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Future of World's Arid Regions Chronicled in Landmark UN Environment Report

Global Deserts Outlook Launched on World Environment Day

Algiers/London/Nairobi/Rioja, 5 June 2006 – The world's deserts are facing dramatic changes as a result of global climate change, high water demands, tourism and salt contamination of irrigated soils.

Desert margins and so called 'sky islands'-mountain areas within deserts that have been important for people, wildlife and water supplies for millennia-are under particular threat.

Global and regional instability, leading to more military training grounds, prisons and refugee holding stations, may also be set to modify the desert landscape the new report by the United Nations Environment Programme (UNEP) suggests.

“These intrusions import many people into deserts, generate considerable income and help upgrade infrastructure but have large environmental footprints particularly with respect to water. In an insecure and competitive world, this kind of investment will continue, even grow,” it says.

Not all the changes need necessarily be harmful. Some may have clear benefits for indigenous people and other desert residents, and even the wider world.

Most deserts have sunlight and temperature regimes that favour—possibly surprisingly-- sites for shrimp and fish farms in locations like Arizona to the Negev desert in Israel.

Such ventures offer new and potentially environmentally-friendly livelihoods for local people and businesses.

Eventually these and other developments that make use of the unique features of deserts could also help relieve the pressure on mangroves and sensitive coastlines which are currently being cleared for shrimp ponds.

Meanwhile, animals and wild plants, remarkably adapted to the harsh and often unpredictable desert world, promise new sources of drugs, industrial products and crops.

Nipa, a salt grass harvested in the Sonoran desert of north western Mexico at the delta of the Colorado River by the Cocopahs people, thrives on pure seawater producing large grain yields the size of wheat.

“It is a strong candidate for a major global food crop and could become this desert's greatest gift to the world,” says the report.

Meanwhile some experts believe deserts could become the carbon-free power houses of the 21st century. They argue that an area 800 by 800 km of a desert such as the Sahara could capture enough solar energy to generate all the world's electricity needs and more.

Many of the changes that deserts could experience are likely to be far less positive unless they are better controlled.

Population growth and inefficient water use are, by 2050, set to move some countries with deserts beyond thresholds of water stress, or even worse, water scarcity. Examples include Chad, Iraq, Niger and Syria.

Renewable supplies of water which are fed to deserts by large rivers are also expected to be threatened, in some cases severely, by 2025.

Examples include the Gariep River in southern Africa; the Rio Grande and Colorado Rivers in North America; the Tigris and Euphrates in southwestern Asia and the Amu Darya and Indus Rivers in central Asia.

Better management of water supplies will be the key challenge for the future of deserts but could, if successful, be a beacon of hope and good practice for other water-short parts of the globe.

These are among the findings of UNEP's Global Deserts Outlook launched to mark World Environment Day on 5 June.

The main World Environment Day celebrations for 2006 are being held in the Algerian capital Algiers with the theme "Don't Desert Drylands!". 2006 is also the United Nations International Year of Deserts and Desertification.

The Global Deserts Outlook is the first thematic report in the Global Environment Outlook (GEO) series of environmental assessments by UNEP.

This GEO report, prepared by experts from across the globe, traces the history and astonishing biology of the deserts and assesses likely future changes in deserts.

It also flags policy options that may help governments and relevant bodies deliver a more sustainable future for these extraordinary regions.

Shafqat Kakakhel, UNEP's Officer in Charge and Deputy Executive Director, said: "There are many popular and sometimes misplaced views of deserts which this report either confirms or overturns. Far from being barren wastelands, they emerge as biologically, economically and culturally dynamic while being increasingly subject to the impacts and pressures of the modern world".

"They also emerge as places of new economic and livelihood possibilities underlining yet again that the environment is not a luxury but a key element in the fight against poverty and the delivery of internationally-agreed development goals such as the Millennium Development Goals," he added.

Mr Kakakhel cited the growing interest in deserts as prime locations for aquaculture and the source of novel drugs, herbal medicines and industrial products derived from the plants and animals adapted to these arid areas.

“If the huge, solar-power potential of deserts can be economically harnessed the world has a future free from fossil fuels. And tourism based around desert nature can, if sensitively managed, deliver new prospects and perspectives for people in some of the poorest parts of the world,” he added.

Some Key Facts from the Global Deserts Outlook

Almost one-quarter of the earth’s land surface – some 33.7 million square kilometres – has been defined as “desert” in some sense. These deserts are inhabited by over 500 million people, significantly more than previously thought.

The desert cores remain pristine in many parts of the world, representing some of the planet’s last remaining areas of total wilderness.

The desert fringes in many places, however, suffer high pressures from human activities and include several of the most threatened terrestrial ecoregions of the world.

Climate Change

Water is a vital and limiting factor in deserts. Many life forms exist in limbo, suddenly bursting into fruit and reproducing in vast numbers in response to ‘rain pulses’. Water supply is also vital for human settlements and these are even more vulnerable to unsustainable withdrawals of water

Climate change as a result of human-made emissions is already affecting deserts. The overall temperature increase of between 0.5 and two degrees C over the period 1976-2000 has been much higher than the average global rise of 0.45 degrees C.

The Dashti Kbir desert in Iran has seen a 16 per cent fall per decade in rainfall during this same period; the Kalahari in South Africa a 12 per cent decline and the Atacama desert in Chile , an eight per cent drop.

In contrast Kizil Kum in Afghanistan and the Western Desert in Egypt have seen an four to eight per cent rise over the same period.

Profound changes with important implications for water supplies and people, and desert plants and animals, are likely in some regions unless greenhouse gas emissions are dramatically reduced.

Under scenarios developed by the Intergovernmental Panel on Climate Change (IPCC), the body of scientists advising governments and the United Nations, temperatures in deserts could rise by an average of as much as five to seven degrees C by 2071 -2100, compared to the average in the period 1961-1990.

Many deserts will see declines in rainfall of between five and ten or even 15 per cent with deserts in southerly latitudes especially vulnerable.

Most of the 12 desert regions, whose future climate has been modeled, are facing a drier future with rainfall in some cases forecast to be 10 to 20 per cent lower by the end of the century.

This applies to the Great Victoria desert of Australia; the Atacama and also to the northern-hemisphere deserts such as the Colorado and Great Basin region in the United States.

Only the Gobi desert in China is predicted to have rainfall increases of between ten and 15 per cent.

The problem will almost certainly be compounded by the melting of glaciers whose waters sustain many deserts such as the Atacama and Monte Deserts in South America.

The glaciers in the mountains of High Asia may decline by between just over 40 per cent and 80 per cent by the end of the century under two IPCC scenarios, says the report.

The situation is being aggravated by overgrazing and the cutting of trees and other vegetation in these desert mountain realms thus reducing the capacity of these natural water towers.

The report adds: "A large fraction of the water used for agricultural and domestic purposes in the arid Southwest of the United States, the deserts of Central Asia and the Atacama and Puna Deserts on both sides of the Andes is drawn from rivers that originate in glaciated/snow-covered mountains".

Modeling of the impact on California's irrigated farmlands indicates that they are likely "to lose more than 15 per cent of their value because of losses in snow pack," says the Global Deserts Outlook.

Other impacts of climate change include the turning of some semi-arid rangelands into deserts and the re-mobilization of dunes currently stabilized by vegetation as in the southwestern Kalahari Desert in southern Africa.

Wider Water Issues and Agriculture

Underground water supplies, some centred around oases and in 'sky islands'--formed over thousands and in some cases over a million years-- are increasingly being drained of water for agriculture and settlements including retirement resorts.

The biggest casualties may be cities in the deserts of southwestern Asia and in the southwest United States.

Other water supplies are under threat from salinization and pollution by pesticides and herbicides.

Rising water-tables beneath irrigated soils has led and will probably lead to much more salinization of soils as is already occurring in western China, India, Pakistan,

Iraq and Australia. For example in the Tarim River basin of China, more than 12,000 square km of land has been salinized over the last 30 years or so.

In some coastal areas ground-water supplies have been contaminated as seawater invades subsurface waters that have been over-exploited. Seawater has penetrated 20km inland into some Libyan coastal aquifers.

In some parts of the world, deserts are becoming increasingly attractive as places to live and to retire, but this often requires large pumping and water transfers.

While traditional American cities like Detroit and Chicago have seen population falls since the 1950s, desert ones like Phoenix and Tucson, Arizona, have seen populations rise from almost zero to between 500,000 and 1.5 million over the same period.

Countries like the United Arab Emirates are also seeing a growth in retirees which will certainly increase water demand.

Large rivers running through deserts have supported desert people for millennia. Many have been dammed, and although the dams store valuable water, the water losses downstream have led to serious impacts on floodplain and river ecology.

The Colorado River in the southwestern United States has been dammed to generate water supplies and electricity for Arizona and California but its delta in Mexico has lost most of its water and productivity.

A similar story is linked with the Aswan High Dam in Egypt. Built in 1970, it has reduced the level of nutrient-rich silts and soils flowing downstream causing the Nile Delta to shrink.

One possibility to improve water efficiency is to restrict irrigated agriculture to high value crops like dates, intensive greenhouse farming where evaporation is reduced and to aquaculture. Low value crops like maize could be imported from wetter parts of the world.

Desalination plants, which turn sea water into drinking water, are used in some counties like Saudi Arabia but they consume large amounts of energy in a world where energy prices are rising sharply.

More attention should be focused on ancient and ingenious methods of water management as they might offer sustainable options for the future. These include underground channels known as *qanats* and *foggara* in North Africa and *karez* in countries like Pakistan.

Biodiversity

Urgent action is needed to protect wildlife in deserts with hunting among the biggest threats, says the report.

“Large convoys of air conditioned caravans follow hunters across the deserts of Arabia, Kazakhstan and Sudan,” it adds.

Desert species on the brink of extinction or declining fast include various species of gazelle, oryx, addax, Arabian tahr and the Barbary sheep as well as one of the falconers favourite prey, the Houbara.

Probable impacts include those created by new roads, expanding settlements and other infrastructure developments that concentrate around desert montane areas.

“Sky islands” in deserts are plant and animal communities that have been isolated in mountain ranges when the deserts became rapidly more arid some 20,000 years ago.

Many hold unique and rare species that, like oceanic islands, have evolved in isolation. These include the rich pine and oak forests of the Moroccan Atlas Mountains; the Arabian tahr goat found in the Al Hajar Mountains near the Gulf of Oman and the wild olives and Saharan myrtles of Niger’s Air Massif.

“At greatest risk are the few patches of dry woodlands associated with desert mountain habitats which may decline by up to 3.5 per cent per year,” adds the Global Deserts Outlook.

Indeed experts fear that these woodlands—areas which made the great desert trades such as the Silk Road, the cross-Sahara trade and many others possible-- could be largely lost in less than 50 years unless urgent action is taken to protect and conserve them.

Desert wetlands, fed by the large rivers crossing deserts, are probably the most threatened ecosystem, as a result of their valuable water supplies being diverted to domestic or agricultural use. These include the extremely threatened ecosystems of the Aral Sea and the Mesopotamian Marshlands in Iraq.

The report estimates that desert wilderness -- those areas where there are no nearby roads, will decline from just under 60 per cent of the current total desert area to just over 30 per cent by 2050.

“Species such as desert bighorn sheep, the Asian Houbara bustard and California desert tortoise, that are sensitive to fragmentation of habitat or poaching, induced by increased access to areas previously not accessible to people, will be affected significantly by this change,” says the report.

New Industries from Aquaculture to Tourism

Rising numbers of people are attracted to deserts for hiking, fishing and to view cultural artifacts.

Countries are recognizing this and the number of desert-based conservation areas including National Parks is set to climb.

Popular sites include Joshua Tree National Park in North America, St Catherine’s Monastery in Sinai and Uluru (Ayers Rock) in Australia.

A series of large transboundary parks are being negotiated in southwestern Africa which should offer new levels of protection to the entire coastal Namib desert.

Some deserts areas—Arizona and the Negev-- are capitalizing on the low costs of land, mild winter temperatures and in some cases the availability of ‘brackish’ water that may be too salty for plant crops to farm crustaceans and fish.

Raised in closed systems that prevent evaporation, such farming can be more water-efficient than crop production.

Micro algae called *Haematococcus* that produce a reddish pigment are also being grown in deserts, sometimes in long thin glass tubes.

The pigment, an antioxidant, is sold as a health product. It reputedly strengthens the immune system, slows skin ageing and alleviates muscle fatigue.

“The pharmaceutical potential of desert plants has yet to be tapped,” says the report.

Desert plants, from countries like China and India, are being exported for herbal treatments and medicines to places like Germany. The report expects this trade will grow.

Meanwhile, scientists are also screening desert plants for promising medicinal compounds. Some, found in the Negev, are known to hold anti-cancer and anti-malarial substances.

Others, from the deserts of Argentina, Arizona and Morocco, are effective against diseases like uterine cancer and infectious diseases. Essential oils from two plants found in the deserts of Morocco appear to enhance the growth and the efficiency of feed conversion in poultry.

Compounds from *Hoodia gordonii*, a dryland plant from the Kalahari Desert, are being marketed as an appetite suppressant.

Notes to Editors

Global Deserts Outlook has been produced by UNEP’s Division of Early Warning and Assessment and is the latest in its series of Global Environment Outlooks <http://www.grid.unep.ch/geo/>

The full Global Deserts Outlook will be available under embargo from 2 June and on 5 June at www.unep.org and www.grida.no.

World Environment Day is celebrated around the world annually on 5 June. This year’s main host city is Algiers, Algeria. Please go to <http://www.unep.org/wed/2006/english/> where there are also other language versions of the site and related materials.

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