future for pastoralism?

**Safriel:** Yes, surely. But again its future much depends on solving basic problems in governance.

**Mortimore:** Pastoralism has been shown time and again to be the most rational, efficient and sustainable land use system in the arid sub-zone between the farming regions and the desert. Yet governments continue perversely to frown on the mobile lifestyle of nomadic groups. A polarisation between pastoralists and their advocates on the one hand and policy makers set on sedentarisation on the other is counter-productive, and a fresh approach is needed.

**IUCN:** What role will dryland ecosystem services play in boosting people's livelihoods?

**Mortimore:** Dryland ecosystem services include the soils, nutrients and plants needed to support agriculture and livestock keeping as well as providing a range of secondary products – timber, fish, medicine, raw materials – that are commercially valuable. Governments fail to recognise adequately the contribution made by dryland ecosystem services to national economies. These commodities can be further developed to enhance rural incomes, benefiting poor peoples' livelihoods, provided that access to them is not impeded. But there are both biophysical and economic limits to their exploitation on a sustainable basis.

**Safriel:** It all depends on how many people and on the standard of living they aspire, as ecosystem services, like any natural resource, are finite. In drylands, as elsewhere, a long-term approach to optimizing use of ecosystem services is required, as well as measures to protect and manage biodiversity, so that it can continue to be effectively involved in the provision of ecosystem services.

**IUCN:** What is your vision for the world's drylands? What should sustainable development in these areas look like?

**Safriel:** Drylands have the highest population growth compared to all other ecological environments on earth. If this is maintained, the development of drylands is doomed to non-sustainability. There is no uniform vision for all drylands, as much depends on the natural degree of aridity of each. Deserts have lots of economic merit, as expressed in the recent intense urbanization trends; there is also a potential of increasing desert water supply through desalination using solar energy. As for non-desert drylands, water management and production is an issue. Investments in governance and social barriers are more important than in biophysical sciences associated with water and agriculture.

**Mortimore:** My vision is that the marginalisation that has befallen drylands and their peoples will be reversed in favour of increased economic opportunity, strengthened autonomy and empowerment in natural resources management, supported by the best knowledge that science, in partnership with indigenous capabilities, can provide. Drylands will be better integrated into national economies, and access of dryland peoples to employment, education, health, and financial resources will not be impeded. Technocratic solutions are insufficient, even if well-designed. The political challenge must also be faced, in the context of both conflict situations (in some countries) and current trends towards democratisation. ■



# The great Indian bustard: a great indicator of ecosystem health

Arvind Kumar Jha, IUCN Commission on Ecosystem Management and Y.L.P. Rao



**T**he great Indian bustard (*Ardeotis nigricaps*), also known as Maldhok, occurs in 7 States in India and in Pakistan. It is a large, ground-dwelling bird about 1 m high, living in semi-arid grasslands. Farming and economic activity in these areas, as well as poaching, irrigation schemes, livestock grazing, pesticide use and nest-trampling, disturbs the natural habitat of this species and has led to its decline.

This species is listed as Endangered in the *IUCN Red List of Threatened Species* and is one of the most threatened species in the bustard family, with a very small, declining population. The bustard is protected legally and there has been extensive research into its status, distribution, ecology and conservation. Despite this, there is need to establish new protected areas and to promote a conservation strategy.

The Great Indian Bustard (GIB) Sanctuary (8,496 km<sup>2</sup>), lies in the State of Maharashtra in Solapur and Ahmednagar Districts. This Sanctuary was developed because the Indian Government recognized the urgent need to conserve drylands to ensure the survival of bustards. It includes forests, agricultural fields, woodlots and grasslands, and is the largest protected area in the country.

The Maharashtra Forest Department conducts a bustard census every year in July; figures from 1998 to 2008 show that few birds remain. This species has disappeared from most of its former range apart from Nanaj, which has relatively low level of biotic interference. The disappearance of bustard from the forest ranges of Rehekuri and Karmala is mainly due to habitat degradation and other disturbances.

Bustards around the village of Nanaj are mainly sighted at the start of the monsoon around the last week of June, and remain in the area until December, with few birds seen between January and May. Their breeding season coincides with the increase of the grasshopper population as a result of the rains.

### Breeding

The great Indian bustard normally lays a single egg, on bare ground. The female incubates the egg for one month, and hatching success is around 70%. Reptiles such as monitor lizards and snakes prey on the eggs. At Nanaj, nesting sites are found mostly within the grasslands of the Drought Prone Area Programme plots, as these are well-protected from people and livestock.

### The dating game

Bustards have an elaborate territorial courtship display which takes place during the breeding season on elevated spots from where the bird can see all around. At Nanaj, this occurs from the end of June to early November, and is the time for the alpha male to show his dominance. Hot weather, strong winds and heavy rainfall

may hamper a display of this courtship process, which may vary from 5 minutes to 3 hours, depending on the weather conditions and presence or absence of hens.

### The preferred habitat

Bustards prefer grassy plains and open scrubland with scattered trees, and nest in open areas with short grass or on well-drained, stony ground. They forage in scrubland, grassland, grazing land, stony wasteland, and crop fields. They are rarely seen in damp or water-logged areas, sugarcane or standing wheat fields. For day roost, Bustards prefer to sit or stand in the shade of small trees or shrubs, while for night roost they prefer bare ground.

A large number of species share the great Indian bustard's habitat including blackbuck, chinkara, common fox, wolf, jackal, mongoose, monitor lizard, and snakes, and birds like the white-eyed buzzard eagle, drongo, Indian roller, red-headed merlin, and Indian myna.

Bustard species can be considered as indicators of grassland ecosystems and by conserving bustards and their habitats, a large number of species dependent on healthy grasslands will also be protected. It is essential that sanctuaries created for the great Indian bustard be managed in a way to ensure their continued survival. ■

Estimated Bustard Population in GIB Sanctuary

Year	Rehekuri	Karmala	N. Solapur (Nanaj)	Total For PA
1998	8	7	15	30
2008			30	30

# Battle to conserve the endangered saiga antelope

Valery Neronov, IUCN Commission on Ecosystem Management

Anna Lushchekina, IUCN World Commission on Protected Areas

**T**he Saiga antelope is a unique nomadic animal, well adapted to the harsh and unpredictable conditions of the dry steppes and semi-deserts of Eurasia. Despite having a rather short life span, Saigas reproduce quickly, allowing rapid population growth even after losses caused by habitat change or disease. However, the greatest threat to the Saiga antelope today is excessive and unsustainable hunting due to high demand for its meat and especially its horns, which are greatly valued as traditional medicine. Brought back from the brink of extinction in the early 1900's, the Saiga antelope has recovered, only to find itself under serious threat once again.

Two subspecies of the Saiga antelope have been described. *Saiga tatarica mongolica* inhabits the steppes of Mongolia. The second subspecies, *Saiga tatarica tatarica*, is found in the vast plains of the Central Asia and Pre-Caspian region. Three populations are known in Central Asia (the Ural, Ust-Urt and Betpakdala), and one in the Pre-Caspian region. Some herds of Saigas from the Ust-Urt population, mostly found in Kazakhstan, can migrate into Uzbekistan and Turkmenistan.

From 1980-1994, total numbers of Saiga antelope fluctuated between 670,000 and 1,251,000 animals. However, from 1998 onwards, all four populations of the tatarica subspecies went into dramatic decline. In one year (1998-1999), researchers recorded an annual decline rate of about 35%. The next year the rate of loss was even higher: up to 56%. According to recent censuses and experts'

assessment there are no more than 70,000 Saigas throughout the entire range of this species. If this dramatic decline is not stopped we could lose this unique animal.

International awareness of the critical situation regarding the Saiga antelope led to the listing of this species in 1995 onto CITES Appendix II. It was assessed as Critically Endangered in the *IUCN Red List* in 2002. In 2004 the critical situation of the Saiga throughout its entire range was addressed by resolutions adopted by the CITES COP-13 and at the IUCN World Conservation Congress. After tireless efforts of both the Convention on Migratory Species and CITES, a Memorandum of Understanding on the conservation and restoration of Saiga was signed by four range states in 2006. These countries have started implementation of an Action Plan, a draft of which had been prepared at an international workshop, organized in Elista, Kalmykia, in 2002.

A dramatic decline in livestock numbers in 1992 increased interest in Saiga as a source of meat, with meat appearing in food markets in some cities and towns. Increased illegal trade in Saiga horns was also observed in the last years of the Soviet Union's existence, when the State control on international trade was dissolved and customs regulations became lax. This situation stimulated a massive illegal hunt for Saiga horns and their subsequent sale for medicinal purposes to Oriental

markets. The fact that the proportion of adult males in Saiga populations has been steadily declining from 1997 indicates that poaching for horns has grown more intense as well, as only male Saigas have horns.

Several international projects have helped to regularly monitor Saiga populations in the northwest Precaspian region since 2003. It was shown that the "Chernye Zemli" Biosphere Reserve (93,000 ha) and the "Stepnoi" Sanctuary (82,000 ha) provide good conditions for a significant part of the life cycle of Saiga. As livestock numbers continued to decline and people became poorer, many resorted to poaching the Saiga to sell its meat in local markets, and export its horn to the east. This was highlighted in a socio-economic study that sought to understand the main reasons behind the massive decline in Saiga populations. These results demonstrated that ensuring livelihood security would also help to decrease poaching. Work by the Saiga Conservation Alliance, officially inaugurated in September 2006 ([www.saiga-conservation.com](http://www.saiga-conservation.com)) has also helped local people to link explicitly support for rural livelihoods with action to sustainably conserve the Saiga.

Sustainable dryland management is needed in all the Saiga antelope's range states, as this is essential to both conserve the Saiga as well as to improve people's livelihoods. ■



# Hidden wealth of drylands in Uzbekistan

Elena Kreuzberg-Mukhina, IUCN Commission on Ecosystem Management and Species Survival Commission

Alex Kreuzberg, IUCN World Commission on Protected Areas and Species Survival Commission

Uzbekistan is a country rich in biodiversity and natural resources; indeed it has been identified by several global studies (WWF's "Global 200 Ecoregions", CI's "Conservation Hotspots", and IUCN/WWF's "Centres of Plant Diversity") as having many areas of international importance. Given that the country lies at the crossroads of Central Asia, the fauna and flora of Uzbekistan has a unique and complex history. Today around 702 species of vertebrates as well as an estimated 15,000 species of invertebrates occur in the country. The *Red Book of Uzbekistan* estimates the number of vascular plant species to be around 4,500.

Central Asia has long been recognised as the home of many wild relatives of cultivated plants, and over 200 wild relatives have been identified in Uzbekistan. In addition, it is an important area for the conservation of land-races, dozens of which are conserved on-farm by local communities. More than 300 species of wild plants are of economic importance, including species used for medicinal, aromatic, dye, food, and other purposes. Several hundred species are used horticulturally and for planting in towns and oases. People have used both plants and animals sustainably since ancient times.

That is the good news. The bad is that desertification in Central Asia, including Uzbekistan, is of great concern. Recent research shows that desert area in Central Asia has increased by about 100,000 km<sup>2</sup>, and biological productivity in some regions has been reduced by half. This in turn leads to social and economic tension with increased hardship for local people (for example

reduced cattle productivity and increased disease) as well as the loss of native flora and fauna.

The main cause of desertification in Central Asia is change in water regimes due to unsustainable use, and in part to climate change. A large part of Uzbekistan is made up of desert steppe with the main water resources coming from the Amu Darya and Syr Darya rivers which flow through the Karakum and Kyzyl Kum Deserts, and end up in the Aral Sea. These regions are experiencing intense desertification, as are other areas impacted by agricultural development. At present more than 60% of arable lands in the Aral Sea basin are affected by salinization, with mineralization of irrigated agricultural lands some 23% higher than elsewhere in Uzbekistan.

The loss of the Aral Sea, once the fourth largest inland lake in the world, is a classic case study of an ecological and human disaster. Due to extensive irrigation projects which drain the rivers that feed into this lake, coupled with unsustainable agriculture, the traditional fishing culture of the region has also suffered greatly. The salt left behind by the shrinking lake has lowered the overall economic viability of the area.

In addition to extensive irrigation and over-regulation of water-flow which has had such a negative effect on the environment, the country also has to deal with over-use of pesticides, salinization, soil erosion, water pollution, livestock overgrazing, and the cutting of forests and riparian vegetation. This results in habitat loss and declining biodiversity in both numbers and extent. Desert, water and riparian ecosystems are the most impacted by large scale development of lands and the accompanying redistribution of water resources.

As a result, 87 animal species and 6 plant species of water and riparian ecosystems; 46 animal species and 60 plant species of desert ecosystems; and 43 animal species and 251 plant species of mountain ecosystems are in grave danger of extinction, with some already extinct. At least 2 animal species and 1 plant species in water and riparian ecosystems; 3 animal species in desert ecosystems; and 4 plant species in mountain ecosystems already became extinct in Central Asian region recently.

Furthermore, the national report of Uzbekistan to the CBD in 2006 identified the problem of increasing population pressure on natural resource and the environment, with the population estimated to grow from 28.7 million in 2010 to 40.5 million in 2050.

With more than 57% of the area of Uzbekistan used for agricultural purposes, farming provides 46% of the country's employment, 60% of its cash from abroad, and about 90% of its food. But due to unsustainable agriculture leading to increased salinization and erosion, about 20% of the land is not exploitable. Climate change is also predicted to negatively affect agriculture, so there is an urgent need to identify how ecosystems can be used sustainably.

International cooperation in the area of environment management will give Uzbekistan and other countries of the region a chance to mitigate the impact of negative environmental factors. An IUCN Drylands Initiative will strengthen IUCN's influence in the region and help in protecting these essential dryland ecosystems. ■





# Unprecedented law on soil protection and land improvement in Turkey

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For the first time in Turkish history, a 'Law on Soil Protection and Land Improvement' was passed after protracted advocacy efforts to parliament by the TEMA Foundation, a Drynet (see page 31) partner. Included in this milestone effort were diverse volunteers (universities, Chamber of Turkish Agricultural Engineering, parliamentary groups, the Turkish National Assembly, farmers, technocrats, bureaucrats and TEMA and grassroot representatives). These volunteers now act as representatives of local Soil Conservation Councils, established by this new law. This landmark law is also the first such law that has passed thanks to NGO pressure. Such a law was necessary to help curb desertification, prevent land degradation and ensure land management in the country

## Lobby efforts

Lobbying included a petition campaign with over 1 million signatories, and communication to raise public awareness on the issue through media, seminars, and visits. TEMA actively led the lobbying activities with the support of partners and TEMA members. Each citizen can become a TEMA volunteer by paying 20 Turkish Liras. TEMA is the largest environmental NGO active throughout Turkey, with over 350,000 supporters and 555 voluntary representatives.

The participation in the decision-making process of universities, chambers and NGOs through Soil Conservation Councils hastened the process at local government level, and all the information gathered has been used to develop an action plan that includes one representative in each Soil Protection Council.

## Background

Turkey's nature is facing serious threats due to intense land use. Given Turkey's harsh climatic conditions, poverty, unsustainable land

management and climate change are turning drylands into deserts, and desertification in turn exacerbates poverty. Numerous soil types occur in Turkey, with many highly eroded.

Soil erosion risks increase in more mountainous areas, yet this is where most villages are and where most of the agriculture takes place. Valuable humus is lost through the indiscriminate felling of trees, overgrazing, uncontrolled irrigation, salinization of the soils, and inappropriate land use techniques. Many practices such as deep tillage and using heavy machinery, excessive and incorrect fertilization, excessive irrigation, ploughing slopes in the wrong direction, and badly chosen land uses have led to high erosion.

Unfortunately, farmland is also threatened by a huge and rapidly growing transportation and construction industry. Uncoordinated action by government agencies makes legislation difficult to enforce. The destruction of vegetation and soil leads to water shortage, poverty, and emigration.

TEMA Foundation raises public awareness of environmental problems, specifically soil erosion and deforestation. It implements model ecological agricultural practices that protect the soil and plant cover in forests, pastures and farmlands, such as: terracing, production of cover fodder crops, wind breaking, contour farming, pasture rehabilitation, strip cropping, rotations, range improvement measures, deferred grazing, and measures to protect the soil from the impact of rain, wind and frost. The local people also learn different income-generating methods that do not include moving the soil, for example, beekeeping, fruit growing, and eco-tourism.

## Challenges faced when pushing for the law

Numerous advocacy meetings were organized with ministers, parliamentarians, and party leaders, although in the middle of all this effort

there was a change of government, which delayed the drafting process. There was also no empirical scientific evidence on what desertification and land degradation had occurred, and no legislative framework to oversee the drafting process for such a law. In addition, it was important to get buy-in from business and industry groups which were included in the drafting process, while reassuring them that their investments in the land were protected.

## Achievements from the law

These efforts bore fruit as the law is now in place and TEMA continues to work through the Soil Protection Council representatives to ensure that soil is properly managed. The Government now considers land-use planning as an important Action Plan, and soil protection rules are enforced in every state in Turkey. The new rules include Chamber of Agricultural Engineers and TEMA Foundation national representatives in the decision-making process, where TEMA can impact land use decisions. The law now requires that factories operating in agricultural areas without a license must stop operations. It has also been exciting to identify the factors that have contributed to soil degradation, desertification and misuse of land, raise local community awareness on land use, and see the land in Turkey rehabilitated.

## Hurdles to implementation of the law

The challenge now is to ensure that Soil Conservation Councils have enough power and means to act as watchdogs to oversee implementation. There is still the need for Statutes to bring the Law into force, and soil mapping and classification is essential to identify erosion-sensitive lands. There is also need for clear and enforceable penalties for those who misuse land. ■

[www.tema.tr](http://www.tema.tr)



# The Nature Protection League, Portugal's oldest NGO

Eugénio Menezes de Sequeira, Liga para a Protecção da Natureza, IUCN Member

**T**he LPN (Liga para a Protecção da Natureza, or the Nature Protection League), is a Portuguese not-for-profit environmental NGO, founded in 1948, and the oldest in the Iberian Peninsula. An IUCN member since 1976 with more than 5,000 members, the LPN's headquarters are in Lisbon, with three regional offices. The organisation owns and manages a 1,700ha property including five farms and an environmental education centre. The main areas of work of the LPN are environmental education, direct interventions at national and international level, and conservation and research projects. The LPN is currently undertaking a pilot project to combat desertification. This includes experiments in farm management aimed at conserving natural habitats, threatened species and agro-ecosystems as well as improving farmer livelihoods.

In regards to dryland work, the LPN has recently received awards for the following projects:

- "Nature conservation and soil management technologies integrated in the economy of rural desertification-prone regions" was awarded the "Global 100 Eco-Tech Award" at the 2005 World Exposition at Japan, which aims to support global environmental technologies that contribute to our world.
- "Soil recovery in a rural threatened ecosystem in Portugal: an example with potential to disseminate amongst

the Mediterranean Area" received the "Environment and Soil Management Award" of the European Landowners Organization in 2007.

- "Sustainability of Nature Conservation in Portuguese Farming Areas" earned the "Energy Globe Award", also in 2007.

## The local situation

Drylands in northern Mediterranean areas, and in particular Portugal, suffer from a very high risk of erosion due to:

- Irregular rainfall (ranging from sudden, intensive rainfall to seasonal droughts meaning that there is often little available water).
- Steep slopes providing energy for high run-off.
- Shallow soils with low water-holding capacity and infiltration rate, and low levels of organic matter making them highly prone to erosion and surface-crusting.
- Low vegetation and land cover, with forest loss common due to frequent wildfires.
- Poor agricultural practices in the past causing high erosion rates, although today land abandonment is causing greater problems.
- Unsustainable water use due to pollution, salinization and sodization, and depletion of aquifers.
- Coastal concentration of economic activities, with bad or inexistent land use planning, causing loss of the remaining best soils and water and soil degradation.

To improve soil and water conservation and to maintain ecosystem processes, new technologies need to be developed to halt the negative feedback loops that are causing increased land degradation.

While all these issues including desertification, soil erosion and loss of fertility, increased sensitivity to climate change, and loss of biodiversity are being addressed by UN Conventions on Desertification, Biodiversity and Climate Change, the LPN is acting locally while contributing globally.

## The LPN programme

The LPN Programme "Sustainable Castro Verde" includes activities to combat desertification and improve drought resilience. Located in the Castro Verde Special Protected Area in the Alentejo region of southern Portugal, the area is also known as the "Campo Branco", or the "White Field".

This Natura 2000 Site is acknowledged as one of the most important European areas for the conservation of steppe birds, which will make many a birdwatcher's mouth water: Great Bustard (*Otis tarda*), Little Bustard (*Tetrax tetrax*), Lesser Kestrel (*Falco naumanni*), Black-bellied Sandgrouse (*Pterocles orientalis*), Montagu's Harrier (*Circus pygargus*), Common Crane (*Grus grus*), and Calandra Lark (*Melanocorypha calandra*), among others. These highly threatened bird species are dependent on the cultivation of cereal crops in rotation with fallow lands, which are also used as pastures.





The semi-arid, sub-humid area of Campo Branco is threatened by soil erosion and desertification, and its economy is dependent on farming, mining and services. The conservation of this threatened cereal/steppe ecosystem can only be achieved through an integrated sustainable development approach, combining land and soil protection, direct nature conservation action, development of new farming practices, scientific research, environmental education and sustainable ecotourism.

To address desertification, the LPN engaged in a number of research projects aimed at increasing soil fertility and soil formation rate, while at the same time increasing the ecosystem's support capacity and improving biodiversity protection and farmer's livelihoods.

While space precludes detailed description of this research as well as the references to the many scientists undertaking this work, information can be supplied by the LPN upon request. But briefly, experiments monitored differences in various crop rotations of 13 plots (2 ha each), using different soil inputs (nothing, sub-soiling, or sub-soiling with sewage sludge injection). These areas were either under permanent pasture, ploughed wheat with 3 years pasture, heavy ploughed spring legume crop followed by ploughed wheat and 3 years pasture, and direct seeding wheat followed by direct seeding oat, with 2 years pasture.

Concurrently an experiment involving 4 plots (0.5 ha each) was carried out to compare soil erosion and water loss by runoff with different farming practices (traditional ploughing, permanent pasture, no tillage cereal, and sewage sludge injection with no tillage).

### Positive results

Direct seeding increased soil organic matter content and infiltration rate. Gravel and stones at the surface, together with mulching, reduced the crust-forming process. In addition, contour sub-soiling, and especially deep sewage sludge injection, increased the soil infiltration rate, water-holding capacity, soil formation rate, organic material and aquifer recharge. This technology could decrease water shortages in spring.

### Conclusions

1. Soil fertility improved, with increased soil depth (increased rate of weathering by sub-soiling and mainly by sewage sludge injection).
2. Water holding capacity and water infiltration rate increased, with decreased runoff.
3. Decrease of greenhouse gas emissions (no tillage farming system) by providing increased organic matter in the soil, acting as a carbon sink.
4. Production costs and maintenance decreased.
5. In some cases, cereal production and consequent profit for farmers increased. After several demonstration meetings, some farmers started using direct seeding instead of traditional ploughing.

6. A significant increase in the population of threatened bird species was observed.

These results are then transferred to farmers, students and decision-makers through extension services provided by the Vale Gonçalo Environmental Education Centre.

Through integrated management, the desertification process can be reversed. The LPN is striving to expand these practices to increase conservation gains for both biodiversity and ecosystem services, while at the same time improving socio-economic levels of the people living in these areas. ■

[www.lpn.pt](http://www.lpn.pt)

# Rare cacti and the need to protect Mexican drylands

Héctor M. Hernández, IUCN Species Survival Commission, Chair Cactus and Succulent Plant Specialist Group

**D**rylands cover half of Mexico, with about 20% of the country's territory receiving less than 300 mm rainfall per year. The Chihuahuan and Sonoran Deserts are the most extensive deserts in the country, and towards the south there is a small but biologically important, semi-arid area known as the Tehuacán-Cuicatlan valley.

The Mexican drylands are among the richest wilderness desert areas of the world. It has been estimated that the Chihuahuan Desert includes about 3,500 species of plant species, with more than 1,000 endemic, plus 24 reptiles and other vertebrate species unique to the region. Similarly, the Sonoran Desert has some 3,200 plant species, about half of which are endemic. The two deserts are thus extremely important from a conservation perspective.

## People in the desert

Ever since people first arrived to Mexico about 11,000 years ago, they have impacted on the environment, but never as much since the arrival of Europeans, particularly during the 20<sup>th</sup> century. Previously the nomadic inhabitants developed a deep understanding of their natural surroundings, with the land providing them with almost everything needed for life in the desert.

Today's rural inhabitants still make traditional use of their natural resources, and the list of plants and animals used for food, forage, medicine, and other purposes is extensive. Some species are an important source of income for local communities, in particular jojoba (*Simmondsia chinensis*) which is used for oil, guayule (*Parthenium argentatum*) used for rubber, candelilla (*Euphorbia antisyphilitica*), a wax, and lechuguilla (*Agave lechuguilla*), an important source of fibre. Several species of cactus called prickly pear (*Opuntia* species) are widely used for their edible fruits and vegetative parts. Also called *nopales*, *Opuntia* species have a strong symbolic significance in Mexico and are today a very visible part of the national emblem.

## The cacti

Perhaps the plants that most easily define Mexican drylands are cacti, numbering about 570 species. As expected, the drylands, and to a lesser extent some thorn and dry tropical forest, are the areas of highest species diversity. Unfortunately a large number of Mexican cacti are threatened due to habitat destruction and wild collection by amateur collectors and the horticultural market. It is sad that the overwhelming beauty of these plants is one of the main reasons for their disappearance.

## Cactus research and conservation in the Chihuahuan Desert

Our research, supported by the National University of Mexico, has focussed on the Chihuahuan Desert, as this region is the most important centre of cactus diversity in the world. Some 329 cactus species have been identified here, with about 60% endemism. In a recent study we estimated the distribution range of a representative selection of cacti, which is essential for determining conservation status. The results showed an enormous variation, with some species found in areas smaller than 1 km<sup>2</sup>, to others found almost throughout the Chihuahuan Desert. However the great majority of the species are restricted to smaller areas, with 59 species occurring in areas of less than 100 km<sup>2</sup>. From a conservation perspective the most important group are the extremely narrow endemics (42 species) with a geographic range restricted to less than 10 km<sup>2</sup>.

With few exceptions, these microendemism are well-known and highly attractive to illegal collectors. Most of them belong to genera endemic to the Chihuahuan Desert, such as *Ariocarpus*, *Astrophytum*, *Aztekium*, *Geohintonia* and *Turbinicarpus*, or to popular horticultural genera such as *Mammillaria* and *Echinocereus*. The tiny geographical areas from where these species are found, in conjunction with collection pressures, make these species Critically Endangered.

In the Chihuahuan Desert there are 32 major Natural Protected Areas covering some



37,197 km<sup>2</sup>, almost 7% of the area. In order to assess the effectiveness of these areas in conserving cactus species, we are currently studying where 121 endemic cactus species are found. Preliminary results show that 77 species (63.6%) are present in at least one protected area, while the remaining 44 are totally unprotected.

An important conservation area created in 1997 in the southern end of the Chihuahuan Desert is the Real de Guadalcázar State Reserve (2,570 km<sup>2</sup>). With 76 species, this area has the highest concentration of cactus species when compared with other similarly-sized regions. Unfortunately despite the reserve's creation more than a decade ago, action is still needed to ensure that this protected area serves as a real instrument to protect the rich endemic cactus flora of the region.

## What is next?

Mexican drylands are clearly areas of high conservation priority. However, the gradual destruction of cacti habitat, along with the illegal collection, place this group of plants in the embarrassing position of being one of the most endangered groups of organisms on earth.

Only a combination of actions will guarantee their conservation. Public awareness needs to be improved, as well as better legislation, improved protected area management and the creation of new protected areas. Increased artificial propagation of the most endangered species in botanical gardens is needed, along with an increase in commercial propagation to release pressure on the wild populations.

## The IUCN/SSC Cactus and Succulent Plant Specialist Group and the Red List Project

Only about 10% of the total number of species in the cactus family has been assessed using the current IUCN Red List criteria. In order to contribute towards Target 2 of the Global Strategy for Plant Conservation (<http://www.cbd.int/gspc/>), members of the Cactus and Succulent Plant Specialist Group are initiating the Global Cactus Assessment, a project to assess the conservation status of the entire family. Preliminary evaluations suggest that about half of the species are threatened, confirming the critical conservation status of the family. ■

<http://data.iucn.org/themes/ssc/sgs/cssg/>



# Saving the peninsular pronghorn

Benito Bermudez, for the Secretaría de Medio Ambiente y Recursos Naturales México, IUCN Member



One of the most threatened antelopes in the world, the peninsular pronghorn or “berrendo peninsular” (*Antilocapra americana peninsularis*), is making a come-back. A captive-breeding programme was started in Mexico in 1997, after almost twenty years of studies which showed that this subspecies, restricted to the coastal plateau and desert valleys of the Vizcaino Desert in the central part of the Baja California peninsula, was in danger of extinction due to habitat change, hunting and natural predation.

Herds of hundreds of animals once roamed an area of more than 45,000 km<sup>2</sup> in Baja California from below Ensenada in the north to the plains of Magdalena in the south. That is, until the end of the 19th century when the wild population was decimated due to hunting for meat. This led the President of Mexico to establish a permanent hunting ban on pronghorn, which is still in force today.

Based on these studies, a “three-pronged” recovery programme for the pronghorn was developed which included semi-intensive management of the wild population, captive breeding, and environmental education.

The first part of the programme consisted in capturing five fawns soon after their birth, which were raised under fairly basic conditions in a captive-breeding facility set up within the pronghorn’s natural range, and cared for by trained personnel. This founder population was genetically screened to avoid as much inbreeding as possible, and supplemented by other animals captured near the facility.

This intensive management allowed the captive population to increase to more than 300 animals in 10 years, which was more than the population in the wild. At the same time monitoring continued, showing that during 10 years the wild population remained stable at around 200 animals.

Work was also undertaken to create what in Mexico are called “UMA”, which are conservation management units encouraging sustainable use of wildlife, in order to guarantee the conservation of this subspecies in parts of the peninsula where wildlife populations are controlled.

To date 25 animals have been captured from the wild and contributed to more than 300 genetically viable animals in the captive-bred population. This, in addition to around 200 animals in the wild, means that the initial objective to double the population of the pronghorn has been more than reached.

The next phase of the programme is the release and translocation of pronghorns into adequate habitats to establish and reinforce wild populations. In the first phase, two adult males with radio collars and GPS were released in 2004 to evaluate their ability to adapt to new surroundings, their incorporation into the wild herd and their movements over time during one year.

Given positive results and the constant increase in numbers of pronghorn held in semi-captivity, it was then decided to release 25 pronghorn onto deserted lands at “La Choya”, an area covering 23,000 ha which has a habitat similar to that where the pronghorn occurs.

This group of 25 pronghorn was released in March 2006, and in August 2007 a second release of 21 animals was successfully undertaken. In winter 2008 another 40 captive-bred fawns will be reared, to be released on the island in spring. This will bring us considerably closer to the carrying capacity of the deserted lands at “La Choya”.

Educational and environmental awareness activities in rural communities, including farmers, ranchers and landowners, continue to be undertaken in areas where the pronghorn occurs, increasing interest by the entire population about the conservation of their native fauna and flora.

Although the increase in extensive farming has considerably reduced the opportunities for natural survival of this species in the coastal plains of the Vizcaíno Desert, the development of wildlife management units is one way to create corridors so that the pronghorn in the peninsula of Baja California can continue to survive. With continued support by local communities, private initiatives, and from all three levels of government, the future of the pronghorn looks brighter every day. ■

[www.semarnat.gob.mx](http://www.semarnat.gob.mx)

# The Chihuahuan Desert: a bi-national reservoir for biological diversity

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Ignacio March

The Nature Conservancy (TNC), IUCN Member

The Chihuahuan Desert Ecoregion (CDE) stretches from Arizona, New Mexico and Texas in the USA to Chihuahua, Coahuila, Nuevo León, Durango, Zacatecas, Aguascalientes and San Luis Potosí in Mexico, covering an area of almost 60 million hectares. Following WWF's definition of an ecoregion ("a large unit of land and water that contains a distinct assemblage of natural communities sharing a large majority of species, dynamics and environmental conditions"), the CDE is one of the three most biologically rich and diverse arid ecoregions in the world, rivalled only by the Great Sandy-Tanimi Desert of Australia and the Namib-Karoo of southern Africa. The landscape includes a series of watersheds, hillside forests, grasslands and scrublands.

The outstanding features of this ecoregion from a global perspective include its highly diverse and endemic desert taxa associated with very specialized habitats (gypsum dunes, desert springs and other freshwater ecosystems).

Prominent plant species are creosote bush (*Larrea tridentata*), tarbush (*Florensia cernua*), mesquite (*Prosopis glandulosa*), acacia (*Acacia* spp.), lechugilla (*Agave lechuguilla*), and about 330 species of cacti (see "rare cacti" in this booklet, page 26). Grasses include grammas (*Bouteloua curtipendula*, *B. eriopoda*), purple three-awn (*Aristida purpurea*), tobosa (*Hilaria mutica*) and alkali sacaton (*Sporobolus airoides*).

Animal diversity is very high, including mammals such as the pronghorn (*Antilocapra*

*americana*), jaguar (*Pantera onca*), collared peccary (*Tayassu tajacu*), kangaroo rats (*Dipodomys* spp.), black-tailed prairie dog (*Cynomys ludovicianus*) and black-footed ferret (*Mustela nigripes*). Desert birds such as roadrunner (*Geococcyx californianus*) and scaled quail (*Callipepla squamata*) are common, and numerous raptors such as Swainson's hawk (*Buteo swainsonii*), great horned owl (*Bubo virginianus*), aplomado falcon (*Falco femoralis*) and golden eagle (*Aquila chrysaetos*) may be observed. Reptile diversity is among the highest of all deserts and several endemic freshwater species as well as many endemic invertebrates add to the list.

## Threats to conserving the desert ecoregion

Despite the uniqueness of this region, only 4% has protected area status (see table).

The Chihuahuan Desert is a fragile landscape and its biodiversity is under siege, due to multiple anthropogenic factors such as suppression of natural wildfires, diversion of surface and groundwater for agriculture, introduction of invasive species and overgrazing. The landscape is changing dramatically as prairies and scrublands are converted to croplands throughout the region.

These changes leave deep marks on the landscape and contribute to global challenges such as desertification, climate change and the spread of invasive species. The loss and fragmentation of natural ecosystems is causing biodiversity loss and the extinction of uncounted populations and species, changes in the structure and functioning of ecosystems, and ultimately the loss of environmental services.

## Challenges and next steps

The Nature Conservancy (TNC) is committed to the vision of the Ecoregional Assessment for the CDE, which is "Our vision is a Chihuahuan Desert where governments, local communities, non-governmental organizations, academic institutions, landowners, and other stakeholders work together to ensure that the richness and diversity of wildlife, habitats, natural communities, and ecological processes of the Chihuahuan Desert are conserved and, where necessary, restored".

TNC strives to fulfil this vision by promoting the protection of 10% of the ten major habitat types in the CDE by 2015, by working at the local, national and international level. At the local level TNC is working on desert grassland ecosystems under the Great Plains Initiative (which stretches from Canada to Mexico) and the Chihuahuan Desert Borderlands Initiative. ■

www.nature.org

### Chihuahuan Desert ecoregion protected area status.

CDE total area (ha)			CDE area having protected area status		
USA	15,754,144	26.5%	USA	869,658	1.46%
MEX	43,684,826	73.5%	MEX	1,502,800	2.53%



# Cerrado conservation: scientific challenges in a neotropical savanna

Cristiano Nogueira, Ricardo Machado, Mário Ramos Neto

Conservation International Brazil, IUCN Member

Thinking of South American natural environments, the first image that comes to mind is dense and humid rainforest. Few are aware that the central part of South America includes the sub-humid Cerrado region, a global biodiversity hotspot and the largest block of savannas in the eastern hemisphere. Covering approximately 2 million km<sup>2</sup> (roughly the size of Eastern Europe), the Cerrado is found in central Brazil, extending to patches in adjacent Paraguay and Bolivia.

The Cerrado is characterized by seasonally dry savannas composed of grasses and small, contorted trees. It harbours a highly diverse and endemic flora which is adapted to natural fires and acidic, unfertile, aluminum-rich soils. Throughout most of the Cerrado region the climate is mild, and rainfall is concentrated in the wet season (October–April) after a distinct dry winter (May–October).

The Cerrado savannas probably existed prior to the presence of humans in the continent, but today the region is home to a wide variety of indigenous cultures. However urbanization in Brasília, the new Brazilian capital which lies in the heart of the Cerrado, and unsustainable economic growth is irreversibly changing the landscape.

## Cerrado characteristics and biodiversity

In central South America, Cerrado savannas dominate the landscape, occurring on plateaus of crystalline or sedimentary rock which are separated by a network of depressions, creating a variety of different habitats. The sources of the Paraguay, Paraná, Parnaíba and São Francisco river basins, of great importance for aquatic biodiversity and water resources, originate in the Cerrado.

The Cerrado savannas are one of the oldest vegetation types in South America and among the most diverse ecosystems on earth, covering around 72% of central Brazil. Within them one finds a network of gallery and dry forests, woodlands, palm marshes, and crystalline or sedimentary rock outcrops. Due to its history, variety of habitats, and its central position in South America (lying between the two largest blocks of Neotropical rainforests, the Amazonia and Atlantic Forest, as well as two large tracts of open, dry formations, the Caatinga and Chaco), biodiversity in the Cerrado is very diverse with high levels of endemism.

For example, at least 44% of the more than 12,000 vascular plants native to the region are unique to the Cerrado. Although the Cerrado is one of the least studied Neotropical regions in zoological terms, overall vertebrate diversity is impressive – and still underestimated. At least 1,300 fishes, 268 reptiles, 150 amphibians, 837 birds and 199 mammals are recorded in the Cerrado, and richness values may represent up to 49% of overall Brazilian species

richness, depending on the taxonomic group. Some of the endemic birds found in open Cerrado grasslands and tabletop savannas belong to unique avian evolutionary lineages.

## Conservation challenge

Despite high figures in species richness, endemism and phylogenetic uniqueness, the Cerrado has only just begun to receive proper scientific attention, and conservation measures in the region lag behind recent and drastic changes in land use. In the past three decades, deforestation rates in the Cerrado have been higher than anywhere else in the world, and conservation efforts have been limited, with less than 3% of the area currently protected in parks and reserves. During the same period half of the Cerrado has been irreversibly converted to grazing and agricultural land. Today less than 20% of the region remains as undisturbed, pristine habitat, and recent estimates show that at least 20,000 km<sup>2</sup> of this is converted each year. It is predicted that by 2030, any remaining natural Cerrado habitat will only be found in formal protected areas. It is for this reason that the Brazilian Cerrado is considered one of the 34 hotspots in the world.

At least 103 vertebrate species are threatened with extinction in the Cerrado, according to combined data from the IUCN and Brazilian Red Lists. Clearly, the lack of basic biodiversity data precludes adequate threat assessments for Cerrado fishes, amphibians, and reptiles, with the numbers of threatened species representing less than 3% of overall Brazilian richness in each group, despite high levels of habitat loss. For example, global threat status for all 103 recently

documented Cerrado endemic reptiles has never been assessed, and only two Cerrado reptile species are considered threatened in the Brazilian Red List. Similarly, many Cerrado amphibians were considered as Data Deficient in the recent Global Amphibian Assessment and are flagged as priorities for scientific research.

Numbers of threatened species will increase both with better knowledge as well as due to the constant high rate of habitat loss. Recent studies on the distribution of small vertebrates show that most of the endemic reptiles, rodents and marsupials occur in typical, open Cerrado savannas, which are the first habitats to be converted for intensive agriculture. These endemic species remain unprotected by conservation measures, given the recent nature of scientific discoveries, the rampant rates of habitat loss, the lack of attention to inter-fluvial savannas in the Brazilian forestry code, and the lack of a strategically designed protected area network.

The ability to incorporate and to adapt to the changing levels of biodiversity information, and the very fast rates of habitat change caused by major economic interests, makes the conservation of the Cerrado one of the greatest challenges for conservation on the planet. Because critical economic and political interests are involved in the destruction of the Cerrado, scientists and conservationists must be creative and also very quick and effective in gathering the best and most complete information possible to generate viable conservation in this world's richest tropical savanna. ■

[www.conservation.org.br](http://www.conservation.org.br)





## Drylands deserve more attention

Marie José van der Werff ten Bosch, Both ENDS, IUCN Member

Emmanuel Seck, ENDA TM, IUCN Member

Noel Oettle

**A**t UNCED in 1992, it was decided that desertification warranted increased and special attention. In May 1993, negotiations for a Convention to Combat Desertification began, resulting in its adoption in June 1994. Three months after the 50th ratification, the Convention entered into force in December 1996. The first Conference of Parties was held in Rome, in October 1997. At this moment (2008), the number of ratifications has more or less stabilized at 193 countries.

This Convention to Combat Desertification is unique in the sense that it is the first international legally binding agreement that is based on the participation of local communities. For example, the Convention states that its National Action Programmes (NAPs) have to be developed through close co-operation between governments and local communities and their organisations. Civil Society Organisations (CSOs) also have two half-day slots available in the plenary of the Conference of Parties to discuss issues with the Parties and observers. Nevertheless, we recognise the problem that although the UNCCD is legally binding, participation on paper differs from par-

ticipation in practice and there is no international court to oversee implementation of the Convention in practice.

### Civil society: crucial role

It is not enough to invite CSOs to meetings to then just ask their opinion on what is already planned. Their activities should form the starting point, from which policies and action plans should be developed in close cooperation with the relevant stakeholders. Since most drylands lie in marginalised rural areas where few investments by central decision-makers and donors (both financial and political) are made, the communities themselves have been looking for their own solutions to land degradation and drought. Many of these solutions are innovative and inspiring, and deserve more attention as the largest investments in drylands still come from the communities themselves. It is the farmer that invests most in his or her own fields, assuming he or she has the tenure rights to the fields. Communities draw up their own management and delivery systems with relatively low overhead costs, and contribute through labour, materials and skills.

What is needed in drylands is to work on longer-term sustainability, and not just crisis management such as drought. This is especially true with current climate changes becoming more and more of an issue in drylands around the world. Instead of symptom treatment, we need to address the root causes so that local vulnerability can be reduced as ecosystems and social systems become more resilient. This in turn means better capacity to resist sudden changes and forces, such as events related to climate change.

### Local communities know more

Local communities often rely on experience and intuition to react quickly to unexpected events thanks to their direct relation with the natural resources surrounding them. The ability of communities to cope is based partly on historical experience, and partly on survival instincts, knowledge and access to information. Local communities are also the first to recognise symptoms of crisis, since these affect their daily lives so strongly.



Local action is by definition limited in scale. But coupled with less context-specific, higher level policies and management plans, local action is a powerful and essential part of long-term natural resource management, and therefore deserves to be supported.

### What do Both ENDS and ENDA TM do to encourage local action?

For Both ENDS and ENDA, partnerships with local organisations and communities are at the heart of the work in drylands. Both organisations are partners in many projects including "Drynet" (Strengthening civil society networks to address dryland degradation and poverty issues in the context of strategic development frameworks and the UNCCD). Drynet is a 3-year networking and capacity building initiative taken by 14 CSOs working in 17 countries on issues related to drylands, land degradation and civil society participation in policy development.

While the causal patterns of desertification and land degradation vary in the different countries where Drynet is active, at the same time the partners share the following points of view:

1. Dryland development/resource rehabilitation feature low on political agendas worldwide so CSOs must play a crucial role in getting dryland issues on the political and donor agendas.
2. Policy frameworks should ensure political and budgetary attention for drylands is integrated into general development processes and aid agreements.
3. The majority of dryland CSOs are strong in approaches and strategies to combat land degradation locally, but weak in linking their successes to a wider political context/players and this must change.
4. There is a need for integrating environment issues in development cooperation frameworks.
5. CSOs - and many times the administrations as well - are not aware of, and therefore unable to optimize on the interconnection between development cooperation frameworks.
6. Limited access to information for CSOs on best practices is a problem. Results from science and local successes that could inspire others stay local instead of being disseminated and used to design innovative successful projects.
7. CSOs have limited capacity in project development and management techniques to transfer ideas into feasible and bankable projects.
8. CSOs need to become structural partners in their consultations with policy makers and donors to make desired changes.
9. The understanding of different methodologies to facilitate participation in planning processes differs widely in the affected countries.
10. In most dryland regions in the world CSOs still need to network effectively to have a larger impact together on policy makers and donors.

The Drynet initiative is meant to strengthen the voice of local communities and organi-



sations in the national and local development and planning processes, and to enable them to make necessary changes happen in their countries. Drynet does this by making relevant information better accessible, actively spreading it through newsletters, radio programmes and a website. To understand who the main players (managers, donors and policy-makers) are, we undertook an extensive survey in Drynet countries as well as in European countries, since European foreign policy and investment can have great impact on the well-being of dryland ecosystems and inhabitants. In the Drynet countries, the partners are reaching out to all actors, organising seminars for discussion and training, and for joint strategising about how to ensure that needed changes happen.

### The UNCCD 10 Year Strategic Plan: an improvement?

UNCCD adopted its 10 Year Strategic Plan last year to enhance the implementation of the convention. Although it could reflect better the final aim of servicing land users in drylands, it does provide opportunities for CSOs to exert influence and raise attention to their issues of concern. The UNCCD is a very valuable instrument, and with the current reform process could become even better, given that the role and engagement of CSOs are better anchored institutionally. But it still remains an instrument, which, combined with other initiatives, will have a stronger impact than by standing alone. The people, plants and animals of the drylands deserve attention and support and can inspire policy makers and donors to take appropriate action. Initiatives such as Drynet show the way forward. ■

[www.enda.sn](http://www.enda.sn)

[www.bothends.org](http://www.bothends.org)

### Drylands and biodiversity

Although often neglected or unknown, the drylands of the world contain a unique richness of species and breeds, mainly due to ingenious adaptations of the flora and fauna to harsh dryland conditions. Herders in Africa graze no fewer than 150 varieties of cattle, 60 different strains of sheep, and 50 different goats on drylands. Farmers maintain an enormous variety of seeds necessary for their subsistence. As fluctuating dry and wet periods are characteristic of drylands, adaptive variation is key for ecological sustainability. Any reduction in diversity is often irreversible.

### An example: the Knersvlakte in South Africa

The Knersvlakte is an extensive dry plain in the centre of the Succulent Karoo hotspot bounded on the east by the Bokkeveld Mountains. Fields of white quartz pebbles cover the gently rolling hills of the area and are associated with unique dwarf succulent plants. This 48,500 ha. area is extremely rich, with a total of 1,324 plant species, 266 of which are Succulent Karoo endemics. Within the hotspot, this priority area has the greatest percentage of threatened endemics with 128 species being listed on the Red List.

### The partners in Drynet

Both ENDS Netherlands, CAREC Kazakhstan/Uzbekistan/Kyrgyzstan/Tajikistan/Turkmenistan, CARI France, CENESTA Iran, EMG South Africa, ENDA TM Senegal/Madagascar/Morocco, Instituto Sertão/ASA network Brazil, LPP Germany, LPPS India, OLCA Chile, PROBIOMA Bolivia, TENMIYA Mauritania, SCOPE Pakistan, TEMA Turkey

[www.dry-net.org](http://www.dry-net.org)



## Cultural awareness and nature conservation

Piet Wit, Deputy Chair, IUCN Commission on Ecosystem Management

**T**here is an old and ongoing debate about the interaction between landscape and culture. Individual persons and whole nations in dry-land areas derive part of their identity from the open landscape that they live in. Two examples:

### Mongolia

In 1992 Dr. Batjargal, the Minister of Environment of Mongolia, proposed to the world to declare his entire country a biosphere reserve. The pride of Mongolia, waking up after centuries of domination by its neighbours, lies with its nature and culture. Horses are very much part of that identity, and so are the Takhi, the Mongolian name for Przewalski's Horse. The Takhi is a close relative of the domestic horse but has never itself been domesticated. The IUCN Red List of Threatened Species categorizes it as 'Extinct in the Wild'.

Without the horse, the great Empire of Djenghis Khan never would have happened. Horses were the mainstay of the mounted people roaming wide and far. They established an empire stretching from Asia Minor and Persia through Central Asia into Indo-China. Even nowadays, many Mongols would not be able to get anywhere, if not for

their horses. The horse is still the most suitable cross country means of transportation, living off the land, and not degrading the land as its motorized brethren do.

The Mongolian Association for the Conservation of Nature and the Environment, and the Dutch 'Foundation for the Preservation and Protection of the Przewalski Horse' - both IUCN Members - joined forces to bring the world's last living truly wild horse back to its homeland, the Eurasian steppe. The first Takhi were welcomed at Ulaanbaatar Airport by a large crowd. It was a very emotive ceremony, where even old herdsmen let their tears run freely. It was a symbol of homecoming for a whole nation.

In any case, thanks to the Takhi, principle one of the Ecosystem Approach (ecosystem management is a matter of societal choice, as elaborated by the CBD) never posed a problem in and around Hustai National Park where the horses were reintroduced.

### Mauritania

To move to another continent, the Guelb-Er-Richât, a geological miracle in Mauritania nick-named the "eye of Africa", is a heaven for lovers of nature and culture. Local nomadic tribesmen are the first to appreciate its importance. Even in the smallest tem-

porary settlement, one will find tribesmen with their little private museums, where an illiterate herdsman stands guard over a collection of stone-age artefacts and wildlife trophies found in the desert. Elsewhere herdsmen prevent inhabitants from neighbouring communities cutting down Acacia trees that form surprisingly dense stands in this middle of the desert.

Near Al Ghallaouyia an enlightened herdsman has declared himself guardian of one of the most important sites with rock engravings of the Sahara; one of his fellow herdsmen at El Beyyed jealously surveys a large site where the soil is literally covered by stone-age artefacts. The last populations of dorcas gazelle and possibly even addax are found in this fascinating area, the adopted homeland of the last great French explorer, Theodore Monod.

It is this awareness that IUCN seeks to harness for the protection of ecosystems such as these in the Central Sahara and Central Asia. People depend on these systems, economically and culturally, and identify with their species. These cultural values, together with the natural ones, must therefore be conserved by all means. ■

# What's happening to the birds in drylands?

Mike Evans and Stuart Butchart, BirdLife International, IUCN Member

**A**s about 48% of the world's land can be considered drylands, it is no surprise that a similar proportion of the world's 9,852 bird species occur in dryland ecosystems. A shocking 1 in 8 bird species (1,222 species) are considered to be globally threatened, according to the *IUCN Red List 2008*, and about a third of these species are dependent on dryland habitats. About 66% of threatened dryland species occur in shrublands, 43% in grasslands and 8% in savannas. Dryland ecosystems are clearly of great significance.

In drylands, land degradation is greatly driven by inappropriate land-uses, such as over-intense grazing, over-frequent burning of vegetation, and large-scale irrigation. Many local communities adopt or acquiesce to such land-uses, unsustainable in the long term, due to poverty and a lack of immediate alternatives. As the land degrades, they are often faced with the loss of rural livelihoods, emigration to cities and increased poverty levels.

Land degradation now also threatens 170 dryland bird species with global extinction – more than 10% of all globally threatened birds – and affects many areas of particular value to dryland birds and other biodiversity (Important Bird Areas and Endemic Bird Areas) around the world.

BirdLife International, a global network of 100 independent national NGOs, links together diverse communities and constituencies at all levels. Here are a few examples of conservation actions at the local, national, regional and global level.

## Local action in Lebanon

The Society for Protection of Nature in Lebanon (BirdLife in Lebanon) is encouraging local communities to revert to the 'hima' concept, a traditional land-use system in the drylands of the Middle East and North Africa, to proactively manage natural areas, such as shrublands, grasslands, savannas and wetlands, and protect them from over-exploitation. This system is a form of adaptive management through a mixture of strict protection and sustainable use of land, with consequent preservation of natural resources and biodiversity.

## National action in Kenya

More than 40% of Kenya's 60 Important Bird Areas (IBAs) are in drylands. Local community groups are working with NatureKenya, the BirdLife Partner, to monitor many of these special places. This sort of monitoring programme is operating in a dozen other countries in Africa. According to the IBA monitoring scheme, even though conservation action in sites in Kenya increased substantially from 1999-2003 and threats were reduced, the average site condition still deteriorated. Continued monitoring will help guide future conservation actions.

## Regional action in Africa

Eight African countries in the BirdLife International Partnership are leading an effort to conserve the unique wildlife in the savanna stretching from Sudan to Guinea. They have identified a network of 105 Important Bird Areas that form a crucial stronghold for maintaining the 54 bird species (and much other biodiversity) that is endemic to this biome.

Although covering only 283,000 km<sup>2</sup>, or 7% of the biome's total area, this IBA network has the potential to conserve core populations in critical dryland habitats, and so provides an excellent means of focusing conservation efforts on priority sites.

## Global action

Birds provide unique information for assessing global biodiversity trends, and are already being used to track progress towards the CBD 2010 target of reducing the rate of biodiversity loss. By determining the global conservation status of birds and then monitoring whether this improves or gets worse, these 'Red List Indices' show that the conservation status of birds living in savannas, shrublands and grasslands – the most species-rich habitats in drylands – has deteriorated markedly since 1988. The most frequently cited pressures on these species include the conversion of habitat to cultivation and plantations (often via irrigation), and the impoverishment of ecosystems by over-intense livestock rearing. Hunting and habitat alteration by invasive alien species are also major threats.

## What's next - more action

Birds are beautiful, inspirational and found throughout the world. By focusing on birds, and the sites and habitats on which they depend, the BirdLife Partnership is working to improve the quality of life for birds, for other biodiversity, and for people. ■

[www.birdlife.org](http://www.birdlife.org)



# Ecoagriculture in drylands

Sara J. Scherr, Ecoagriculture Partners, IUCN Member

**W**hile drylands house about 22% of the world's protected areas, these are proving insufficient to protect its rich, endemic and highly adapted flora and fauna. Reducing poverty and hunger in the drylands will depend on sustaining their natural resource base, while improving crop, livestock, forest, and fishery production. New approaches are needed that reflect the interconnectedness of the agricultural, biodiversity conservation, and poverty reduction agendas. One such approach is 'ecoagriculture', which seeks synergies that achieve sustainable agriculture, biodiversity conservation and rural livelihoods jointly in agricultural landscapes.

Many dryland farming and livestock-raising communities around the world have developed innovative ecoagriculture systems, managing landscape mosaics that functionally integrate production and conservation areas:

- In Rajasthan, India, community-led watershed restoration programmes have re-instated more than 5,000 traditional 'johads' in over 1,000 villages, increasing water supplies for irrigation, wildlife, livestock and domestic use, and re-charging groundwater.

- In Niger, the 're-greening' movement has supported farmers to use low-cost natural regeneration and soil and water conservation practices across the landscapes to reverse desertification and increase crop production, income, and food security, benefiting at least 4.5 million people in an area of 5 million hectares, restoring watersheds and wildlife habitat.
- In Spain, the 'dehesa' landscapes sustain livestock and grain production in areas of limited rainfall over nearly 3.5 million hectares of southern Spain and Portugal, mimicking the natural savanna, and supporting high levels of biodiversity. Scattered trees, shrubbery, and diverse cultivation and livestock systems increase the heterogeneity of the habitat.
- In Zimbabwe, herders use rotational grazing systems that restore and carefully manage vegetative cover, thus raising production of domestic livestock, while increasing water infiltration and recharge, and supporting increased wildlife populations in the savannas.

Narrow sectoral strategies have failed in the drylands. Ecoagriculture approaches require collective action by the diverse stakeholders responsible for managing dryland landscapes – farmers,

pastoralists, community-based organizations, NGOs involved in conservation, agriculture and rural development research institutions, the food industry, and policymakers.

More and more dryland initiatives are moving in this direction, such as TerrAfrica's work on Sustainable Land Management. The international conservation and development communities can help to scale up the development of dryland ecoagriculture systems in several ways:

- Coordinate the agendas of the Convention on Biological Diversity and the Convention to Combat Desertification energetically to pursue landscape-scale strategies in drylands.
- Support integrated landscape management with a focused programme of research, knowledge exchange and capacity-building across communities and sectors.
- Empower dryland resource managers – farmers, pastoralists and others – to play a central role in designing investment and conservation programmes and policies. ■

[www.ecoagriculturepartners.org](http://www.ecoagriculturepartners.org)



# The Temperate Grasslands Conservation Initiative

Bill Henwood, IUCN World Commission on Protected Areas

**M**ost arid, semi-arid and sub-humid areas are either characterized by desert, or temperate, sub-tropical or tropical grassland ecosystems. Here we will focus on temperate grasslands, which occupy 8% of the earth's surface, occur on every continent except Antarctica, and are one of the world's great biomes. However, they are now among the most altered and endangered ecosystems on the planet, especially the prairies of North America, the pampas of South America, the lowland grasslands of south-east Australia, and the steppes of eastern Europe. It is on these grasslands that were once found some of the greatest assemblages of wildlife ever witnessed, but today, only remnants of their former numbers remain.

Grasslands have been the source of livelihoods since time immemorial, and temperate areas have produced important grass species such as corn, wheat, and oats for food supply. But this has been at a cost to conservation as human activity has significantly altered their natural state. Unfortunately, only 5.5% of the world's temperate grasslands are protected within the global system of protected areas.

The level of communication and international cooperation within the conservation community that is so often evident in the conservation and protection of other biomes, such as tropical rainforests, mountains or coral reefs, has not existed for temperate grasslands. There has been a pervasive lack of recognition of this ecosystem as being one worthy of protection, essentially precluding its protection as a viable land use option.

The Temperate Grasslands Conservation Initiative (TGCI), an undertaking of the IUCN World Commission on Protected Areas (WCPA) Grasslands Protected Areas Task Force, aims at fostering communication and cooperation

globally to increase conservation and protection of temperate grasslands and seeking their rightful place in the world's protected areas system. The TGCI also targets commitment to conservation of grassland ecosystems beyond protected area boundaries, to stem habitat loss, conserve biodiversity, restore lost or damaged ecosystems, reintroduce extirpated species and promote ecologically sustainable grassland management practices. The TGCI also recognizes the importance of temperate indigenous grasslands to the life and cultural survival of mobile indigenous peoples and the irreplaceable value of indigenous knowledge and accumulated experience of traditional indigenous temperate grassland users.

## The IUCN/WCPA Grasslands Protected Areas Task Force

The IUCN World Commission on Protected Areas created the Grasslands Protected Areas Task Force in 1996 towards a goal of helping protect 10% of the temperate grasslands biomes by 2014, and protect, restore and wisely use grassland protected areas through best management practices and guidelines.

To do this, there is need to assess and catalogue the number, location, geographic extent, biophysical representation and condition of protected areas in the temperate grasslands biome; determine existing gaps in their protection as well as how to fill those gaps; develop a global strategy and region-specific action plans to protect grasslands; and identify common management issues and practices that impact the biophysical condition and long-term maintenance of biodiversity in grassland protected areas.

In the decade since the creation of the Task Force, there is increased interest in the conservation and protection of grasslands, and more grasslands are being protected today worldwide. However, more still needs to be done in this regard.

## The temperate grasslands conservation initiative

The Temperate Grasslands Conservation Initiative proposes to reverse the trend of biodiversity loss and degradation of the temperate grasslands biome by promoting both the designation and special management of representative protected areas, and the widespread use of sustainable management practices beyond protected area boundaries, with the goal of at least doubling the current level of protection by 2014.

A significant "Hohhot Declaration" resulting from a TGCI inaugural workshop held in Hohhot, China in June, 2008, underscored the need to consider temperate indigenous grasslands as providers of environmental services essential for life on earth as a source of food, fibre, human livelihoods and well-being, cultural and biological diversity, the recharge of aquifers and the sequestration of carbon, particularly in the face of global climate change. The Declaration recognizes that temperate indigenous grasslands are critically endangered and urgent action is required to protect and maintain the services they provide to sustain human life. All sectors of society are called upon to collaborate toward this goal. The final report from the Hohhot workshop with the full text of the declaration will soon be available on the WCPA website. ■

[www.iucn.org/wcpa](http://www.iucn.org/wcpa)



# Pastoralists, the best custodians of drylands

Nikola Rass, IUCN World Initiative for Sustainable Pastoralism

For a long time desertification was thought to be in large part the result of pastoralism. Yet, there is evidence that pastoralism, the extensive herding of livestock in rangeland environments, is the most sustainable production system in the drylands as well as one of the few production systems that is genuinely compatible with 'formal' nature conservation. The World Initiative for Sustainable Pastoralism (WISP) was inaugurated in 2005 to demonstrate and advocate that pastoralists are the best custodians of drylands' environments. With its partners, WISP is elaborating these arguments for local, regional, national and international fora, in order to influence policy that supports pastoralism for sustainable drylands development.

Although there are many systems of pastoralism in different parts of the world, all share a number of commonalities, including mobility of livestock to access seasonal resources, communal management of pastures and other resources, and complex systems of governance that are vital to enable both mobility and communal resource management. Pastoralism often means living in sparsely populated, remote areas.

## Pastoralists are major custodians of the world's drylands

Drylands have an over-riding feature – a scarcity of water and a highly seasonal and variable precipitation. Mobile pastoralism is a sophisticated management system that is well adapted to the ecological variability in drylands. While mobile pastoralism is the dominant livelihoods activity in the more arid regions, a mixture of pastoralism and farming is found in areas that are more suitable for farming. Mobile pastoralists have developed an enormous knowledge on the ecosystem and the climate that allows them to survive in very harsh conditions, permitting them to make use of scarce vegetation that is often scattered over large distances, and to avoid overgrazing. Nevertheless, pastoralism has often been misunderstood as a backward system, and inappropriate develop-

ment programmes and policies (e.g. supporting ranching or sedentarisation) have been established. This leads to marginalization of pastoralists' livelihoods and encroachment on rangelands, resulting in degradation. Overgrazing has often been reported to be the main cause for degradation of the drylands, when actually encroachment of agriculture combined with reduced livestock mobility and reduced access to key grazing areas are most often the cause.

## Pastoralism as a conservation strategy

In the past, conservationists have generally believed that wildlife conservation and animal husbandry are incompatible forms of land use and should be kept apart, resulting in making conservation areas off-limits to herders. How-

WISP, supported by UNDP/GEF and IUCN, is a global Initiative that aims to empower pastoral people to sustainably manage drylands and rangelands resources through capacity building, advocacy and creation of networks. WISP is supporting pastoralists from different parts of the world to get connected, learn from each other, and to develop sound policy arguments to support their case. The global perspective allows the pastoralists to exchange knowledge and practices, and also attempts the unification of pastoralists worldwide to give them increased self-confidence and a stronger voice in the policy-making process. Although in some countries pastoralists are the majority, in most countries they constitute a minority and are socially and politically marginalized. Worldwide, they make up a large and significant minority group of an estimated 100-200 million people.





ever; there is global evidence that pastoralism is not harmful to the environment, but that conservation in dryland areas actually relies on pastoralism. This is logical if one considers that many of the world's drylands have evolved over millions of years in coexistence with large herds of herbivorous animals, and have thus become grazing-dependent. Most of the charismatic wildlife in the world's drylands depends on open grasslands. In recent centuries there may have been a shift from wild ungulates to domestic stock, with livestock replicating the animal impact of wild herds (grazing, manuring and trampling).

In addition pastoralists have modified their rangelands through the use of fire and intensive grazing to promote the growth of

palatable grasses and reduce bush encroachment. That high numbers of many species of wildlife do well in managed pastureland is supported by a case study documenting wildlife issues in Kitengela pastoral areas adjacent to the Nairobi National Park (see box). Similar cases have been reported from many other different parts of the world. Despite these findings, pastoralists have often been expelled from national parks and nature reserves, losing important grazing ground, which is critical to their survival.

WISP argues for a joint management approach of protected areas, recognizing the complementarity of human activities, livestock and wildlife. Other recommendations put forward by WISP request that pastoralists should

be compensated for the ecosystem services they provide to the drylands environment and to the global atmosphere. An ongoing WISP knowledge management project is examining whether pastoralism, already displaying outstanding resilience and ability to adapt to climate change, also has a positive effect by contributing to above and below-ground carbon storage. WISP is collecting the arguments and facts to position pastoralists accordingly in the discussions about climate change and carbon sequestration. ■

[www.iucn.org/wisp](http://www.iucn.org/wisp)

### **Wildlife on pastureland and pastoralists in national parks?**

Nairobi National Park in Kenya was created in 1946, dispossessing local Maasai pastoralists of their ancient grazing land. Since then Maasai are not allowed access to the Park. However, grazing in the park is critical for the Maasai herds, especially during times of drought. Wildlife, however, can move freely between the national park and the pastureland of the Maasai. Wild ungulates make increasing use of the well-managed pastureland for grazing, and in turn attract predators from the national park, which hunt their prey in the open pastureland. However, it is often not the wildlife, but the Maasai's domestic stock that feeds the lions. This has become such a serious issue that the Kenya Wildlife Service has recently introduced a "consolidation programme" which compensates pastoralists when wildlife from the national parks kills livestock or destroys home gardens and Maasai property. Nevertheless the park remains closed to pastoralist herds, despite all evidence showing their profound knowledge of the environment and their positive impact on wildlife.

# Sustainable land management in drylands – Challenges for adaptation to climate change

Levke Sörensen, Anneke Trux, Anselm Duchrow, Convention Project to Combat Desertification (CCD Project) of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation), IUCN Member, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ)

## Climate change and its impacts in drylands

For most dryland regions, climate models predict higher temperatures, decreased precipitation, and an increase in intensity and frequency of extreme events such as droughts and heavy rainfall, although when, where and how is unknown. All this may impact people and dryland ecosystems through:

- Increased land degradation/desertification.
- Reduced carbon sequestration services.
- Vegetation shifts from semi-arid towards arid vegetation.
- Decreased water availability and quality.
- Shortening of the vegetation period.
- Reduction of rain-fed areas.
- Diminished agricultural productivity and crop yields.
- Productivity decline in grasslands.

Climate change will potentially increase poverty and undermine sustainable development, and developing countries with vast dryland areas are particularly vulnerable. The adaptive capacity of pastoralists, small-holder and subsistence farmers, highly dependent on natural resources, may be overstretched and economic alternatives and safety nets are mostly lacking.

## Role of development cooperation in adaptation to climate change

Adverse impacts of climate change are already happening, so adaptation is an urgent issue. According to the Intergovernmental Panel on Climate Change (IPCC), adaptation is defined as “the adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities”. Adaptive responses include not only technological and managerial, but also behavioural and institutional actions, the introduction of economic and policy instruments, and research and development.

Development cooperation provides practical support to increase the adaptive capacity of partner countries and to reduce the vulnerability of exposed people and ecosystems. Development cooperation can assist in:

- Regional and local climate impacts assessment.
- Assessment of social and economic vulnerabilities of a population.
- Setting priorities for action based on impact and vulnerability assessments, working with governments, NGOs, and civil society.
- Implementing priority measures in specific sectors.
- Mainstreaming climate concerns in all areas of decision-making and planning.

## Need for action in drylands – today and in the future

In drylands, societies are used to adapting to highly variable environmental conditions, so building on their experience is a good starting point for adaptation. While climate change adds more pressure to an already stressed system, the well-known practices of sustainable land management (e.g. erosion control, water use efficiency, crop and pasture rotation) enhance the adaptive capacity and resilience of dryland societies and ecosystems. However business as usual is not enough and new approaches are needed.

Working on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), GTZ attaches great importance to adapting to present and future climate change impacts, which includes:

- Revision of best practices, including familiar approaches and tools.
- Mainstreaming of adaptation in planning, which is essential for sustainable development.
- Focus on strategic planning to create mid- to long-term perspectives for adaptation.
- Enhanced flexibility. For dryland regions like the Sahel, climate scenarios are characterized by a high level of uncer-







tainty, and local and sub-regional climate projections often do not exist.

- Identification of incentives and options for diversifying livelihoods.

In this context, an integrated multi-level approach (local, national, regional) is essential, with participation at the local level as key to implement adaptation. Furthermore, planning for adaptation requires a combination of short-, medium- and long-term adaptive responses.

### Examples for GTZ's work on adaptation to climate change in drylands

#### Index-based weather insurances in Africa

GTZ is involved in developing index-based weather insurances in Africa. The objective of such insurance products is to protect local farmers, herders and small scale entrepreneurs from the hazards of severe droughts. Crop failures due to extreme weather events are difficult to cope with for any farmer, but can mean a disaster for the poor. Poor farmers often avoid risks by not investing – a behaviour, which in turn reduces production and incomes and is

therefore part of the poverty trap. In this context, and combined with traditional risk coping strategies, weather insurances aim at mitigating poverty and food insecurity, by transferring part of the weather risks beyond the region.

#### Tunisia's Strategy for Adaptation to Climate Change in Agriculture

Tunisia has been one of the first countries to develop a national adaptation strategy for the agricultural sector. Based on climate projections and their impacts between 2020 and 2050, Tunisia has decided on strategic orientations and an Action Plan in order to prevent negative consequences of climate change now. Water management is at the very heart of the strategy as water scarcity is a major threat for agricultural productivity. The strategy, which has been elaborated with support by GTZ, also takes into account the need for institution-building and improved knowledge and sharing of experiences for adaptation.

#### Study on national planning under Multilateral Environmental Agreements (MEAs)

GTZ is about to publish a study called "NAPAs, NAPs and NBSAPs: Improving the effectiveness of national planning exercises under multilateral environment treaties". The study

analyses lessons learnt from ongoing national planning exercises under the MEAs in order to draw conclusions on how to deal with future elaboration and implementation of Adaptation Strategies under the Convention on Climate Change. The study concludes that national planning under MEAs needs to move out of the environment corner and to better integrate with other sustainable development processes in order to maximise returns from limited funds. Furthermore, there is a clear need to invest in monitoring and evaluation, as well as in better coordination at the national and MEA level in order to increase synergies. ■

[www.gtz.de/desertification](http://www.gtz.de/desertification)

\* For the uninitiated, the UN Framework Convention on Climate Change has NAPAs (National Adaptation Plans of Action), the UN Convention to Combat Desertification has NAPs (National Action Programmes) and the UN Convention on Biological Diversity has NBSAPs (National Biodiversity Strategies and Action Plans).

Note: This article reflects the personal opinion of the authors.

# The Sahara Conservation Fund

John Newby, IUCN Species Survival Commission

## What was your first experience in the world's drylands/Sahara desert that made you become a devoted drylands conservationist your entire life?

Carrying out a 28-day field trip on camelback in Chad in 1973 with 20 Arab rangers. The trip was a true baptism of fire: a really gruelling experience at the height of the hot season, with little water to drink but a truly wonderful experience with masses of wildlife in superb grassland and desert habitats. The relative simplicity and purity of desert ecosystems is something I really appreciate. Similarly, the strength and ingenuity of desert dwellers, living much as they have done for hundreds of years and demonstrating an amazing degree of self-sufficiency and self-reliance in areas to all intents and purposes devoid of modern amenities, government, interference, etc. Mind boggling!

## What path did your career follow? And why did you found SFC?

After working in conservation for some 30 years and getting increasingly frustrated that little or nothing was being done to address the extinction crisis effecting Sahelo-Saharan wildlife, the only answer was to create SCF and to build a network of like-minded individuals and institutions keen to see something done. Interestingly, the backbone of SCF's support comes from the zoo world in the United States, Middle East and Europe. SCF provides a much needed focal point for organizations to work together to multiply their resources through cooperation and provides an entry point into the international conservation arena. It's thanks to zoos that species like the addax, the scimitar-horned oryx and the dama gazelle can still be saved. Without their collections and breeding programmes all would likely be as dead as the dodo.

## What is your opinion on the importance and value of the world's drylands?

Drylands make up a sizeable proportion of the planet's land mass and sustain a large number of people in many countries. They are not irrelevant. Many of the people living in drylands understand their limits and productivity and where alternative forms of livelihood are unavailable this is extremely important in maintaining social and political stability. For desert dwellers, the continued existence of healthy populations of wild plants and animals is an integral part of their finely-balanced livelihoods. Desert antelopes and gazelles are highly productive on rangelands often too sparse for livestock. Maintaining healthy wildlife populations has major ecological and social benefits whilst contributing to the diversification and strengthening of pastoral economies.

## What is so fascinating about the Sahara?

Life in such an extreme environment. Superb adaptations. Vast, vast spaces. A landscape modelled by physical and mathematically complex forces – wind, erosion, heat. Colours, textures... A place with an unimpeded 360 degree panorama of the UNIVERSE!

## What are the threats and conservation challenges?

Ignorance about desert biodiversity (you mean there is life out there?!), lack of resources, over-hunting, unsustainable use, terrible de-

velopment thinking such as sedentarization of nomads, drilling wells in places with only ephemeral pasture, not to mention unmanaged tourism and uneducated tourists...

## So what is the importance and status of antelopes?

The scimitar-horned oryx is extinct in the wild, a victim of over-hunting, civil war, poverty-driven expansion of rain-fed agriculture into marginal lands, desertification and the impact of over-grazing and competition brought on by short sighted pastoral development schemes. The addax is now down to around 300 head; the dama gazelle in a similar situation; bustards and dorcas gazelle populations hunted to extinction by 'sportsmen' from wealthy nations; desert races of the cheetah and the ostrich virtually gone. A sad, sad story indeed.

## Your projects have very much a community angle and go beyond pure species conservation, why?

To succeed, conservation must meet human aspirations, be they spiritual, aesthetic or more down-to-earth, such as the need for food or income. Whilst campaigning vigorously against unsustainable use, SCF seeks solutions to allow people to draw benefit from their natural resources without threatening their long-term survival and productivity. The biggest challenge is getting beyond the rhetoric because it is not always obvious what direct and tangible benefits there are, especially when one is dealing with last ditch attempts to save endangered species. Nonetheless opportunities are there that need to be exploited. Our ostrich project in Niger will play a catalytic role in providing education and outreach programmes to schools and community groups. It is also working with local ostrich breeders to improve their skills and productivity and through this, their income. Employment opportunities exist but one needs to be extremely careful about over-optimistic projections, especially with long-term benefits that may or may not accrue as the project meets its goals.

## What does a drylands conservation approach need to look like?

Linkages are important: biodiversity-habitats-livelihoods. There is still a chronic lack of cooperation and information-sharing across sectors or interest

groups. With more care win-win solutions can be found. More work is needed on quantifying the true value of dryland species and habitats in both micro- and macro-economic terms.

## How is the community benefitting financially from your project?

Whilst SCF is not a development organization per se (and we always make this very clear), we do of course subscribe to and promote the fundamental notion that conservation is a contribution to development and this is particularly obvious in drylands, where so many people still derive their livelihoods from natural resources. One thing SCF is always keen to do, working as it does in some of the remotest parts of the world, is act as go-between, ambassador or catalyst for the local communities with development and humanitarian agencies. We may not have the resources ourselves but we certainly can make sure that those that do are made aware of the needs of desert communities. ■

**MISSION:** The Sahara Conservation Fund (SCF) was established for charitable, scientific and educational purposes for the conservation of the wildlife, habitats and other natural resources of the Sahara desert and bordering Sahelian grasslands through a powerful network with a common goal: the conservation of deserts and their unique natural and cultural heritage.

### MAJOR PROJECTS ON DRYLANDS

- Preventing the addax from extinction in the wild (Niger, Chad) through establishing a network of desert protected areas and conservation corridors
- Ostrich recovery and reintroduction (Niger) by working with private ostrich owners, government agencies, non-governmental organizations and community leaders to establish a captive-breeding center and reintroduction programme
- Reintroduction of desert antelopes (Senegal, Tunisia, Algeria) and other locally extinct species, including gazelles, scimitar-horned oryx and addax
- Pan-Sahara Wildlife Survey. The first integrated Sahara-wide inventory and conservation assessment of desert species and habitats, coupled directly with prioritization and fundraising for action.

[www.saharaconservation.org/](http://www.saharaconservation.org/)



# Face to face

This booklet has been made possible by the contribution of numerous IUCN members. On this final page we highlight a selection of IUCN Commission members, asking what led them to work in drylands and conservation. Space hasn't allowed us to include all of the contributors, but it does show that in addition to dryland ecosystems being extremely diverse, the people working in them are as well!

Joost Brouwer, CEM



**What made you decide to devote yourself to dryland work?**  
I was fortunate to work as a Principal Scientist at the ICRISAT Sahelian Center in Niger from 1990-1994, which led to my keen interest in agro-ecological research on dryland regions. From 1994-1998 I was a member of SAWEG, IUCN's Sahelian Wetlands Expert Group.

**How does your engagement in CEM benefit you and your work?**

I have provided input regarding the Ecosystem Approach for a number of years, and in 2008 I was asked to represent CEM at CSD-16 in New York. There I gave a presentation on 'linkages among climate change, drought, desertification and biodiversity'. This has led to a number of very useful professional contacts for me, both to spread the results of my earlier work and to develop new ideas.

Piet Wit, Deputy Chair, CEM  
Director Syzygy



**How does your engagement in CEM benefit you and your work?**

I benefit from the extensive networking with worldwide conservation experts.

**What made you decide to devote yourself to dryland work?**  
Endangered status of most of the drylands biodiversity, the importance of drylands for mankind, and the cultural values of dryland societies

S. Kumaraswamy, CEM  
Scientist



**How does your engagement in CEM benefit you and your work?**

Research on dryland ecosystems, biodiversity, ecological functions and human dimensions to eco-development

**What made you decide to devote yourself to dry land work?**

Drylands ecosystems are subjected to extreme levels of anthropogenic pressure and exploitation, yet future economic development will come from them. The ecosystem services of the dry land systems are eroding at a faster rate than other resources due to scarcity and unsustainable usage. I want to be part of the urgent need to sustainably manage them to protect livelihood systems for posterity.



Valery Neronov, CEM, SSC and Anna Lushchekina, WCPA  
Deputy Chair of the Russian Committee for the UNESCO programme on Man and Biosphere since 1976

**What made you decide to devote yourself to dryland work and the conservation of the Saiga antelope?**

I got interested in the saiga antelope in 1976 when I came to Mongolia and was involved in the study of another remarkable antelope inhabiting Eurasian steppes - the Mongolian gazelle. After that, together with Anna Lushchekina, we conducted a survey on the status of Mongolian saiga and started a comprehensive study of saiga in Kalmykia in the 1990's.

Ashish Kumar, CEM, WCPA  
Scientist



**How does your engagement in CEM benefit you and your work?**

The material provided by IUCN commissions is informative and useful and it helps update my knowledge on global issues and trends concerning ecosystems and protected areas.

**What made you decide to devote yourself to dryland work?**  
Drylands in Kachhh offer excellent prospects for research on ecosystem and environment-related issues. I want to increase my understanding and contribution to the native biodiversity and its linkages with the livelihood support system as this helps maintain and sustain the ecosystem.

Elena Kreuzberg-Mukhina, SSC, CEM, WCPA  
Professor assistant, Department of Biology, Carleton University, Ottawa, Canada



**How does your engagement in IUCN's Commissions benefit you and your work?**

I have been engaged in three Commissions (CEM, SSC and WCPA). All these have impacted upon my research, especially in the analysis of dryland ecosystems and biodiversity in Central Asia (especially the Aral Sea basin), introduction of the ecosystem approach at the national and regional levels, and input into biodiversity conservation through species assessments and developing the Red List process.

**What made you decide to devote yourself to dryland work?**

I started my work in Central Asia, studying the houbara bustard, during which time I gradually became involved in more general biodiversity management and protection throughout arid regions. My current scientific interests concern the impact of land development for agriculture on biodiversity in drylands.



Nérida Barajas Acosta, CEM  
PhD candidate for the Autonomous University of Chihuahua  
Western Chihuahuan Desert Conservation Coordinator - The Nature Conservancy

**How does your engagement in CEM benefit you and your work?**

I work in the drylands desert grasslands, and freshwater ecosystems, and I benefit from receiving updated global information related to my work.

**What made you decide to devote yourself to dryland work?**

I have been living in the Chihuahuan Desert for 9 years; I love it and want to help the community face the conservation challenges here.

Alex Kreuzberg, SSC, WCPA  
Analyst, Algonquin College, Ottawa, Canada



**How does your engagement in IUCN's Commissions benefit you and your work?**

Being a member of SSC and WCPA has helped me in my work with the CBD including the establishment of a national Clearing-House Mechanism, analysis of national capacity needs and preparation of the Third National Report. It has also contributed to assessing management effectiveness of protected areas in Uzbekistan, and species Red Listing.

**What made you decide to devote yourself to dryland work?**

I was born in Tashkent in Uzbekistan, and since my childhood I remember the wonderful expeditions with my father to various corners of Central Asia. I love diversity of living organisms in Central Asia, both mountain and arid parts, and wish to protect this biodiversity for future generations.



Dr. Arvind Kumar Jha, CEM  
Commissioner (TRTI) and Chief Conservator of Forests

**What made you decide to devote yourself to dryland work?**

Maharashtra dryland ecosystems need conservation as they suffer from human as well as biotic pressure. These grasslands once supported a milk and animal meat based economy very well, but now the planting of Glyricidia has disturbed the ecology. I want to play a part in restoring this.



One Union - a wealth of  
expertise on drylands