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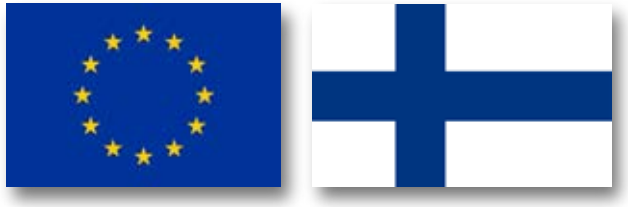
Afghanistan's environment 2008



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Robust data being difficult to obtain in Afghanistan, the State of the Environment report has used data from various sources and in some instances the data do not match.

Cover photo by Safya Saifi

Afghanistan's environment 2008

Contents

Environment and Poverty
by Safya Saifi, Huma Jamshid, Nilab Habiby

From **Kabul's environment in pictures**, Afghanistan's first-ever environmental photo exhibition, December 2006

State of the Environment – Key challenges and opportunities

کابل بی زر باشد و بی برف نه

"Kabul can be without gold but not without snow"
Afghan proverb

This report provides readers with an overview of the key environmental issues, factors and drivers of environmental change in Afghanistan, and highlights the latest achievements and prospects ahead. It is the First State of Environment (SOE) Report for Afghanistan, produced by the National Environmental Protection Agency (NEPA) with assistance from the United Nations Environment Programme (UNEP), in accordance with section 9 (12) of the Environment Law, 2007. It is designed for both a national audience (Government officials, community leaders, and natural resource policy-makers at a central and local level) and the broader international community: donors and international organizations, policy-makers in neighbouring countries, people and institutes interested in Afghanistan. It provides in a consolidated format the best available information and also identifies gaps in data on the state of the environment.

Each chapter of the report gives an overview of the context, importance and use of natural resources, what is known about their current conditions, trends and linkages to regional or global factors. The report also reveals how Afghanistan's natural resources – if managed in an efficient and sustainable manner – could provide the basis for future economic growth and stability.

Environment at stake – what do we know?

Afghanistan's territory has been inhabited for thousands of years and has served as an important communication hub and cultural melting pot. As such it is home to many sites of great cultural importance. It is also the original home of many agricultural products (varieties of cereal, breeds of sheep and goats, and forest products), minerals (gold, copper and semi-precious stones), and other natural resources. Since ancient times Afghanistan's natural resources, including land, water, minerals and forests, have serviced great and small empires, which have clearly had an impact on the shape and state of the country.

Managing livelihoods in the mountainous dry lands of Afghanistan has never been easy. The influence of more than three decades of conflict, compounded by years of drought and mismanagement of important resources, has made it that much harder, and has caused widespread human suffering as well as the devastation of almost all natural resources across the country. As in most countries in the world, environmental degradation affects the poor most. It is closely linked to human health and well-being, and in turn, to economic development. Social inequalities and inefficient use of resources perpetuate a vicious cycle of their degradation and pollution. This contributes to poverty and the erosion of livelihoods that were precarious from the outset. The period ahead offers a crucial opportunity to integrate environmental management into the country's social and economic strategies so that long-term peace, growth and increased prosperity can be secured.

The legacy of conflict that has plagued Afghanistan and its people for nearly 30 years has damaged not only the country's society and institutions, but also its environment. The main impacts are the depletion and overuse of important resources (forests, biodiversity, water), which exacerbates the stressful socio-economic conditions and the impact of natural hazards; reduced access to natural resources; erosion of the rule of law; collapse of traditional governance systems and processes; pollution with toxic rocket fuel, spilled oil and land mines, making essential land and pastures unsafe to use.

Today almost 80 per cent of the country's population (19 million people) live in rural areas. That portion of the population relies heavily on productive natural resources, which makes it extremely vulnerable to the impacts of local and global phenomena (such as droughts, natural disasters, climate change and desertification) and the degradation of natural resources through erosion and pollution of soil and water. The influx of returning refugees, sheer population growth, and the creation of new environmental refugees and internally displaced persons – as a result of droughts, natural disasters, climate change and desertification – could exert additional stress on natural resources.

Afghanistan's fast growing urban centres consume increasing amounts of agricultural goods and energy. Due to over-population in many urban areas and the high concentration of pollution sources such as cars and industries, the residents suffer from severe air pollution, poorly organized collection and disposal of waste, lack of sanitation and access to safe drinking water. There is also a shortage of green open spaces.

The rich mineral resources of Afghanistan (gas, coal, copper, gold, rare metals), currently unexploited, could be the focus of major investment and development once stability and investment conditions improve. However this could


Topograhy
TURKMENISTAN
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DUSHANBE
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KABUL
Kabul
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Srinagar
Chagcheran
Jalalabad
Herat
Hari Rud
Peshawar
ISLAMABAD
Kohat
Rawalpindi
Ghazni
Gardez
Khost
Farah Rud
Helmand
Bannu
Jhelum
Tarin Kowt
Minawai
Gujrat
Sialkot
Karkh Rud
Arghandab
Farah
Delaram
Dera Ismail Khan
Sargodha
Gujranwala
Qalat
Chenab
Chiniot
Kandahar
Faisalabad
Lahore
Zhob
Sistan Lakes
Lashkar Gah
Jhang
Kasur
Zabol
Zaranj
Leiah
Okara
Ravi
Helmand
Sahiwal
Chahar Borjak
Dera Ghazi Khan
Multan
Abohar
Quetta
Sutlej
Ganganagar
Beji
Zahedan
Sibi
Bahawalpur
Pishin Lora
Dalbandin
Khanpur
0 50 100 150 km
0 500 3000 m
Map by UNEP/GRID-Arendal, 2008

also bring adverse environmental and social impacts, if such projects are not designed and implemented within a proper, modern regulatory framework.

Overall the sustainable use and accessibility of natural resources are still key factors for achieving and maintaining social stability and sustainable development in Afghanistan.

There is an acute need for knowledge on the state of the environment: the amount of water available and used in Afghanistan, and shared with neighbouring states; existing biological species and their potential use in medicine, agriculture, recreation and tourism; the proportion of the land base that needs to be irrigated or can be used as rangeland.

An analysis of baseline information reflecting the pre-conflict environmental situation 30–50 years ago, of the post-conflict environmental assessment conducted by the United Nations Environment Programme, and of the most recent data gathered and synthesized for the purpose of Afghanistan's National Development Strategy 2008 (ANDS) reveals the following priority environmental issues needing further policy attention and action:

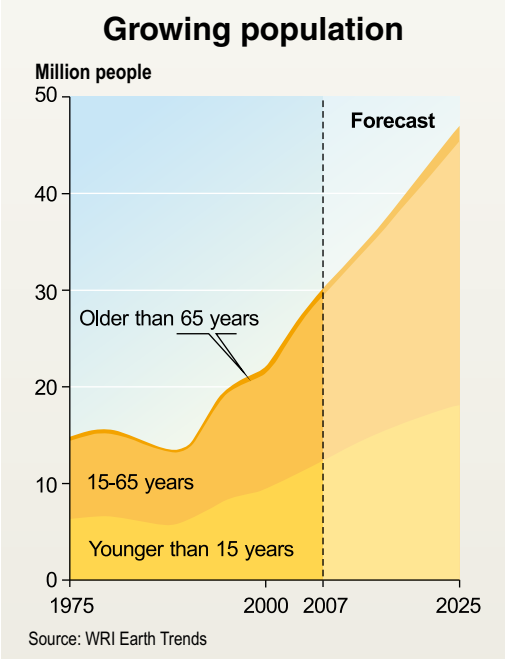
- Water resources
- Rangelands, forests and biodiversity
- Land use, agriculture and soils
- Urban environment
- Natural disasters and climate change

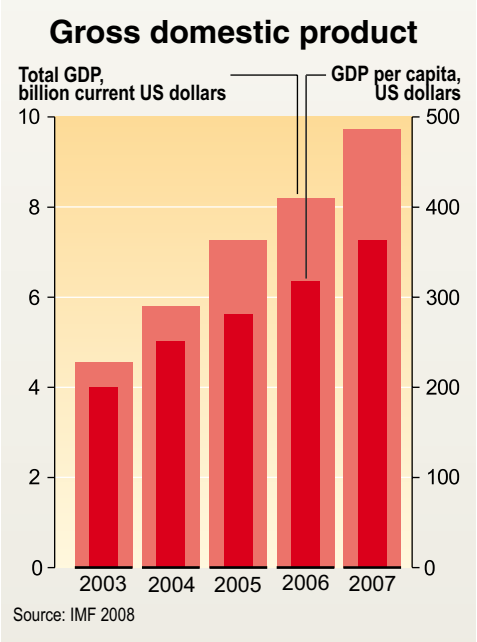
Given the lack of information it is difficult to obtain a clear picture of the current state of the environment in Afghanistan. The lack of systematic observation of rivers, forests, wildlife, lands, climate and atmospheric conditions in the past prevents comparison of present conditions to the situation 5, 10 or even 30 years ago. There is much uncertainty about the sources of environmental pollution, its extent and transfer as well as linkages to public health and diseases. Little is known about the scope of erosion and contamination of land, as well as their economic consequences. Without sufficient data it is difficult to predict major floods, droughts and other natural hazards. Assessments of the quantity and quality of surface and ground water are varied and generally out of date. The need for data collection and exchange is consequently a major priority for effective environmental management.

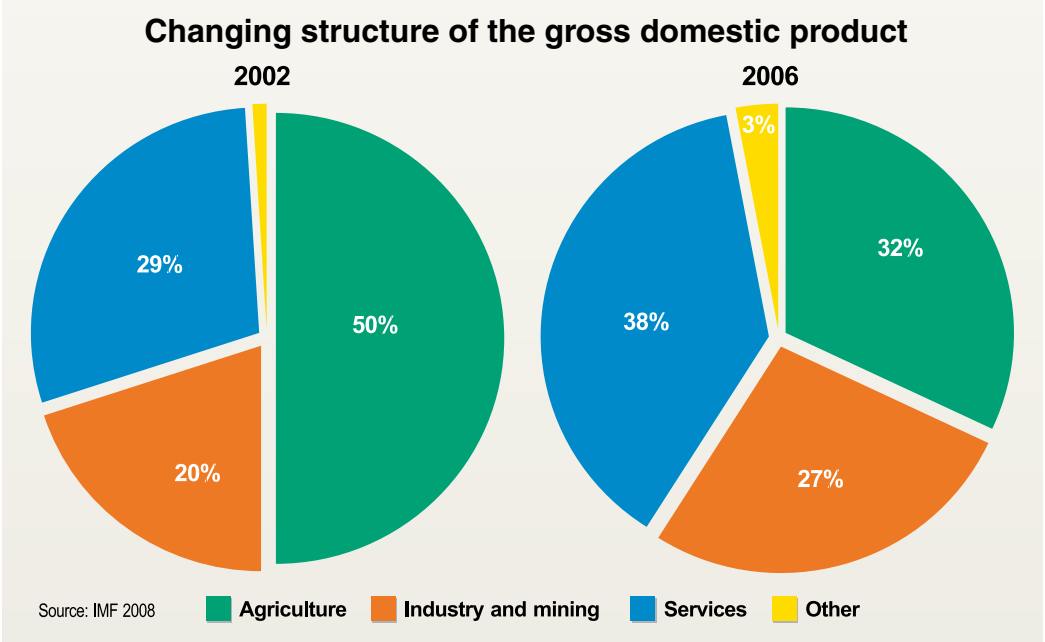
With better knowledge and understanding of environmental conditions, and with careful planning and targeted implementation, it should be possible to overcome current socio-economic and environmental problems, and lay the foundations for a prosperous, peaceful Afghanistan. Putting the country back on a path towards sustainable development will nevertheless be an enormous challenge. Traditional systems for managing natural resources and existing strategies for adaptation and mitigation have been damaged by past and ongoing conflict, population pressure, the collapse of the rural economy, self-centred control by local groups, and the breakdown of law and order. To establish a sustainable development agenda, a community-based approach to natural resources is needed. Otherwise the current trend of environmental degradation may lead the country deeper into poverty and dependence on international aid, pushing the people of Afghanistan further into the abyss of human insecurity, social conflict and misery.

Geography, economy and population

Afghanistan is a semi-arid land-locked country in the centre of Asia, covering an area of about 652 000 square kilometres. It extends about 1 300 kilometres from southwest to northeast, and about 600 kilometres from northwest to southeast. The country's climate is continental, with big differences in temperature from day to night, from one season or region to the next, ranging from 20–45°C in summer in the lowlands to minus 20–40°C in winter in the highlands. Severe, long-lasting droughts, such as the one in 1999–2001, have major impacts on the environment and society. In spring late frost affects agriculture (mainly fruit production), while rising temperatures cause flooding and increase the vulnerability of crops to natural disasters.







The overall average annual rainfall of about 250 millimetres conceals stark variations between different parts of the country, from 1 200 millimetres in the higher altitudes of the northeast to only 60 millimetres in the southwest. Annual evaporation varies from relatively low in the Hindu-Kush Mountains (900–1 200 mm) to high (1 400–1 800 mm) in the hot arid plains of the north and south. Due to its mountainous relief and the convergence of several climate systems, Afghanistan boasts an impressive diversity of ecosystems, land cover and water sources. Geographical features and the distribution of the country's natural resources are reflected in the specialization of economic activities: crop cultivation, livestock grazing, forest products and minerals.

Afghanistan has a wide range of neighbours, with Turkmenistan, Uzbekistan and Tajikistan to the north; China to the northeast; Pakistan to the east and south, and Iran to the west. Relationships with them and the broader global community largely determine the current and future use of national and transboundary natural resources, as well as the effectiveness of any response to common environmental challenges and hazards.

Afghanistan's economic outlook has improved since the fall of the Taliban in 2001. Gross domestic product (GDP) has grown at a rate of 11 per cent since 2002, although in 2006–7, real economic growth was lower, about 7.5 per cent, which is nevertheless high for the region. Growth is largely due to reconstruction efforts supported by development assistance and recovery in the agricultural sector. Agriculture (32%) and services (38%) are the main contributors to Afghanistan's GDP. According to the International Monetary Fund, the opium sector represents about 40–50 per cent of GDP (as an illegal activity it does not register in economic calculations, but it has a significant overall impact on income and purchasing power). There are no large industries in the country but many small and medium enterprises. In particular the number of small shops is increasing.

During the fighting and period of severe drought (1990s–2005) some five million Afghans left the country because of insecurity and constrained livelihoods. Another five million were internally displaced. Most of the refugees were forced to live in Pakistan (3 million) or Iran (1.5 million). After the Interim Government was established, introducing relative stability, these refugees began to return home. More than three million Afghans have now returned, but in 2007 a significant number were still in host countries – Pakistan (two million) and Iran (900 000).

Environmental governance – the way ahead

The past five years have seen several important achievements in the field of environmental governance. The National Environmental Protection Agency (NEPA) was established in 2005 as Afghanistan's environmental policy-making institution, tasked with regulation, coordination, monitoring and enforcement. With technical assistance from the United Nations Environment Programme, Afghanistan's first Environment Law was drafted further to a consultative process and signed by the President in late 2005. It was then reviewed and amended by the (then newly-established) National Assembly, and the final version was promulgated in early 2007 (Official Gazette No. 912, 25 January 2007). In addition, with support from the international community, several projects targeting various aspects of capacity building and environmental assessment, clean-up and restoration have been implemented, and important international environmental conventions and cross-border cooperation agreements signed. In 2008 adoption of the Afghanistan National Development Strategy (ANDS), which among priority issues and sectors lists environmental management and conservation, will be an essential step forward.

Within ANDS, NEPA is expected to play an important role in environmental protection. However its mandate extends further: under the Environment Law it is responsible for fulfilling 18 key functions related to the environment and natural resources. In the years to come NEPA will consequently be one of the central institutions dealing with management of Afghanistan's environment for the benefit of all Afghan people, alongside other sectoral ministries such as the Ministry for Agriculture, Irrigation and Livestock (MAIL), the Ministry of Energy and Water (MEW), and the Afghanistan National Disaster Management Authority (ANDMA).

The new Environment Law of Afghanistan is based on 13 fundamental principles. It consists of nine chapters and 78 articles addressing all the main environmental concerns. For example, chapter 4 addresses the regulatory provisions for pollution control and waste management; chapter 6 focuses on biodiversity, conservation and management of natural resources. Overall, the law defines the functions and powers of NEPA and reflects the role of the agency as the apex body for the formulation, implementation, regulation and monitoring of Afghanistan's environmental policies and also as the coordinator for international environmental cooperation. To promote further integration and coordination of environmental matters with other government agencies, the Environment Law has established Afghanistan's Committee for Environmental Coordination and the National Environmental Advisory Council.

Afghanistan's environmental policies are steadily improving. The National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) and National Adaptation Programme of Action for Climate Change (NAPA) projects, completed in February 2008, provide an excellent overview of Afghanistan's progress towards implementing UNFCCC (Climate Change Convention), UNCBD (Biodiversity Convention), and UNCDD (Desertification Convention), and its overall position in the international environmental arena. The National Environmental Strategy of Afghanistan, developed by NEPA in 2007 as part of the ANDS process, clearly demonstrates the cross-sectoral perspective of environmental management. It also proposes specific activities and considerations to meet national targets for the Millennium Development Goals (MDGs). Assessment of ozone-depleting substances has helped to define the weight of Afghanistan in the global impact on Earth's ozone layer. Very comprehensive work has been carried out to assess Afghanistan's biodiversity, ecological hotspots and conservation potential, while developing recommendations for strengthening the network of protected areas and supporting community-based natural resource management. The new approach to environmental policy is designed to address the cross-sectoral character of the use of natural resources, as well as the underlying causes of environmental degradation.


Water basins
TURKMENISTAN
UZBEKISTAN
TAJIKISTAN
CHINA
AFGHANISTAN
IRAN
PAKISTAN
INDIA
DUSHANBE
KABUL
ISLAMABAD
Turkmenabat
Sharisabz
Karshi
Amu Darya
Shurchi
Qurghonteppa
Kulob
Alichur
Murghab
Pamir
Khorugh
Wakhan
Tejen
Mary
Karakum Canal
Atamyrat
Termiz
Faizabad
Andkhoi
Mazar-e Sharif
Kunduz
Talogan
Hindu Kush
7492 Noshaq
Mashad
Sheberghan
Salid
Balkhab
Kunduz
Pul-e Khumri
Chitral
Gilgit
Maimana
Khulm
Gushgy
Torbat-e Jam
Murgab
Panjshir
Charikar
Asadabad
Mongora
Swat
Indus
Qala-e Nau
Bamiyan
Kunar
Herat
Chagcheran
Band-e Amir Lakes
Jalalabad
Mardan
Srinagar
Hari Rud
Logar
Naghlu Reservoir
Kabul
Peshawar
Farah Rud
Ghazni
Gardez
Kohat
Rawalpindi
Helmand
Khost
Kurram
No drainage
Dasht-e Nawar
Bannu
Jhelum
Adraskand
Tarin Kowt
Minawali
Gujrat
Sialkot
Farah
Khuspasa
Arghandab
Jhelum
Sargodha
Gujranwala
Dera Ismail Khan
Chenab
Chiniot
Delaram
Qalat
Tarnak
Gomal
Faisalabad
Lahore
Kash Rud
Kandahar
Arghastan
Zhob
Jhang
Kasur
Sistan Lakes
Lashkar Gah
Ravi
Zabol
Zaranj
Dori
Leiah
Okara
Sahiwal
Helmand
Chahar Borjak
Quetta
Dera Ghazi Khan
Multan
Abohar
Sutlej
No drainage
Ganganagar
Zahedan
Bahawalpur
Pishin Lora
Sibi
Khanpur
Daibandin
0 50 100 150 km
Flow direction
Source: Afghanistan Information Management Services
Map by UNEP/GRID-Arendal, 2008

Water resources

Mountains are vital "water towers" for Afghanistan and the Central Asian region as a whole. However climate change, the resulting melting of mountain glaciers, severe droughts and poor management of water resources are threatening water security. War-inflicted damage to large and small irrigation systems, and the disruption of water supplies have reduced the accessibility of this essential resource. However rehabilitation projects and river basin management initiatives are being implemented and are addressing the water problems. New legislation is being passed, backed by the appropriate institutions. Cross-border environmental cooperation on water resource management and hydropower is gradually taking shape. Improved access to safe drinking water for the urban and rural population is an important priority.

Key issues

water use in agriculture, sustainable water management, impacts on irrigation and ground water sources, limited access to safe drinking water and sanitation, melting glaciers, drying lakes, and other impacts of climate change

Water is the country's most critical natural resource and key to the health and wellbeing of Afghan people. In Afghanistan, as in the rest of the world, the availability of, access to and quality of water (or its absence) can also be a source of conflict or a driving force for migration. As Afghanistan has an arid climate, water resources are scarce, particularly during drought periods. More than 80 per cent of Afghanistan's water resources originate in the Hindu Kush Mountains at altitudes above 2 000 metres. The mountains operate as a natural storage facility and source of water through the accumulation of snow during winter, snow melt and rainfalls during spring, and release of frozen water from glaciers in summer sustaining the vital flow in rivers. The Amu Darya River basin, which is shared with Tajikistan, Uzbekistan and Turkmenistan, covers approximately 15 per cent of the surface area of Afghanistan and holds more than 55 per cent of country's water resources. The basin has the largest potential for irrigated agriculture and hydropower. In contrast the Helmand River basin, which covers some 45 per cent of Afghanistan, contributes only about 10 per cent of the country's total water resources.

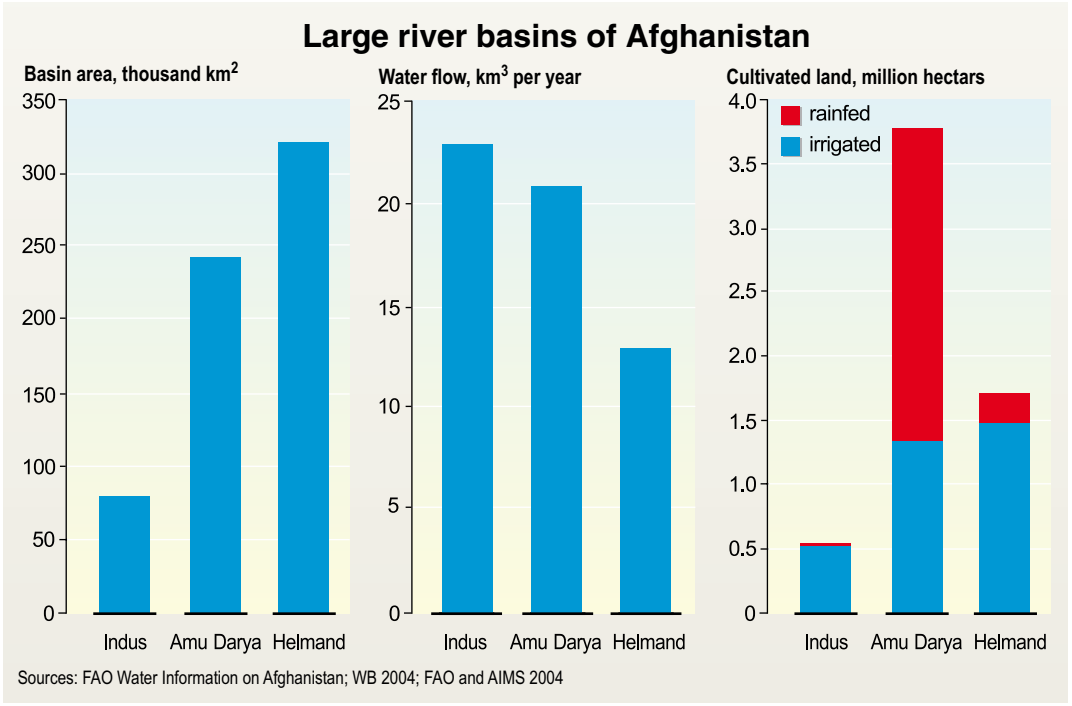
Afghanistan's irrigated land and gardens (3 million hectares) account for the bulk of agricultural produce. An additional 3.5 million hectares are used for non-irrigated production, which is dependent on rainfall. Together they play a major role in the country's economy, with agriculture accounting for more than half of GDP. Similarly more than 80 per cent of the population is engaged in agriculture, including livestock-raising. The country is consequently extremely vulnerable to water shortages.

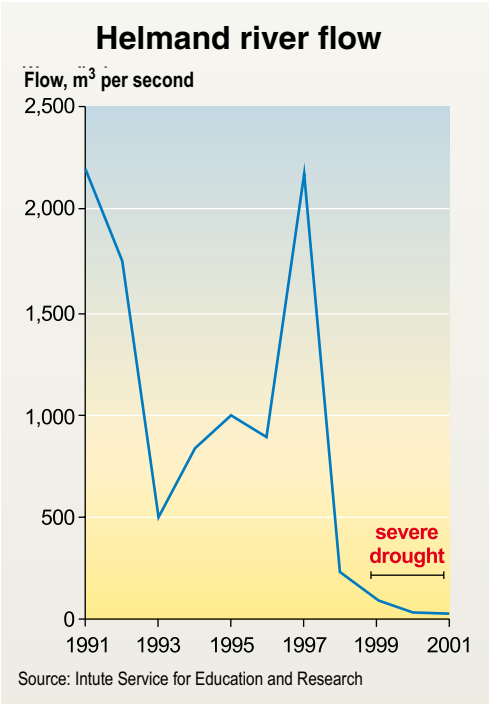
About 20 cubic kilometres is used for irrigation and drinking per year. This includes 85–90 per cent of water taken from surface sources, and 10–15 per cent from below the ground. Agriculture uses almost 99 per cent of the water, primarily from rivers and streams, followed by springs, kareze, shallow and deep aquifers. The use of water is likely to increase in the coming years due to growing demand from agriculture but also from urban centres and industries.

The total irrigated area has fluctuated over the past 30 years. By the mid-1970s, Afghanistan was almost self-sufficient for its food supply. Nearly 3.3 million hectares were cultivated using various methods of irrigation, representing approximately 85 per cent of the country's total crop production. This has dropped to about two million hectares due to unrest and war, droughts, flood damage, aggravated by the failure to operate and maintain irrigation systems at a community and national level. The total area under irrigation is increasing again, but as much as a third of the total available land previously irrigated is not being cultivated due to water shortages. As a result the irrigation infrastructure has seriously deteriorated, and many farmers returning to their land cannot secure a reliable water supply to resume farming. Some provinces that rely heavily on ground water for irrigation – such as Ghazni, Helmand and Uruzgan – are particularly vulnerable, with drought and water shortages impacting directly on livelihoods.

At a larger regional scale, access to water resources in Central Asia, including Afghanistan, can often be both a source of local tension (individual and inter-communal disputes), and a source of friction in inter-state relations (irrigation-hydropower nexus, and the relations between upstream and downstream countries).

A series of recent droughts and increasing air temperatures have reduced the size of glaciers in Afghanistan, posing additional long-term problems due to climate change. In the past 50 years larger glaciers in the Pamir and the Hindu Kush Mountains have already shrunk by 30 per cent, while some smaller ones have vanished altogether. More than 2.5 million people in Afghanistan are already affected by drought or are vulnerable to the impacts of recurrent drought and water shortages. The number may increase further due to global warming and further aridization.





In the last five years a dramatic decline in waterfowl has been observed on the Sistan Lakes, a transboundary water resource shared with Iran. In 2001 a severe drought stopped recharging of these wetlands and dried up the lakes, with predictably negative impacts on their ecology. Kol-e-Hashmat Khan is another degraded wetland near the city of Kabul. A combination of dry conditions and the diversion of water for irrigation and household use dried out this wetland. Urban settlements now occupy a large area of the partly dried-out lake. Drought and excessive extraction of ground water in the vicinity have affected the Ab-e-Estada and Dasht-e-Nawar lakes in Ghazni province.

About 31 per cent of Afghanistan's households currently have access to safe drinking water. Kuchi households have the lowest rate of access (16%), while the rates for rural and urban households are respectively 26 per cent and 64 per cent, on the basis of minimum requirements of 20 litres per day per capita for the rural population and 50 litres per day per capita for the urban population. Access to safe sanitary facilities (improved latrines) is available to only 5-7 per cent of households nationwide. Bacterial contamination of water sources is widespread, increasing morbidity and mortality especially among children.

Water resources in Afghanistan are being polluted due to indiscriminate disposal of untreated industrial and domestic effluents, and the discharge of household and street waste into streams. In some aquifers the concentration of hazardous chemicals exceeds hygienic standards. In Kabul city, which is mostly supplied by ground-water sources (with hand pumps reaching shallow aquifers, and wells for deeper aquifers), water quality varies depending on the location. In some places the quality of ground water is acceptable; in others, the presence of pollutants makes it unsafe for consumption. The use of agrochemicals and the poor storage of pesticides can pollute surface and ground water alike.

Afghanistan's participation in regional and global water partnerships will be soon a prerequisite for the future use of international waters. Afghanistan needs to develop an appropriate information base covering the quantity and quality of its water resources. It must also

Kabul River
by Faridullah Massi

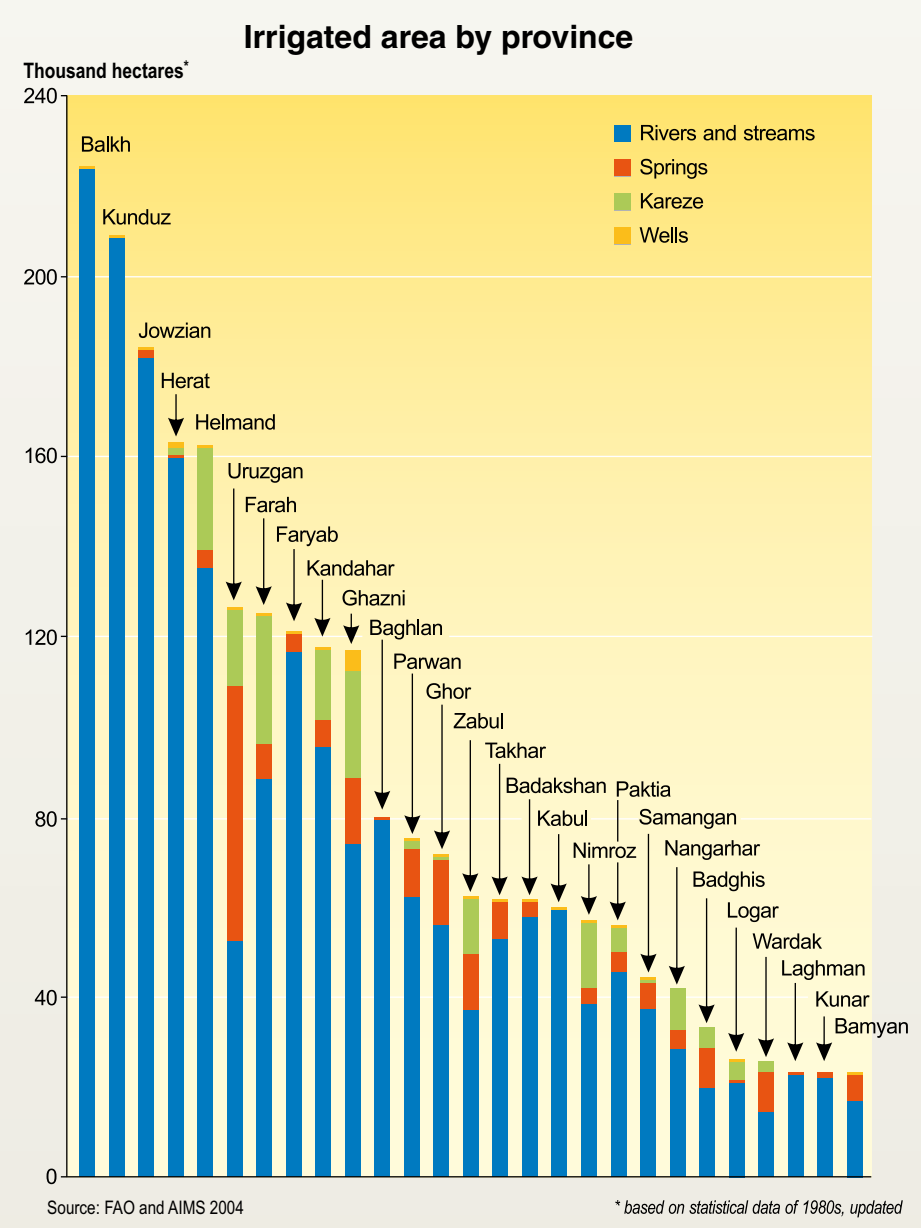
From **Kabul's environment in pictures**, Afghanistan's first-ever environmental photo exhibition, December 2006

carry out a comprehensive assessment of current and future water needs and availability. This could be done in cooperation with neighbours through the exchange of data and expertise, and building of professional and inter-sectoral relations.

Implementation of modern Integrated Water Resources Management (IWRM) principles and the establishment of functional river basin management institutions will help to respond effectively to the needs of users and the environment. Development of national water projects is one of the tasks of the Supreme Council for Water Affairs Management (SCWAM) recently established in Afghanistan. A draft Water Law has been developed and is in the legislative pipeline. At the time of writing, it was awaiting approval by the National Assembly.

Ways forward

- Develop a long-term strategy (in line with IWRM) to manage water resources and reduce vulnerability to drought and other natural disasters. This should also include a plan for securing safe drinking water for the people of Afghanistan. Such planning will be crucial to rebuilding rural communities and improving public health and the economy.
- Integrate pollution control and waste management into national policies addressing the impact of pollution on water resources, and develop corresponding regulatory and other mitigation measures.
- Develop national water quality standards and set up a network for systematic observation.
- Assess the impacts of climate change on Afghanistan's water and other natural resources, and develop adaptation plans.



Rangelands, forests and biodiversity

History shows that environmental degradation is often a contributing factor to the collapse of states and vibrant societies. Rich and healthy ecosystems are fundamental for securing the livelihoods of the majority of Afghanistan's population. Stringent efforts are required to reverse on-going depletion and deterioration of these resources and restore their productivity. This is key to achieving peace, stability and prosperity in Afghanistan.

Key issues

overgrazing, conversion of land, deforestation, unsustainable logging, land degradation, uncontrolled hunting and poaching, impacts of natural disasters, poor spatial planning

Rangelands, forests and biodiversity products are nature's key constituents as well as important sources of food, shelter, energy, income and cultural heritage for the vast majority of the country's population. These natural resources are rightly considered "the wealth of the poor" in Afghanistan because rural people living close to them depend on natural and agricultural ecosystems to provide tangible goods and services: crops, fruit, grazing, timber, hunting, medicine and also erosion control, pollination and water drainage stability. Alpine pastures, cedar forests, unspoilt wilderness and rare animals have huge tourist potential once Afghanistan becomes politically stable and peaceful. To demonstrate the economic value of these natural resources, it is worth noting that three decades ago Karakul fur, wool, cotton, fruit, grapes, raisins, nuts and forest products represented 80 per cent of Afghan exports. Today, more than half a million farmers are involved in horticultural production with a total export value of 127 million US dollars. In comparison opium cultivation has a value of one to three billion US dollars at farm gate prices (50% of GDP) and involves an estimated three million people.

A combination of various driving forces, such as war and lack of control coupled with a series of natural disasters, population growth and increasing demand for natural resources at home and abroad led to significant depletion of resources, leaving them fragmented and reducing productivity. The vast areas of the country contaminated with landmines and depleted forests, especially in the north and east, are the direct results of the war and conflict-related damage to the environment.

At present the rangelands of Afghanistan occupy about 30 million hectares, representing roughly 45 per cent of the country's territory. However large areas which are considered 'barren land' or 'waste land' are also used for grazing, particularly in winter. The total grazeable area is therefore much larger, estimated at 70–85 per cent of the total land area, providing habitat and forage for nearly 35 million livestock as well as numerous wild animals. Indirectly rangelands have significant export potential and generate income for the rural population via livestock subproducts carpets and rugs, wool, and medicinal plants (Ferrula, Bunicum, Rosa, etc). Regrettably the country's many rangelands are in poor condition, with overgrazing a common problem, while competition between farmers for the use of scarce productive rangelands is increasing. In the mountains overgrazing is the main factor in increased soil erosion and forest degradation, hampering forest regeneration. During the last few decades, the number of livestock, in particular sheep and camels, has substantially decreased. But degraded rangelands remain the fact of everyday life. According to farmers' observations, changes in vegetation and its productivity (as well as changes in climatic patterns such as rain, snow and the length of the vegetative season) have forced them to shift grazing from traditional to higher ranges. This in turn increases pressure on the alpine ecosystems, where vast areas of vegetation – formerly highly productive grasslands – have been converted into grazing-resistant cushion shrub lands.

Rangelands are essential for Kuchi pastoralists (estimated to comprise 20% of the rural population) and for a large part of the settled population who derive their income from rearing animals and employment in the livestock industry. Over the last 30 years livestock populations in Afghanistan have fluctuated from between about four million cattle and more than 30 million sheep and goats to the lowest levels recorded in the country's recent history (end of the drought) with 3.7 million cattle and approximately 16 million sheep and goats.

All the remaining forests in Afghanistan serve as important grazing areas. This prevents their regeneration and increases vulnerability. Nowadays, however, illegal logging is the main factor in the decline and disappearance

of forests. If deforestation continues at its present rate, all forest will have disappeared in three decades.

This is a dramatic situation. A few centuries ago deciduous and evergreen forests covered five per cent of Afghanistan's current land area, including one million hectares of oak and two million hectares of pine and cedar growing mostly in the eastern part of the country. Open woodland dominated by pistachios, almonds and junipers occupied a third of the land area. Today most of the original forests have gone. By the middle of the 20th century, the total forest cover of Afghanistan was estimated at 3.1–3.4 million hectares. Forest now occupies less than 1.0–1.3 million hectares (2% of county's total area), with just 0.5 million hectares of forests with 10 per cent crown density, including 0.05 million hectares with 50 per cent crown density. The forest area declined at the rate of three per cent a year from 2000 to 2005 (equal to annual removal and conversion of 30 000 hectares of forestland).

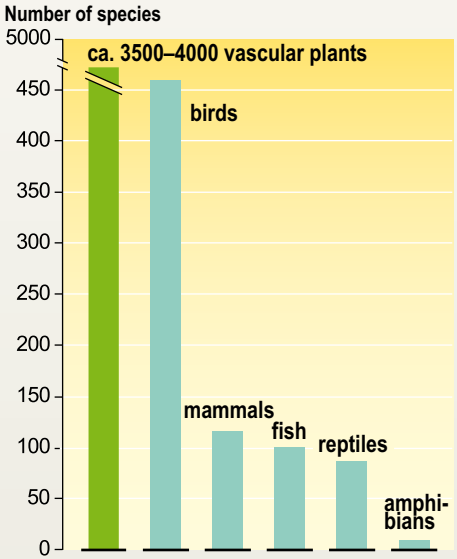
The largest areas of forest are located in the eastern provinces of Nuristan, Kunar and Nangarhar. Remote sensing (satellite image analysis) of these provinces in 1978 and 2002 revealed that forest cover there has been reduced by more than 50 per cent.

Several factors are driving the rapid decline and degradation of forests. One of them is demand for timber for trading in Afghanistan and abroad, especially neighbouring Pakistan. Recently (in 1992–2002, including the Taliban's use of the forest trade as a source of revenue), massive logging and smuggling significantly contributed to forest reduction (50–200 timber truckloads a day or 150 000–500 000 cubic metres of wood annually) in the eastern provinces of Afghanistan. Local communities have lost control over the resources on which they depend for their survival, and forest resources are now largely used for immediate profit by organised crime syndicates and traders. War has also inflicted damage on forest ecosystems. During the 1980s many pistachio trees were uprooted or depleted by Soviet military forces, while intense fighting led to an increase in the risk of forest fires. Other causes of the current deforestation include non-sustainable practices such as tree felling for energy and construction (including increasing urbanization needs); poor forest management; feeble incentives for reforestation; lack of community involvement and awareness; and agricultural and urban encroachments on forest land. The loss of forest cover does not only have environmental impacts, but also leads to economic losses.

In the 1970s Badghis and Takhar provinces of northern Afghanistan were covered with productive pistachio forests and earned substantial revenue from their nuts. These forests almost totally disappeared in just three decades and with them the associated revenue and ecological benefits. It is difficult to calculate the indirect economic losses from the reduction in key forest functions – such as erosion and flood control, soil fertility and biodiversity benefits – but clearly these costs are high. Finally, since the productivity of the country's rangelands and forests is declining, people have been forced to move from rural to urban areas in search of alternative livelihoods, increasing the growth of urbanization.

With increased international military presence and government control in Kunar Province, as well as local infrastructure development and tighter control over timber-smuggling, the rate of deforestation seems to have declined in recent years. But in view of the shortage of impartial information sources and inadequate research, there is no way

Biological diversity



Source: UNEP NEPA National Capacity Self-Assessment 2007

of checking this at present. Nor is it clear whether this promising trend will continue, in view of the economic value of forest products being very high. In some of Afghanistan's northern provinces a very encouraging trend towards in reforestation has also been observed.

Much as for the rangelands and forests, a great deal of Afghanistan's wildlife heritage is under threat. Flamingos have not bred successfully in Afghanistan for about eight years; Siberian cranes have not been observed for 20 years. Several mammalian species – such as the Caspian tiger (Panthera tigris virgata) or cheetah (Acinonyx jubatus ventucus) – are on the verge of global extinction and have not been seen in Afghanistan for decades. Others – such as markhor (Capra falconeri) – are considered endemic and live only in Afghanistan and adjacent territories. The important feature of biodiversity is its high dynamism, and cross-border and seasonal migration, which helps to maintain animal populations in adequate numbers.

The Wakhan Corridor is one of the few intact high mountain ecosystems, home to populations of endangered snow leopards and other mammals, including Marco Polo sheep. However hunting is occurring in many regions of the country, either for sport or food, or to supply fur for sale to foreigners in Kabul. The legal status of protected areas is currently in question, pending approval of protected areas regulations under the Environment Law. Even though the protected areas regulations and management plans are currently under development, effective field-level management to protect and conserve their ecological integrity and wildlife is limited, pending finalization of the plans and regulations (with the notable exception of the proposed Band-e Amir national park). Against this background, the proactive efforts of NEPA and the Ministry of Agriculture, Irrigation and Livestock (MAIL) to collaborate with neighbouring states to promote conservation of cross-border ecosystems are gaining momentum. In particular there is an on-going initiative to establish a transboundary protected area in the Wakhan Corridor in the Pamir-Karakorum mountains (meeting point of Afghanistan, Tajikistan, Pakistan and China), linking prospective protected areas of Afghanistan with corresponding areas in neighbouring countries. The Government of Afghanistan intends to nominate Bande-Amir, in the centre of Afghanistan – comprising six azure lakes and travertine dams – for World Heritage Site status. Dasht-e Nawar and Ab-e Estada are important potential protected areas, especially as habitats and staging posts for waterfowl and migratory birds. However, due to their location and the associated security concerns, access to the sites is limited which has in turn delayed the implementation of any effective management regimes. As Afghanistan's wildlife and biodiversity could be a critical component for future tourist revenue, care should be taken to protect these resources before the opportunity is lost forever. The impacts of economic activities, such as expansion of roads and energy networks, on ecosystem fragmentation should definitely be considered in future development plans. At present Afghanistan has a relatively low fragmentation rate (0.05) compared with many others (Germany 2.0, Norway 0.3, Tajikistan 0.2). The higher this indicator, the more fragmented a country's ecosystems are, and consequently the greater the stress on wildlife and migrating animals.

Mention should also be made of Afghanistan's globally significant genetic resources. Almost 5 000 years ago common, or bread, wheat (Triticum aestivum) was first cultivated on the territory of contemporary Afghanistan. Moreover, experts believe that Afghanistan harbours more native varieties of wheat than anywhere else in the world. Unfortunately many varieties of cultivated species were lost during the period of conflict and the seed collections of many wild ancestors, that might have been resistant to pests and drought extremes, were destroyed.

The impacts of pollution on biodiversity in Afghanistan are spatially fragmented and very limited, with the exception of use and poor storage of pesticides such as DDT and benzene hexachloride – persistent organic pollutants – especially for locust control in the northern agricultural regions of the country. These chemicals were used intensively for several decades and may have accumulated in the ecosystem with possible impacts on biodiversity, water resources and the food chain. Further assessment is required to fill data gaps.

Ways forward

- Develop a scientific inventory of flora and fauna.
- Develop the National Protected Areas System envisioned in the Protected Areas Regulations.
- Develop adequate legal instruments such as laws, regulations, policies and procedures to regulate and address the problems of biodiversity conservation.
- Pilot and implement community-based natural resource management approaches to rangelands and forests.
- Reduce illegal logging, especially large-scale and transboundary activities, by enforcing the timber moratorium issued by the central Government.
- Conduct reforestation and tree planting activities, especially in areas where communities are using forest, range and other biological resources sustainably.

The Desert Blooms – Irrigation and Agriculture
by Mohammed Shafiq Popal, Wali Ahmadzai

From **Kabul's environment in pictures**, Afghanistan's first-ever environmental photo exhibition, December 2006

Land use, agriculture and soils

Due to its socio-economic and geographical circumstances, Afghanistan has been severely affected by land degradation for decades. This in turn is a contributing factor to increased ecological migration and further stress on the ecosystem. Broad indicators show that the cost of desertification to Afghanistan is colossal and constantly increasing. Soil fertility is being degraded by poor agricultural practices; grazing patterns have changed as conflict, land claims and drought have affected traditional grazing patterns; and irrigation systems are being affected by silting and flooding. As in other developing countries, there are many direct and underlying reasons for land degradation, complicated by inadequate national policy, infrastructure, resources, and governance, as well as the sense of insecurity that characterizes periods of war and conflict.

Key issues

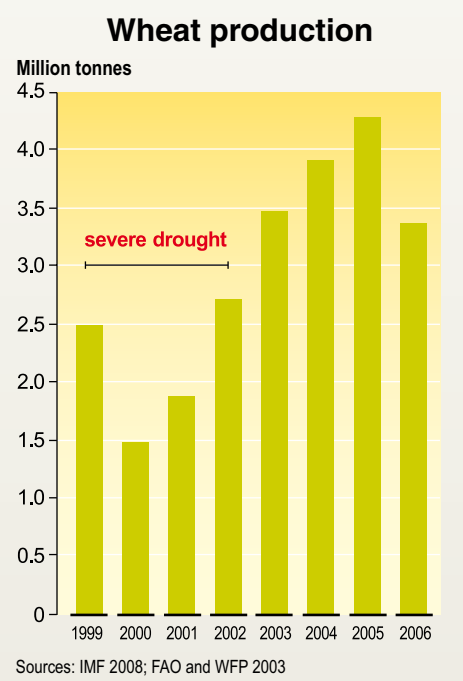
desertification, use of agrochemicals, overgrazing, population growth, rising pressure on land resources, landmines and constrained access to the lands

The agricultural sector of Afghanistan has been and will remain a critical component of economic growth and human development. Hence, sustaining livelihoods in Afghanistan is primarily governed by appropriate environmentally sound management of land resources. However, with its current status and yield capacities, the agricultural sector has now become somewhat inefficient, and poses increasing pressure on natural resources.

Unfortunately, land mines and unexploded ordnance (UXO) still litter vast areas of the country, making some agricultural land unsafe for public use. Landmines kill or maim an estimated 10 to 12 people every day in Afghanistan. At one point the area contaminated by landmines in Afghanistan covered almost 780 square kilometres (making Afghanistan one of the most heavily mined countries in the world). So far more than 400 000 landmines have been destroyed, but a significant portion of the contaminated land has yet to be cleared (on average, 15–30 sq km of land is cleared annually).

In the light of the rising population and the possibility of severe droughts, impacting on the nation's agricultural productivity, land is of paramount importance. Against this background, barren land (deserts, cliffs, etc.) occupies a third of the total land area, whereas the amount of agricultural land under cultivation and pasture has dropped in the last two or three decades either through abandonment (due to lack of water availability and damage to irrigation systems) or degradation (due to soil erosion, salinization, reduced soil fertility). Arable land per capita stood at 0.55 hectares in 1980, and only 0.25 hectares in 2007. The succession of dry years in 1999–2004 and the severe drought of 1999-2001 substantially reduced the cultivated area and also put great pressure on grazing land and the Kuchi nomadic people. The shortcomings of agriculture resulted in mass migration of population to urban centres.

Agricultural production in Afghanistan is limited by very high dependence on water from melting snow and ice and rainfall. As a result, crop harvests vary dramatically from year to year depending on the weather. Even in good years however, Afghanistan is not agriculturally self-sufficient and must rely on food aid.




Land cover
TURKMENISTAN
UZBEKISTAN
TAJIKISTAN
CHINA
AFGHANISTAN
PAKISTAN
IRAN
INDIA
Turkmenabat
Sharisabz
Karshi
DUSHANBE
Amu Darya
Shurchi
Vakhsh
Kulob
Qurghonteppa
Pamir
Alichur
Murghob
Mary
Atamyrat
Karakum Canal
Tejen
Termiz
Khorugh
Pani
Wakhan
Andkhoi
Faizabad
Kokcha
Hindukush
7492
Noshaq
Mashad
Sheberghan
Mazar-e Sharif
Kunduz
Taloqan
Tejen
Murgab
Balkhab
Surkhab
Pul-e Khumri
Chitral
Gilgit
Maimana
Gushgy
Torbat-e Jam
Charikar
Asadabad
Mongora
Swat
Indus
Qala-e Nau
Bamiyan
Herat
Chagcheran
Hari Rud
KABUL
Jalalabad
Kabul
Mardan
Srinagar
Peshawar
ISLAMABAD
Kohat
Rawalpindi
Gardez
Ghazni
Farah Rud
Helmand
Khost
Bannu
Jhelum
Kash Rud
Minawali
Gujrat
Sialkot
Tarin Kowt
Arghandab
Farah
Delaram
Sargodha
Gujranwala
Dera Ismail Khan
Chenab
Chiniot
Qalat
Faisalabad
Lahore
Kandahar
Zhob
Jhang
Kasur
Sistan Lakes
Lashkar Gah
Zabol
Zaranj
Ravi
Leiah
Okara
Sahiwal
Chahar Borjak
Helmand
Quetta
Dera Ghazi Khan
Multan
Abohar
Sutlej
Ganganagar
Zahedan
Beji
Sibi
Bahawalpur
Pishin Lora
Dalbandin
Khanpur
Indus
0 50 100 150 km
MAP BY UNEP/GRID-ARENDAL, 2008
Source: Afghanistan Information Management Services
Rangeland
Rainfed croplands
Irrigated cropland and gardens
Forest
Fruit trees
Sand dunes
Vineyards
Marshland
Forest depletion

Photo by Viktor Novikov

According to the global assessment of soil degradation (GLASOD) about 16 per cent of Afghanistan's land area is severely affected due to anthropogenic activities, whereas the country's vulnerability to desertification is one of the highest in the world (3/4 of Afghanistan is vulnerable to desertification). Less than one per cent of the land lies within protected areas – none of which cover the dwindling conifer forests. The geological, topographic and climatic features of Afghanistan naturally increase the country's susceptibility to the processes of soil erosion, however human activities sometimes significantly exacerbate them through farming of steep slopes, deforestation and de-vegetation of lands, and unsustainable use of scrub and grasslands. Some degradation is so severe that recovery is impossible without human intervention. One of the most threatening impacts arising from loss of soil and vegetation is desertification and increased floods.

As land degradation encompasses several components of the ecosystem, measures to address this problem should be holistic and integrated. While an attempt is made to establish a basic land and natural resource policy and regulatory framework in Afghanistan, these efforts will need to be expanded horizontally to include a much wider range of stakeholders at the national level and vertically to engage more fully provincial and local governments directly involved in natural resource management, as well as the communities themselves. It is also important that addressing the issue of land degradation should be mainstreamed into the framework of agricultural and rural development strategies.

Ways forward

- Prepare national action plan and strategy to address the problem of desertification and land degradation, and mainstreaming of sustainable land management.
- Establish an information system for quantitative assessment, mapping and monitoring the extent of land degradation and its effect on the ecosystem.
- Proceed with the rehabilitation of land, as well as awareness-raising and capacity-building.

Urban environment

Afghanistan is one of the most rapidly urbanizing countries in the region and it will be necessary to rethink urban planning and development. More people in the cities means more pressure on waste management, energy systems and use, sanitation, housing and infrastructure. The health of urban residents and a safe urban environment are top priorities.

Key issues

rapid urban growth, waste management, underdeveloped service infrastructure and reconstruction opportunities, access to sanitation and safe drinking water, air pollution and health concerns

The urban centres of Afghanistan are some of the oldest in Central Asia. Balkh in northern Afghanistan, also known as Bactra in the past, was once a major world city established more than 3 500 years ago; Kabul – the capital and largest city of Afghanistan, with a population of about three million people is an economic and cultural centre, with 3 000 years of history; Alexander the Great founded Kandahar – the second largest city in Afghanistan and an important trading centre, with population of 450 000 people.

Large cities and smaller towns are home to 20–30 per cent of the country's population and experiencing major population growth and a development boom. For example, the population of Kabul has increased six-fold in the last 40 years.

Due to the lack of basic necessities, security and food, and also ongoing conflict, there is a continuous trend of rural to urban migration in addition to settlement in or around urban areas by returning refugees. In 2005 UNHCR registered about 85 000 such migrants in the Kabul area alone. This has led to a rapid increase in the urban population causing a range of problems such as a lack of facilities, water and energy. Population data from 1986-2006 shows a 38 per cent overall population increase nationwide, whereas urban and rural populations increased by 65 and 36 per cent respectively. According to UN-Habitat, Afghanistan is one of the most rapidly urbanizing countries in the region; demographic forecasts suggest that the urban population of Afghanistan could increase by five million by 2015.

In the urban environment, human health is threatened by poor waste management, lack of sanitation and safe drinking water, and air pollution. There are no proper landfills in many cities, and none of the dumpsites is designed to prevent ground water contamination or toxic air pollution from burning waste. People are forced to live under very constrained environmental conditions. The dumpsites of several large urban centres – such as Kandahar and Herat – are located in areas prone to natural disasters, places where rainfall or flash flooding could easily wash out the contents of urban waste into the open environment and pollute rivers. Kabul's dumpsite is poorly isolated from ground water, which poses significant risks for contamination of vital aquifers.

At present the health status in the country is perhaps the poorest in the world. On the basis of data collated by Earth Trend (2003), the infant mortality rate for 2000 is 161, compared with 52 for the Middle East and North Africa, and 55 for the whole world. Similarly, the 'under-five mortality' rate for 2000 is one of the highest in the world: 257, compared with 64 for the Middle East and North Africa, and 83 for the whole world. As a result, the 'life expectancy at birth' for 2005 was estimated at 43.5 years for females and 43 for males, well below the global average of 67.3. In 2002 the Central Statistics Office and World Bank estimated average life expectancy at 44.5 years.

Rapid urban population growth is mainly due to the influx of Afghan refugees who fled the country during the conflicts of the last few decades. In addition a mass exodus of internally displaced persons is occurring, driven from rural to urban areas by food and other security problems. Preferred destinations are the big cities particularly Kabul, where there is greater opportunity. Another security issue in rural areas concerns large stretches of land infested with land-mined fields, which also deters returning refugees from settling in rural areas. High-density unplanned and informal settlements place huge demands on fragile basic urban services, such as the energy supply, while aggravating urban air pollution.

For example, the present ground water resources feeding the Kabul water supply can only cope with increased demand until 2012, on the assumption of consumption of only 40 litres per capita per day. As no reliable alternative ground water resources have been identified, the focus should move to surface water as the new water supply resource for Kabul. A study is urgently needed, followed by decisions on alternative surface water resources to secure a proper water supply beyond 2012. It may take five years just to design and implement such a project.

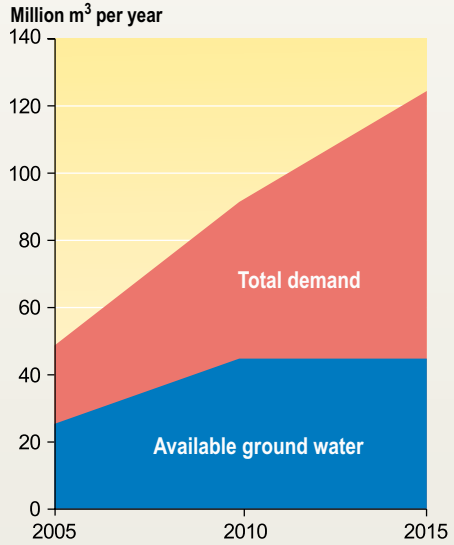
In addition, the levels of air pollution are particularly high in several urban centres of Afghanistan. A comprehensive study of Kabul air quality was carried out in 2005–6. It revealed that 60 per cent of the population is exposed to elevated concentrations of particulate matter PM10 (fine anthropogenic dust), nitrous oxides (NO_x) and sulphur dioxide (SO_2). This causes an estimated excess in annual mortality of 2 000 people, increased respiratory

Air Pollution
by Najibullah Musafer, Gulbuddin Elham, Hameed Auoby

From **Kabul's environment in pictures**, Afghanistan's first-ever environmental photo exhibition, December 2006

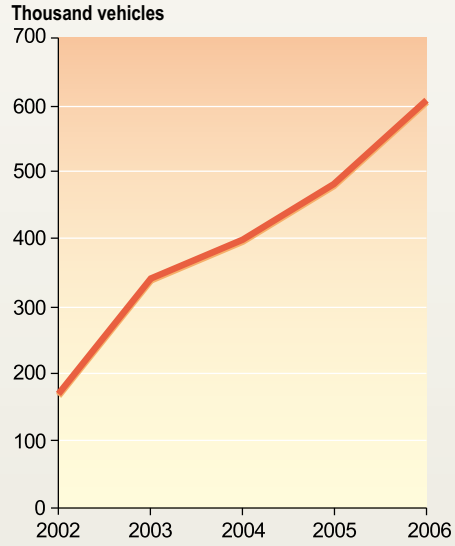
Kabul city water supply

Current and projected availability and demand



Source: Ministry of Water and Power 2007

Surge in road traffic



Source: IMF 2008

Photo by Viktor Novikov

diseases and asthma. Although a majority of the public agreed that Kabul air quality was poor and unacceptable (89%), only 30 per cent felt that they were very much affected by air pollution in the city. The main contributing factors are continued use of old and poorly maintained vehicles; poor quality fuel; roads in bad repair with limited capacity; and rapidly increasing vehicle numbers. In winter, a blanket of dust and pollutants covers Kabul at night and in the morning due to a phenomenon called "atmospheric inversion", which traps the pollutants over the city. Air pollution is also quite high in spring and summer when the air is dry and dusty, triggering a rise in asthma attacks.

Overall, urban air quality monitoring in Afghanistan is in its early stages. It is only recently that urban environmental issues including ambient air pollution have attracted attention from both government and the public. An inventory of air emissions in Kabul and a report on Afghanistan's greenhouse gas inventory were produced in 2007. These reports contain a description of methods, a comprehensive dataset and initial recommendations.

It is important to mention that any attempt at dealing with urban environmental management in general and air pollution in particular requires close coordination amongst and collaboration between many ministries and key players.

It will be the first time in more than 30 years that contemporary urban environmental problems such as air quality or waste management receive any attention. The country is still only beginning to establish its capacity to manage the urban environment. In this respect several on-going initiatives deserve attention: in December 2007 the Government of Afghanistan announced that residential homes located on the hills around Kabul would be demolished so that trees and other plants could grow there. This plan will make the city greener. All city roads will be paved to alleviate the transportation problems and urban spatial planning optimized. Kandahar's residents are gaining improved access to safe drinking water and electricity, and its new residential quarters will be equipped with water and sewer systems.

Ways forward

- Increase the use of cleaner fuels.
- Strengthen methods and tools for integrated control of air pollution.
- Promote strategic urban planning with the focus on energy, housing, waste management, sanitation, greenery.
- Establish environmental information and monitoring systems for the major urban areas.

Natural disasters and climate change

According to the Afghanistan Information Management Service, the country's "high level of poverty, lack of livelihood and income generating opportunities, chronic health problems and poor state of infrastructure, all add to the burden of natural disasters on the people of Afghanistan". Every year natural disasters damage the economy, hamper reconstruction and development, and claim human lives. But many impacts could be reduced or even avoided through effective environmental management, conservation, and early warning.

Key issues

extreme weather events, climate change, poverty and vulnerability, manmade risks, adaptation

In a country where more than 80 per cent of the population relies directly on the natural resource base to meet its daily needs, widespread environmental degradation poses an immense threat to livelihoods. More than two decades of conflict, military activities, refugee movements, collapse of national, provincial and local government, lack of management and institutional capacity, and over-exploitation have severely damaged Afghanistan's natural resource base. Poor residents are more vulnerable to these environmental challenges, having no option but to cope and recover from this severe legacy.

Poverty and social and economic pressures, such as migration, unemployment and land tenure practices have made Afghans more vulnerable by forcing them to live in disaster-prone locations, often on unsafe land and in unsafe shelters or low-cost dwellings, there being no other land available. Since the country is located in a zone of high-seismic activity, earthquakes are common. In 1998 alone they claimed more than 9,000 lives. Flooding and mudslides are real dangers in the mountains and valleys, particularly in spring and summer when snow starts melting or glacier lakes suddenly burst causing destructive flash floods. Prolonged drought and dust storms can also wreak extensive damage, with nationwide impacts. Severe drought may result in up to 10,000 casualties per year. Extreme winter conditions bring high losses in agriculture and infrastructure. These factors add to the burden of environmental degradation and place stress on ecosystems.

Uncoordinated management of water resources and irrigation schemes during droughts could cause inter-communal and even inter-state disputes. Drought and mismanagement of ground water have caused the water table to drop almost all over the country, including the capital – Kabul city. In January–February 2008, parts of Afghanistan were facing their harshest winter in 25–50 years, and more than 1 200 people died, according to Afghanistan's National Disaster Management Authority (ANDMA).

Destruction of natural resources and/or rapid urban growth, in particular when accompanied by the influx of poor migrants from rural areas, are the main factors aggravating vulnerability to hazards in many parts of the world, and the same applies to Afghanistan. The accelerated, and often uncontrolled, growth of cities has contributed to the ecological transformation of their immediate surroundings.

It is essential to mention global climate change and its impact on the environment. Ecosystem services, soil water content, and conditions and rangelands are most affected by climatic hazards and changes. The effects on food crops and livestock are similarly high. Irrigated agriculture, livestock herders and dry land farmers are considered the most susceptible to the impacts of weather hazards and climatic changes. Climate change might worsen Afghanistan's predicament and it is crucial to make plans to adapt to these changes and also reduce greenhouse gas emissions in the country. Under Afghanistan's National Adaptation Plan of Action for Climate Change (NAPA) project, it was decided that the priority for facilitating adaptation to climate change was improved water management and efficiency of use, and land and water management at the watershed level. Other priorities include agro-meteorological observations, horticulture and agro-forestry, adaptive rangeland management, and terracing and erosion control.

Ways forward

- Strengthen public awareness to reduce vulnerability.
- Stimulate inter-disciplinary public-private partnership on risk reduction.
- Initiate capacity-building programmes to address local and national needs on integrated disaster risk management: risk assessment, early warning, training and public awareness, emergency response management, recovery resources, including the strengthening of community-based organizations.
- Implement climate change adaptation projects.

Energy and mineral resources

The management of Afghanistan's rich underground resources and energy wealth, tapping hydropower potential and expanding natural gas production and exportation could provide a major impulse for the country's industrial development. At the same time, Afghanistan now has a unique opportunity to adopt state-of-the-art practices in cleaner production and environmental protection in order to avoid potential negative environmental impacts from resource development.

Key issues

energy potential, the prospects for the use of renewable energies, energy balance and its environmental implications, greenhouse gas emissions, minerals deposits and sound environmental mining practices

Almost all of the country's known oil and natural gas reserves are in the northern part of the country, located in parts of two geologic basins – gas in the Amu Darya Basin to the west, and oil in the Afghan-Tajik Basin to the east. Oil reserves are estimated at 15 million tonnes. The current rate of domestic oil production is only 400 barrels a day (mostly the Angot oil field in Sar-i-Pol).

Natural gas holds the potential (proven reserves range from 30 to 400 billion m3) to become a significant source of energy for the country and an important source of Government revenue. It suffers from a lack of investment. Consumption and production of gas has been declining from the 1990s because of deteriorating infrastructure. Additionally about 30 per cent of gas is lost during production and transmission.

Afghanistan has reasonably good quality coal reserves (estimated at 400 million tonnes), most of which are located in the northern part of the country in the region between Herat and Badakshan. The coal industry is operating at low production rates, less than 100 000 tonnes a year due to devastation from war and years of neglect. The country's main coal mines are in the Karkar and Ispushta districts. Dara-i-Suf appears to have the greatest potential with coal reserves of 84 million tonnes.

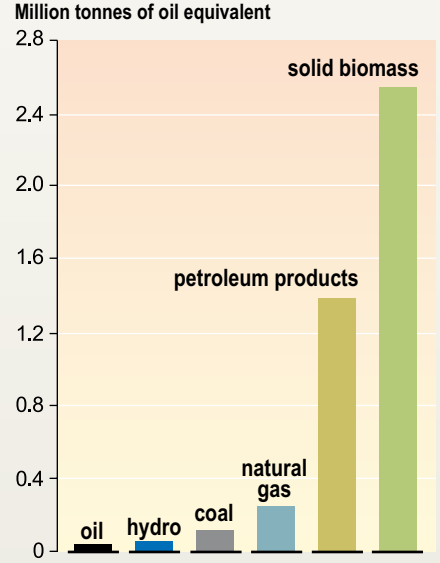
Hydropower, solar, wind and biomass have considerable potential for contributing to the energy supply. Afghanistan could develop about 23 000 MW of additional hydro-generating capacity, with 18 000 MW located on the Panj and Amu Darya Rivers that form the border with Tajikistan and Uzbekistan. Tapping this huge potential would require further substantial work with the neighbouring countries, where environmental cooperation, joint water resource assessment and monitoring could play a major role. The remaining potential is primarily in two areas, about 1 800 MW on the Kokcha (sub-basin within Amu Darya) and 3 200 MW in the Kabul river basin. The nation's total generating capacity supplying the networks in the early 1990s amounted to 400 MW (including 260 MW hydro); this has declined to 250 MW. After hydropower, solar energy probably has the greatest potential as a renewable energy source, although development costs remain a major barrier. Estimates indicate that in Afghanistan solar radiation averages 6.5 kWh per square meter per day and the skies are sunny about 300 days a year. Consequently, the potential for solar energy is high, especially for solar water heaters. For example standard home modules could provide 140–180 litres of hot-water a day at temperature of 60–75°C. Herat is a city known for its 120 days of very high wind. In fact the windy days here are regular and provide good potential for wind power generation. Wind pumps have already been successfully installed in selected villages where access to water was problematic. Biogas is another alternative and could be used in several agricultural areas. Finally, geothermal sources in the mountains of Afghanistan could be used for energy co-generation.

At present the majority (70–75%) of Afghanistan's energy needs is met by traditional energy sources such as animal dung, fuel wood and crop residues. Annual biomass energy use in Afghanistan is equivalent to 2.5 million tonnes of oil. The remaining requirements are met by commercial energy sources mainly petroleum products, but also natural gas, coal and hydropower.

Fuel wood constitutes the basic source of energy for cooking and heating in rural areas, and for decades it has been available in unrestricted quantities. In recent years, a commercial market for it has also developed in rapidly expanding urban areas. But natural regeneration has not been able to sustain forests due to indiscriminate cutting of trees for fuel, thus creating serious environmental risks. In the areas of Jalalabad, Laghman, Kabul and Herat, firewood scarcity is already acute. However the urban centres consume a great deal of energy, mostly supplied by the country's provinces still rich in biomass resources. Such energy demand and consumption patterns affect the environment in both the immediate vicinity of population centres and far away. It also poses health hazards due to high rates of emissions of particulate matter and other pollutants.

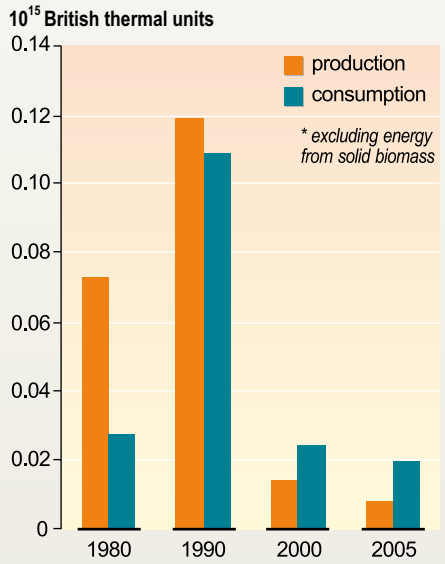
Deforestation not only contributes to the changes in the hydrological properties of soils, drainage of river basins and microclimate; it also has connections to the global climate change. The initial greenhouse gas (GHG) inventory of Afghanistan shows that deforestation plays a very significant role in the country's total greenhouse gas

Energy production and import



Source: ADB and NEPA 2007

Primary energy



Sources: Ministry of Water and Power 2007 and US EIA

emissions compared to fossil fuel combustion (gasoline, coal, etc.). At the same time, soils and remaining forests absorb large amounts of carbon dioxide annually, thereby compensating GHG emissions. The current balance between emissions and removals of carbon dioxide in land use and forestry sector is fragile, but positive. Therefore further efforts should be given to maintaining this balance and other forms of climate change mitigation.

Almost all petroleum products such as diesel, gasoline, and jet fuel are imported, mainly from Pakistan and Uzbekistan. Annually Afghanistan consumes 1.2–1.4 million tonnes of petroleum products; 80 per cent of this amount is used for road transportation and 20 per cent for power auto-production (gasoline mainly) or small-scale grid power generation (diesel mainly), and water pumps. The petrol imported to Afghanistan does not conform to the international standard for lead content and some imports are adulterated with locally produced and processed crude oil. With diesel, the sulphur content can be five times the European norms. Demand for liquid fuels in Afghanistan has increased dramatically in the past five years; with continued and increased reliance on diesel generation, air and road traffic and home use, this demand is expected to increase. Production and combustion of fossil fuels in Afghanistan emits three to five million tonnes of carbon dioxide annually.

Due to a complex geological history, parts of Afghanistan's territory have been blessed with a large variety of precious and semi-precious stones as well as common (copper, lead), rare-earth (lithium) and precious (gold, silver) metals. Afghanistan is well placed to mine and export these commodities. As economic and security conditions improve, Afghanistan will be in a better position to develop its minerals. The annual value of its mineral production could increase fivefold compared to the current 50 million US dollars.

Some of the earliest records of mining anywhere in the world are from Afghanistan, dating back more than 6 000 years. The provinces of Badakhshan and Takhar are prospective for gold mining with a number of deposits with 46.7 gram silver and 4.1 gram gold per tonne of ore. Afghanistan is also the world's leading producer of lapis-lazuli from the Sary-Sang mine in Badakhshan. Emerald production from the deposits of the Panshjer valley is also significant and the stones are said to be of world-class quality.

In 2007, the Government of Afghanistan granted the state-owned China Metallurgical Group the right to develop the country's largest Aynak copper field, 30 kilometres south of Kabul. This field has been the focus of copper working since ancient times. The Aynak contains 240 million tonnes, grading 2.3 per cent copper, making it one of the largest in the region and possibly in the world. The mining company has undertaken to follow the environmental rules and procedures stipulated by Afghanistan's Environment Law and the Environmental Impact Assessment Regulations, which process will be monitored by NEPA.

Ways forward

- Analyse the environmental costs of meeting current and future demand for energy and mineral resources.
- Initiate demonstration and research projects on small renewable energies, bio-fuels, and scope for switching to gas.
- Explore the country's hydropower potential to improve access to electricity and the security of energy supply.
- Expand reforestation and afforestation projects aimed at the efficient and rational use of biomass as an energy source.
- Promote the incorporation of best international practices of environmental responsibility into extractive industries' operations, and the development of corresponding legislation.
- Develop expertise for NEPA staff in assessing environmental impacts of mining operations, licensing, enforcing environmental safety and remediation.

Conclusions

Afghanistan, with its rich natural resources, will gain substantially from mainstreaming environmental protection into the reconstruction agenda and the national budget. This will help the country to meet the basic prerequisites for sustainable development. If the current environmental problems in Afghanistan are not fully addressed, they will have dramatic impacts on the people and the economy. In Afghanistan, as in many developing countries, environmental degradation and sustainable development are inextricably linked to livelihoods, poverty reduction and human health. In other words, for the people of Afghanistan conservation and sustainable use of natural resources holds the key to their quality of life, and in many cases, to life over death.

Environmental management in Afghanistan has come a long way during the last 5 years. With the establishment of NEPA and the promulgation of Afghanistan's first Environment Law in 2005, the country took two major steps towards sustainable development and the integration of environmental issues into development strategies. But much more needs to be done to secure a safe and productive environment for our people and the generations to come.

This report points out several areas of immediate concern, including water resources, rangelands, forests and biodiversity, land use, agriculture and soils, urban environment, natural disasters and climate change.

Water is one of Afghanistan's most important resources, its unequal distribution could lead to severe water scarcity in some regions, threatening human livelihoods, creating environmental refugees, compounding adverse humanitarian conditions and increasing regional tensions. If an unsustainable use of water resources continues it could also threaten agricultural production and food security, as well as wetland ecology and biodiversity.

Continued deforestation combined with livestock grazing and water scarcity will further lead to increased soil erosion and loss of productive land, desertification, reduced fertility and ecosystem services, and a drop in agriculture production. A continued loss of vegetation and green cover, the mismanagement of soil will lead to floods, mudslides, and the deterioration of groundwater and the rapid run off of water during the wet season. Afghanistan is losing its biological diversity, many plants and animals are listed as endangered species due to the destruction of their habitats and the lack of an effective national system of protected areas.

Due to increased urbanization, the quality of life in urban centers continues to deteriorate. Unregulated vehicle traffic and industrial development increase pollution of both water and air in cities. Urban waste is another growing concern.

Finally, partly due to the recent and worsening changes in the global environment and pressures like climate change and desertification, Afghanistan's vulnerability to natural disasters and food shortages is increasing. Unless urgently addressed, this may hinder efforts to further rehabilitate and develop the country as new flows of environmental refugees are created as a result of land degradation and resource scarcity.

The National Environmental Protection Agency of the Islamic Republic of Afghanistan is fully committed to facing these challenges, and calls upon the people of Afghanistan as well as the international community to join forces in responding to them. The journey towards sustainability has begun.

Clean Water or Dirty
by Wakil Kohsar

From **Kabul's environment in pictures**, Afghanistan's first-ever environmental photo exhibition, December 2006

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