United Nations Development Programme
I. R. Iran

RESTORATION AND SUSTAINABLE USE OF THE SHARED SISTAN BASIN

A BASELINE SITUATION ANALYSIS

February 2005

Acknowledgments

This report has been produced in furtherance of a UNDP/GEF proposal that was prepared in 2003 in collaboration with country stakeholders in Afghanistan and the Islamic Republic of Iran to ensure the restoration and sustainable use of the Sistan Basin shared between those two countries.

UNDP wishes to show its appreciation for the support provided in the preparation of this study by the following organizations:

- *International Economic Affairs and Specialised Agnecies, Ministry of Foreign Affairs*
- *Deputy Governor-general for Development Affairs, Sistan and Baluchestan Province*
- *Provincial Office of the Department of Environment*
- *Provincial Office of the Ministry of Agricultural Jihad*
- *Provincial Office of the Natural Resources Organization*
- *The Governor and Deputy Governor of Sistan and Baluchestan*
- *Soil and Water Resources Development Company, Zabol*
- *Water Affairs Bureau, Zabol*

Technical Consultants: Mostafa Panahi
Mohammad Reza Khosravi

Editors: Janet Blake
Farzaneh Derakhshi

Supervisor: Saeid Ferdowsi

FOREWORD

The First National Human Development Report of the Islamic Republic of Iran (1999) marks Sistan&Balouchistan as the least developed province of the Islamic Republic of Iran with a provincial Human Development Index in the range of ????. Due to the harsh, arid climate that prevails across the province, the natural resource base for sustainable development of livelihoods and achievement of the Millennium Development Goals is meager, fragile and vulnerable to natural and human-induced changes. Amidst this harsh and sparsely populated environment lies part of the Sistan Basin, a complex riverine ecosystem that has supported the most densely dwelled human settlements of the area throughout history. Located at the heart of the basin are the Hamun Lakes, a system of three inter-connected shallow freshwater bodies with their peripheral wetlands, part of which declared as a Biosphere Reserve because of its incredibly rich floral and faunal biodiversity. The relatively milder microclimate and availability of water has supported the livelihoods of local communities throughout the history.

However, natural droughts and human-induced fluctuation of the inflowing water occurred in the last decade, has drastically and adversely affected the amount of water, hence the livelihoods. Rapid decrease in irrigated agriculture, loss of freshwater fish resources, and other problems inflicted on the local population due to the lack of water, has now become a serious threat to the sustainable livelihoods of the local people.

To address the aforementioned environment-related development obstacles, in 2003 UNDP tried to assist both the governments of Afghanistan and Iran to secure funding from the Global Environment Facility (GEF). A GEF Proposal was developed and shared with countries with the aim of diagnosing the root causes environmental degradation of the Basin. The main purpose of the proposal was to delineate a strategic action programme whereby remedial countermeasures could be taken against the diminishing trend of the environmental conditions of the Basin.

Towards the same end, the UNDP Country Office in the Islamic Republic of Iran is know pleased to launch this summary update of the environmental and socioeconomic conditions and trends of the Sistan Basin in Iran. While this report is meant to provide decision-makers and executives with an overview of the current conditions of the Sistan Basin, we hope that it will create impetus of more thorough assessments by concerned countries and international stakeholders, hence an active, multiparty dialogue to preserve the environmental basis of the sustainable development of the Basin, both in Afghanistan and in Iran.

Yuxue Xue
Resident Representative a. i.
UNDP Office
Tehran, April 2005

INTRODUCTION

Stretching across parts of South-western Afghanistan and South-eastern Iran, there can be seen a complex of three unique interconnected wetlands. These wetlands, known as the Hamoun Lakes, have been functioning as a vital life support system for the humans and wildlife inhabiting the aquatic and neighbouring terrestrial natural and human ecosystems for some time during the past millennia. The area to which we refer here is known as the Sistan Basin and it constitutes an excellent example of large, permanent freshwater wetlands within an extremely arid desert region. It comprises three large, shallow lakes - the Hamoun-e Puzak, Hamoun-e Saberi and Hamoun-e Helmand - and their surrounding wetlands, extensive reed-beds, and the saline Godzereh depression in Afghanistan that forms the lowest point in the basin and hence the ultimate destination for the waters.

These wetlands provide a habitat for diverse and globally significant fauna and flora. They also provide vital support for sustaining the local economy and for regulating the micro-climate of the region. Furthermore, they are an integral part of the region's unique social and cultural environment. Historical evidence indicates the active presence of ancient civilizations on the shores of the Hamoun Lakes for more than 5,000 years. Life has continued to evolve here due to the presence of water in this area which is the very end point of water flows from the highlands of Central Asia, known today as the Hindu Kush Mountains of Central Afghanistan.

The topographic characteristics in the area have magnified instabilities so that floods and droughts have always been the two sides of the coin in the Sistan Basin. Based on proven data, the Helmand River[1] that is the main bearer of water to the Basin has changed its pathway several times leading to human migration in order to access its abundant water supply and the resulting benefits of the river.

In recent decades during which human activities have imposed their destructive impacts on the natural environment, the situation has become more complicated and unsustainable in the Basin. Natural fluctuations have lost their order and living conditions have become harder. The combined effects of simultaneously occurring natural and manmade impacts have had very harsh impacts on natural and human life across the Basin. Whereas huge floods pose a potential threat to life in future, serious water scarcity is the immediate problem in Sistan Basin. The most drastic drought conditions in living memory commenced in 1998 and have lasted now for six years. During this period, major parts of the Lakes have become completely dry and natural and human life has been threatened on a large scale.

With the aim of the restoration, protection and sustainable use of the Hamoun Lakes, the United Nations Development Programme has supported a series of efforts since 2001. These resulted in the development of a project proposal to be driven jointly by the Islamic Republic of Iran and Afghanistan and supported by the Global Environment Facility. Although this proposal has not yet received official endorsement from either country, the present study aims to provide an update on the status of the Sistan Basin. Geographically, this study focuses mainly on the Iranian portion of the Basin area.

[1] Helmand is also referred to as Hirmand in Iran.

To prepare the report, a study team of professionals in the fields of the environment, economics and remote sensing carried out library research supplemented by data verification site visits.

HISTORICAL OVERVIEW

The ancient Iranian epic the *Shahnameh*, written in the 8th Century, refers to Sistan as a prosperous part of Iran and the home of the greatest Iranian heroes, with its plains made prosperous by a wide diversity of animals and plants. Mediaeval Muslim geographers and travellers recorded the fertility of the land and the prosperity of the inhabitants. According to Christensen, the local urban centre of Zarandj inside Afghanistan was considered to be one of the great cities of the East, famous for its textiles and centres of learning. By the 19th century, however, Sistan had been reduced to a scantily settled maze of ruins and windblown dunes. This reduction in cultivation and settlement appears to have been a very complex process.

In Sistan, as in Mesopotamia, the decline in large-scale irrigation was clearly conditioned by environmental constraints such as the climate, topography, soil composition and hydrology. Some other events, such as recurrent civil wars, invasions and, possibly, outbreaks of epidemic disease have been key catalysts for the start of a marked decline in Sistan area. Irrigated agriculture, based on diversions of water from the Helmand, had been practised in the Sistan Basin at least since the beginning of the third millennium BCE.

It is evident that the expansion in settlement and cultivation that had begun in the Parthian and Sassanian eras, was based on a vast extension of the diversions from the Helmand River. On the east bank of this river, the cornerstone was a great dam across the Helmand located one day's walk south of the capital city of Zarandj. This dam diverted water into a huge system of feeder canals reaching almost 150 kilometres northwards. The system was completed in the early eighth century and had been partially constructed in the preceding centuries.

1. THE SISTAN BASIN: A COMPLEX AND UNIQUE INLAND WETLANDS SYSTEM

Shared between the Islamic Republics of Iran and Afghanistan, within an extremely arid desert region, three large, permanent and unique freshwater wetlands were located not many years ago. These wetlands with their surrounding areas used to play a vital role in supporting life in the ancient district of Sistan. The Sistan Basin itself covers a vast flat plain where Helmand River catchment reaches its final point and discharges its water into the Hamoun Lakes.

The history of human settlement in the Sistan Basin goes back to over 5,000 years ago when wheat, barley, onion, garlic and other plants were cultivated and textiles were produced in the area. Although Helmand River has changed its course several times during the past, the great benefits provided by the Hamoun Lakes and Helmand River have sustained the life not only of a large human population there, but also internationally important and recognised wildlife populations.

1.1 THE NATURAL CONTEXT

The Sistan Basin comprises the land bordering the lower course of the Helmand River and the inland delta of the river. Running for one thousand kilometres across the arid steppes of western Afghanistan, the Helmand River runs down from the western Hindu Kush range and finally empties into a closed basin. Owing to the large quantities of water carried by the river, the centre of the Sistan Basin is covered for most of the year by extensive shallow, sweet water lakes (the Hamoun-e Helmand). The size of the lakes, of course, fluctuates according to the variability of precipitation in the Hindu Kush. The following paragraphs describe the natural context of the Basin in more detail.

1.1.1 DIVERSE ECOSYSTEMS WITHIN THE SISTAN BASIN

The Sistan Basin is made up of three main ecosystems, namely desert, wetlands and an agro-ecosystem. These areas are very rich in terms of biodiversity and ecological interactions. The Basin also includes a complex and unique wetland system consisting of three large shallow, freshwater, inland and permanent lakes (Hamoun-e Puzak, Hamoun-e Saberi and Hamoun-e Helmand). Further to this are the deltas of several major permanent and seasonal rivers feeding into the lakes, the wetlands and the land between and immediately surrounding the lowlands and creating extensive reed-beds. Of the three lakes, Hamoun-e Puzak lies mostly (over 70% of its total area) in Afghanistan, Hamoun-e Saberi lies on both sides of the Iran-Afghanistan border with an approximately equal share on either side and Hamoun-e Helmand is located totally within Iran. The lakes are very shallow (on average only 2-3 metres deep) and, as they lie in a flat area, their surface area varies greatly as a function of the incoming water. During heavy floods, the three may join up to become one vast lake. The main lakes are surrounded by permanent and seasonal wetlands, including vast and rich marshes, reed-beds and salt marshes. The lowest point in the basin, and hence the ultimate destination for the waters, is the saline Godezereh depression located in Afghanistan. The wetlands play a substantial hydrological and ecological role in the natural functioning of Helmand River.

Historical evidence shows that the Lakes have experienced several recorded episodes of drying up and then recovering. Like other natural phenomena, the amount of water flowing from the central Afghan Mountains to the Lakes varies from year to year so that flooding and drought have always been the two sides of the coin in the Sistan Basin. The amount of water flowing into the Sistan Basin has been declining throughout the second half of the last century. In 1970-71 a two-year drought occurred and resulted in a great migration of inhabitants of the Basin, even though the Hamoun Lakes didn't dry up completely during that period. After that, the best year in terms of water was 1991 when Helmand River discharge was recorded as being as much as 14-15 billion m^3. In 1998, another dry period began that has now lasted for more than six years. It is important to stress that the surface area of the three Lakes experiences a large periodical variation that is a function of the incoming water. Although meteorological data and satellite images show a significant decrease in precipitation in the highlands, other factors beyond purely natural reasons are contributing to this dryness (Figure 1).

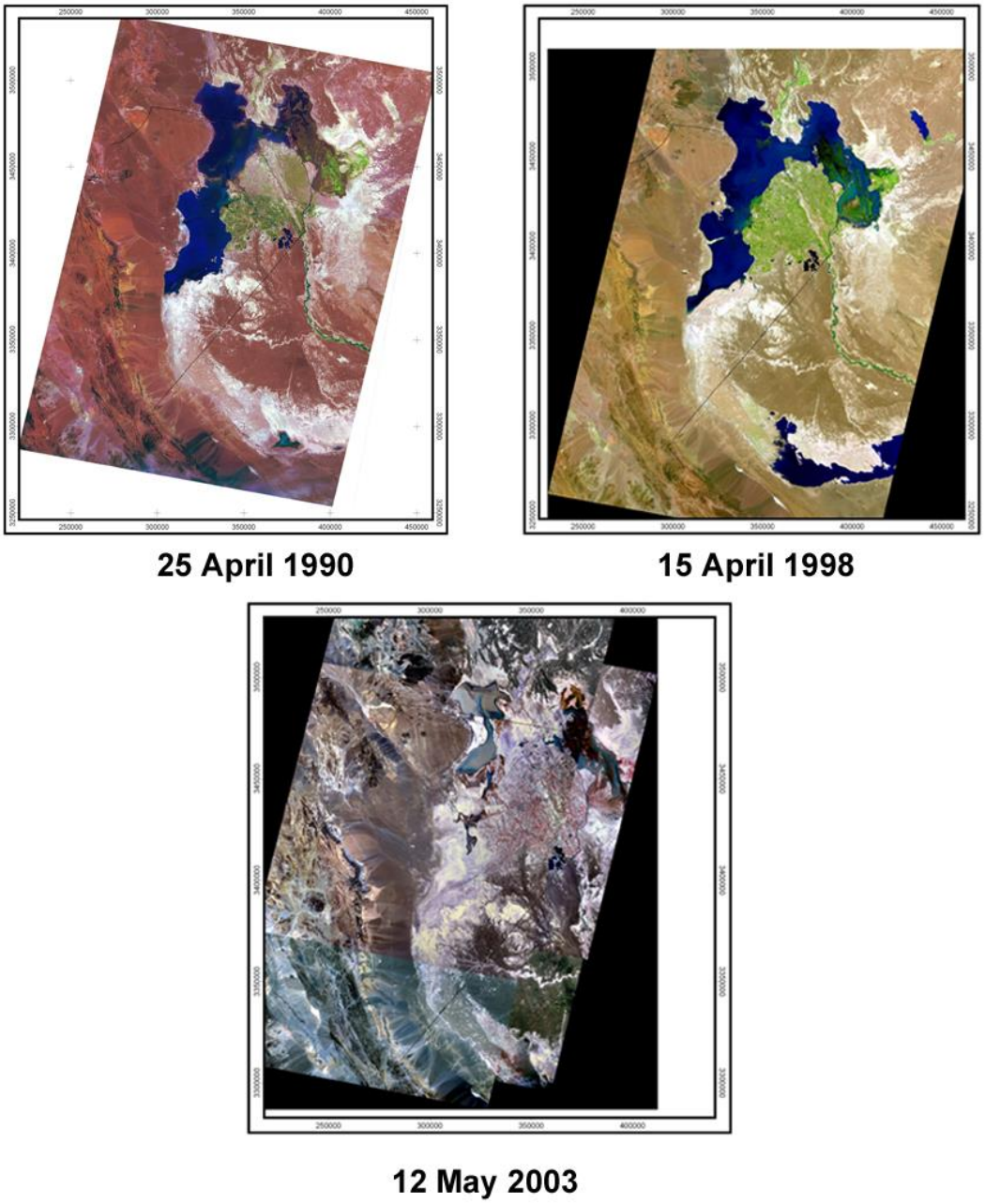


Figure 1. Satellite images show changes in the Hamoun Lakes in Sistan Basin.

Over the past six years, a combination of low precipitation, unmanaged water abstraction and political instability have caused the wetlands to go dry. However, the rivers have continued to flow seasonally in the lower reaches of the river courses, and small springs swell and run permanently over short distances. It seems that the current dry situation is the consequence of a decrease in precipitation, especially snowfall in the central Afghan Mountains, along with development issues upstream of Helmand River.

The wetland ecosystem comprises the Hamoun Lakes and their surrounding lowlands. Altogether, the three lakes cover approximately 216,000 hectares. Hamoun-e Puzak covers 50,000 hectares of which 37,000 ha. are located in Afghanistan; Hamoun-e Saberi covers approximately 101,000 ha of which 40,000 ha. are located in Afghanistan;

and Hamoun-e Helmand covers 65,000 ha wholly in Iran. At their maximum extent and during wet years, the Hamoun Lakes will cover 500,000 ha. of land, 40% of which lies in Afghanistan. Based on satellite images taken in 1990, we see that a total area of 314,508 ha. was covered by the Hamoun Lakes. With an increase of 17% it reached 368,402 ha. However, in 2003, it declined again by 60%. Thus, in May 2003 the total lake surface was only 147,914 ha.

Reports show that some 50 years ago 200,000 ha. of reed-beds and other marshes provided a dense vegetation cover in the area surrounding the Lakes. Those reed-beds served as a very good source of biomass for grazing animals, especially the famous native breed of Sistani cow. Data made available by the Iranian Ministry of Agricultural Jihad indicate that about 20 tons/ha. of wet biomass have regularly been harvested from reeds to serve as high quality forage. As a result of over-harvesting, the total coverage of reed-beds has declined during the past three decades. In the early 1980s, the total area of land under reeds accounted for 100,000 ha. at their maximum extent. In 1983, the Iranian Fisheries Company introduced an alien species of fish into the Lakes. These fish damaged the rhizomes of the reeds and demolished almost all of them. In 1992-3, when almost no reeds remained, the Iranian Ministry of Agricultural Jihad restored some 20,000 ha of reed-beds.

The wetlands are also an extremely important staging and wintering area for migratory waterfowl, as well as an important breeding area for many water birds Theyare also home to a large diversity of mammals, aquatic species and flora. More details concerning the situation of bio-diversity in the area have been provided in a separate section.

The desert ecosystem includes desert ranges, salt planes and sand duneswhich cover a great portion of the Basin. According to satellite images taken in 2003, more than 65% of the Basin area was covered by desert ecosystems, showing an increase of 9% compared to 1998. Desert ranges cover more than 22.65% of the area, equal to 700,000

ha. According to interviews conducted locally, poor ranges have become poorer during the period of drought so that there is no significant biomass remaining on the ranges at the moment. During the years from 1998 to 2003, the salt planes increased by more than 24%. These are mainly low lying land around the Lakes that, owing to recession of the total surface of the Lakes and to salinisation, have changed to salty planes (Figure 2).

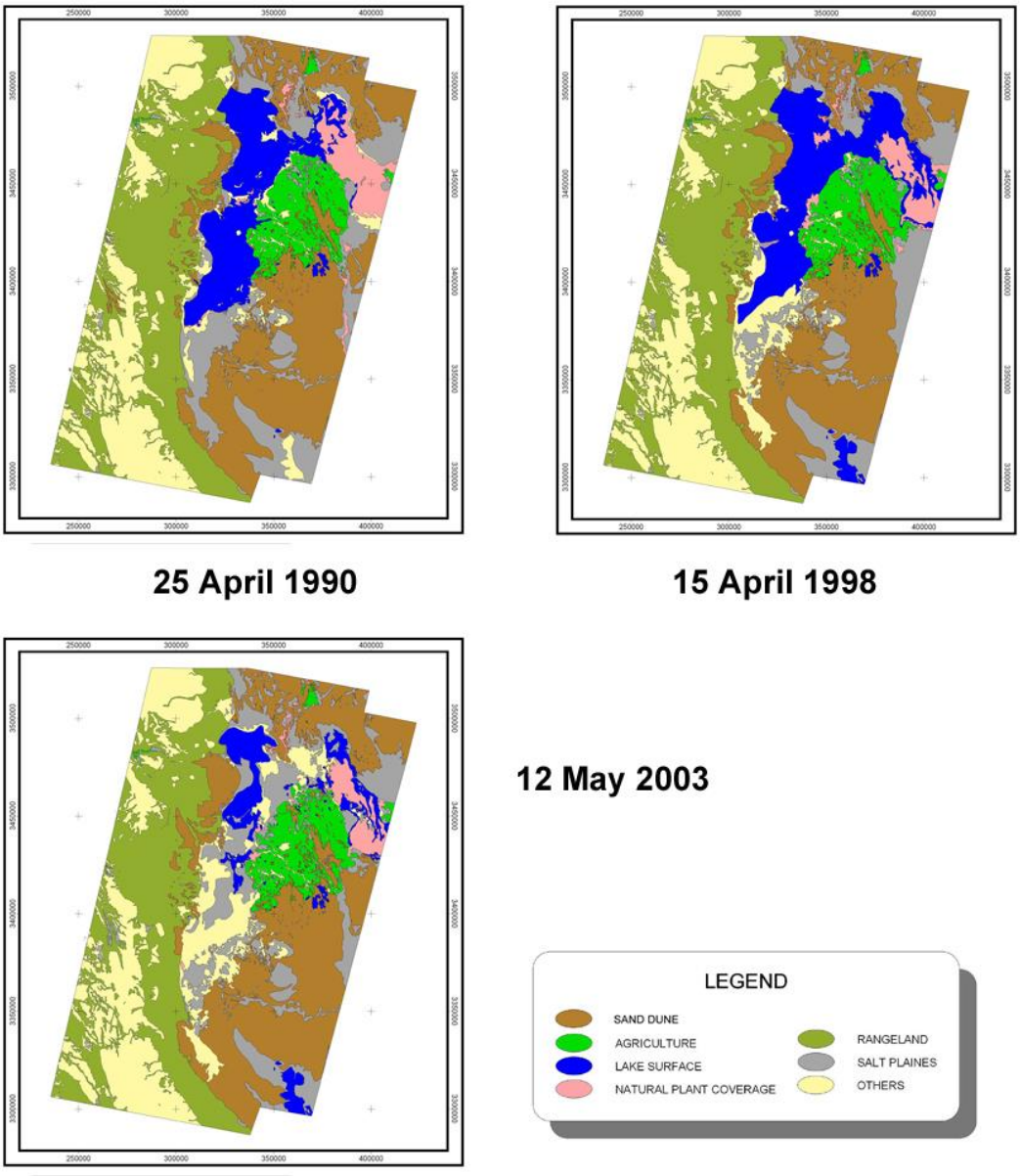


Figure 2. Land use changes in the Sistan Basin based on Satellite image analysis.

Dominant winds blow from the North and Northwest over the region. From late May to late September, a seasonal wind blows in the same direction at a velocity of more than 70km/h. These winds are known as the '120-day winds'. In normal years when the Hamoun Lakes have water and vegetation covers the land, the 120-day winds serve as a cooling system during the hot, dry summers and add some freshness to the harsh climate. However, when the Lakes are dry, the 120-day winds erode a great deal of sand, silt and clay from the dry lake beds and spread it over the region. Sand particles create sand dunes and bury houses while silt and clay particles send suspensions of dust into the air and cause several respiratory and optical infections. Due to the dryness of Hamoun Lakes and the removal of the vegetation cover, these seasonal winds have increased both in duration and speed. In 2004, for example, the seasonal winds lasted for 230 days and their maximum speed exceeded 120km/h. More than 2 million hectares of the Basin area is now under severe threat of wind erosion (FRWO, 2004).

Sand dunes covering an area of 850,000 ha represent the final products of wind erosion moving along the Basin from North to South. Three main corridors have been recognised in which sand particles mainly concentrate and move. Two of these corridors are located in Iran while the third one is in Afghanistan. Sand dunes expanded in terms of their total area over 2% of the total study area during the period of drought in 1998-2004. The main reason for this expansion is that, due to dryness of Hamoun Lakes, a vast area of approximately 450,000 ha. of the Hamoun River bed added to the hotspots that serve as the source of sand particles. The local government on the Iranian side has installed a set of wind breaks to trap sand particles and prevent their movement. These have been placed across the sand corridors in six 3-row units (Figure 3). The Iranian authorities have also used a combination of biological and mechanical methods to fix sand dunes on their side of the Basin over an area of 11,000 ha.

Figure 3. Wind break to trap sand particles in the middle of the Lake.

Agricultural activities used to be widely practised in the Sistan Basin where there is an area of approximately 200,000 ha. of arable land. The total area classified as irrigated for cultivation and orchards is estimated at 150,000 ha. As a consequence of the latest

drought, large portions of the arable land are no longer under cultivation. According to interviews, the maximum number of hectares of cultivated land does not exceed 40,000 ha. Farmers produce cereals in limited acreages where they can obtain a low quality of drained water through so called "*Chahak*" small wells. These *Chahak* wells can be seen around the riverbed and on low-lying land. There is almost no fruit produced in the orchards of the area whereas, previously, one of the best quality grapes was produced there. No reliable data exist on the quantity of fruit production in the past within the Basin. Figures presented in Table 1 summarise the different land uses to which the Basin was put during 1990, 1998 and 2003.

Table 1. Land use changes in the Sistan Basin.

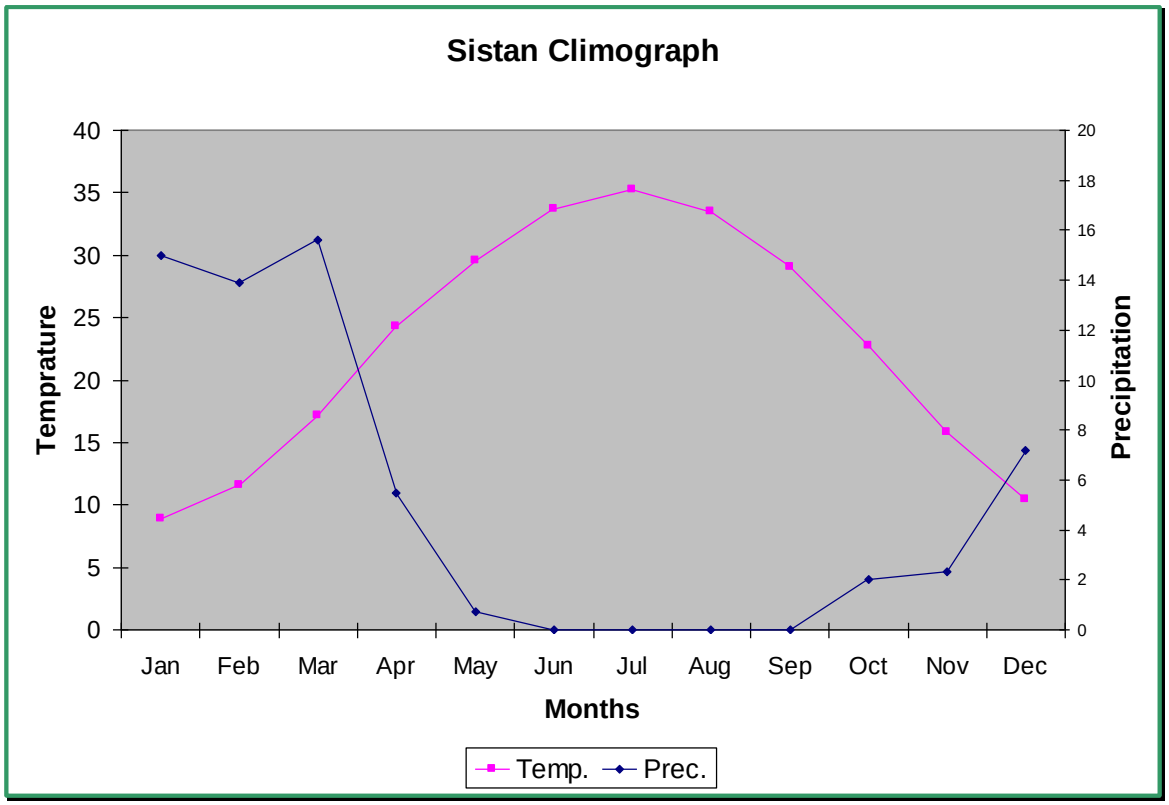
CLASSES	1990 (hectares)	1998 (hectares)	2003 (hectares)
Sand Dunes	778,098	755,179	853,896
Agriculture	177,472	186,215	170,674
Lake Surface	314,508	368,402	147,914
Natural Plant Coverage	112,554	81,733	65,179
Rangelands	724,277	723,924	701,236
Salt Planes	424,523	370,496	460,948
Others	556,278	601,752	687,851
Total	3089700	3089700	3089700

1.1.2 HYDROLOGICAL SITUATION OF THE BASIN

The Sistan Basin is located at the far end of a very huge catchment with a total area of 370,000 km^2 of which 90% is located in Afghanistan. The Helmand River with a 280,000km^2 area covers half of the total area of Afghanistan (560,000 km^2) and is the most important source of water for the Sistan Basin. The Basin is divided between Iran and Afghanistan in a ratio of 2:1.

Geologically, the Sistan Basin is located on several layers of fine sediments accumulated over thousands of years. The Basin, just like other parts of the Iranian Plateau, was covered by the Tethys Sea. Palaeontological and geological data show that, during late Neocene and early Palaeocene eras, the Sistan Basin was covered by a vast, deep saline lake while the Plateau was emerging out of the Tethys Sea. Later, this lake dried out and the Sistan Basin was formed.

Over a period of several hundred years, fine sediments accumulated over the Earth's surface where the Sistan Basin is located. As a result of this process, geologically-speaking the Basin is made up of sedimentary layers. Hot and dry climatic conditions are found all over the Basin. According to available long-term records covering a 38-year period from 1962 to 2000, the average temperature varies between 1.9°C in January and 41.5° in July. However, the temperature occasionally falls well below freezing in midwinter and the coldest weather recorded was -12°C on 31st January 1972. While average annual rainfall is only 62.5 mm., potential evaporation rates may reach over 4,000 mm. per year resulting in a severely dry climate across the region.



Neither the natural nor the socio-economic situations of the Basin is independent from natural and socio-economic conditions further upstream. Due to its specific geological formation, underground water is not accessible and lies below a depth of 500 metres. For this reason, the Basin lacks a reliable source of underground freshwater and depends totally on the water flowing from the Helmand River.

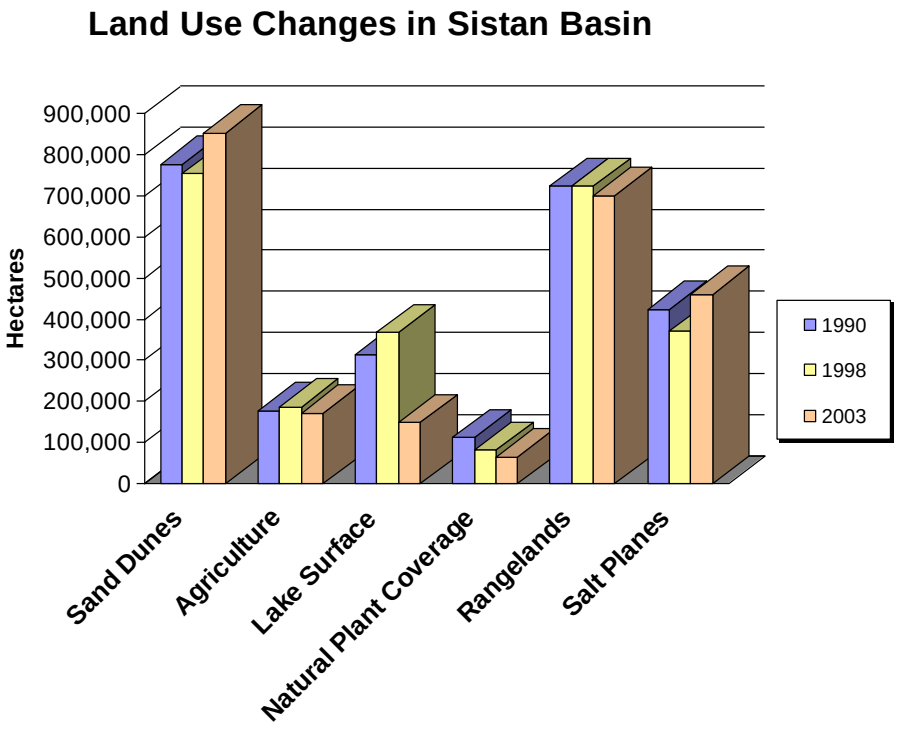
The majority of water in the Helmand originates as precipitation in its upper reaches - falling mostly as winter snow. Hence, the level of the river rises with the onset of snowmelt from spring onwards and peaks in early summer. Apart from in its upper reaches, the River's path passes through semi-arid, arid and even very arid areas from Afghanistan to the Iranian border and the Hamoun Lakes. An average flow of 235 m^3 per second passes through the Helmand River while it reaches its highest flow rate of 500m^3/sec during floods. In 1992, a huge flood instantly resulted in a 14 to 15 billion m^3 flow of water. The average capacity of the Hamoun Lakes is estimated to be 7 billion cubic metres.

A series of diversion and storage schemes have been constructed on the Helmand River, mostly during the 20th century. The most important water schemes undertaken in Afghanistan include the following.

- The Kajaki Dam that was constructed in 1952. It has a 1.7 billion cubic metre capacity and is the most important water reservoir in Afghanistan. The main objectives behind the construction of this dam were electricity generation, water storage for irrigation purposes and flood control.

- The Arghandab (or Dahla) Dam that was constructed in Kandahar Province and could store some 500 million cubic metres of water. Reports suggest that the Dahla Dam is now filled with sediments and is no longer in use.

- The Helmand Irrigation System that includes the Saraj, Boghra and Darwishan schemes. This irrigation system distributes water among 99,400 hectares of irrigated land in Afghanistan and has been restored post-conflict to collect more water from the Helmand River.



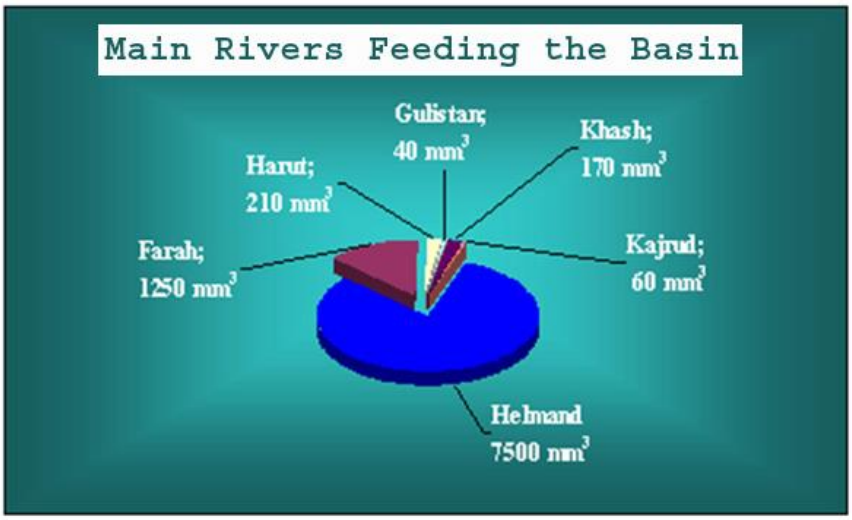
As this study has been carried out in the Iranian part of the basin, it does not include any details or updates regarding water utilisation systems in the Afghan stretches of the Helmand and other rivers. There are a number of water schemes constructed in Iran mainly for the irrigation of agricultural lands and for the provision of drinking water. In 1973, in response to an immediate need for drinking water, Iran began to design a series of canals to divert water from the Sistan branch of the Helmand River into the naturally occurring Chahnimeh storage reservoir system. These water stores became operational in the early 1980s and are currently providing people with safe drinking water in Zabol, Zaranj and Zahedan to the amount of almost 60 million cubic metres each year, even in dry conditions. This availability of safe drinking water appears to be the only reason keeping rural people in their villages and preventing their migration to cities far from the Sistan Basin.

The Government of the Islamic Republic of Iran is currently increasing the capacity of the Chahnimeh reservoirs from 0.7 billion to 1 billion m^3. In addition to these large-scale

schemes, many smaller-scale schemes exist at all points along the river basin (except in its upper reaches). These include: irrigation from natural springs; *kariz*[2] (man-made underground canals for collecting and distributing ground-water); shallow and deep – wells that areboth hand- and motor-driven; up to 60 mobile pumping stations; and small diversions from major rivers or main irrigation canals to household or village irrigation plots. Almost all irrigated agriculture takes place close to the main river course in the river valley.

The Sistan Basin is mostly fed by the waters of the permanent river of Helmand and some other streams, namely the Khash, Harut, Farah, Gulistan and Kajud rivers all originating in the Central Highlands of Afghanistan. The Helmand River originates at the western edge of the Hindu Kush range. The upper slopes of these mountains experience a severe climate for much of the year, with glaciers existing on the uppermost, northern facing peaks. Below 4,000 m., the mountains are initially free of vegetation, followed at descending altitudes by pastures and steppes, small-scale agricultural activities and thin forests.

The cumulative effect of all these extractions from Helmand River, particularly by the Kajaki Dam and the Helmand irrigation systems, has been a great reduction in the flow of the lower reaches of the river running through Nimrooz Province, the Sistan Basin and the Hamoun Lakes. The river is now mostly dry for long periods throughout much of this province and almost no water reaches the Basin and Lakes from the Helmand River. This has greatly increased the drought vulnerability of the area. In addition, the portions of water that reach Iran are channelled from the Sistan branch to the naturally occurring Chahnimeh storage system to keep the safeguarding mechanism of the Sistan Basin full and reliable.



[2] In Persian it's called *qanat*.

Other rivers that flow into the Sistan Basin include the Farah, the Harut, the Gulistan, the Khash and the Kajrud,[3] all of which lie to the northwest of the Helmand. The drainage areas and flows of these rivers are shown in Table 1. As with the Helmand River, all the rivers shown in Table 1 originate in mountainous central Afghanistan and hence they have a similar seasonal distribution of flows to those of the Helmand. They also experience similar levels of extractions in their middle reaches, although there is no information on any large-scale formal diversion or storage schemes.

Table 2. Flows and drainage area of the main rivers flowing into the Sistan Basin.

River	Mean Potential Annual Flow (million m^3)	Drainage Area in km^2
Helmand	7,500	166,000
Farah	1,250	27,800
Harut	210	23,800
Gulistan	40	9,100
Khash	170	10,500
Kajrud	60	20,800
Totals	**9,230**	**258,000**

Source: FAO, 1997.

As a consequence of the upstream withdrawals and diversions, the Helmand River is no longer a principal source of water for the Hamoun-e Puzak. The major source is now the Khash River. In fact, during dry years, there are no water flows from the Helmand into any of the three lakes or wetlands. During times of drought, the final areas to remain wet are the Chahnimeh reservoirs, the Godezereh depression and, sometimes, the Afghani part of Hamoun-e Puzak.

The general pattern is for water to flow through rivers and underground canals from Hamoun-e Puzak to Hamoun-e Saberi and then to Hamoun-e Helmand. In addition, Hamoun-e Saberi receives water directly from the Farah River, and Hamoun-e Helmand receives water directly fromthe Sistan branch of the Helmand River. Excess water flows out from the Hamoun-e Saberi through a seasonal river called the Shileh to the Godezereh depression in Afghanistan. This depression is thought to be highly saline. There is a common misconception that the Hamoun lakes are fed from rainfall in the Sistan locality. This is not so since, even in a good year, Zabol will seldom receive over 100 mm. of direct rainfall while it experiences a rate of evaporation of over 4000 mm. per annum.

1.1.3 THE INCREDIBLE BIOLOGICAL DIVERSITY OF THE BASIN

The wetlands of this area provide a habitat for diverse and globally significant fauna and flora. For example, the existence of 164 species of birds has been reported in Sistan Basin of which 11 species are endemic and other 153 species are migratory. Thousands of water birds [use?] the Hamoun Lakes as a wintering area during the cold season or as a staging area on their migration route to and from the south. In the1980s, an estimated over 1,000,000 birds were recorded in the Basin. *Bird Life International* (1994) lists eight globally threatened winter visitors in the Sistan Basin, including *Pelecanus crispus, Oxyura leucocephala*, and *Aquila heliaca*. Breeding species previously recorded in the area include: *Phoenicopterus ruber, Anser anser, Cygnus olor, Netta rufina, Picus*

[3] Under natural conditions, the flow in the Hirmand (Helmand) river is 4-5 times greater than the combined flow of the other rivers mentioned (FAO, 1997a).

squamatus flavirostris, and *caprimulgus mahrattensis.* For example, *Bird Life International* (1994) lists 20 wintering and breeding bird species in total of which over 1% of the global population has been recorded in the Basin. In terms of wintering birds, over 500,000 wildfowl were counted in 1976 on the Hamoun-e Puzak alone, in what was considered to be a very poor year.

In addition to waterfowl, the Sistan Basin has been providing support to several species of mammal. These include the wolf (*Canis lupus*), golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*), striped hyena (*Hyaena hyaena*), wild boar (*Sus scrofa*), caracal (*Lynx caracal*), goitered gazelle (*Gazella subgutturosa*), and jebeer gazelle (*G. dorcas fuscifrons*). No reliable census data exists for mammals but, since severe drought has affected and broken down food chains, a significant decline in populations is inevitable.

Information on aquatic species in the Basin is limited, although it is thought to host a unique and rich diversity. The dominant flora species in the area are *Phragmites australis, Typha sp., Carex sp.,* and *Tamarix sp.* The vast *Phragmites* reedbeds are considered to be particularly unique.

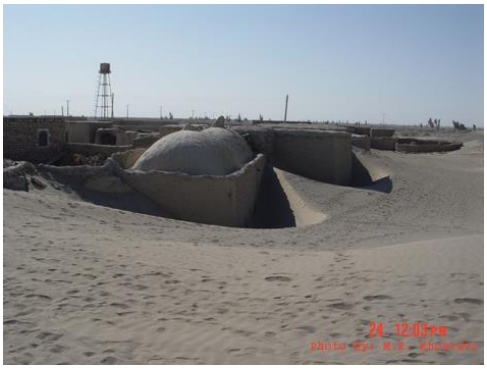
The Sistan Basin appears to be rich also in terms of agricultural biodiversity, although thishas not been properly explored and recorded. While the best known representative of agro-biodiversity in the Basin is the *Sistani* cow, *Khazak* chickens and *Balouchi* sheep are two other important examples. Among horticultural products, a very specific race of grape has been produced and exported to other cities and provinces both within Iran and Afghanistan. All these genetic resources have been naturally and artificially purified over centuries to represent the genotypes that are most tolerant to the harsh conditions of the area. The average fish harvest is estimated at 9,000 ton/year on which 2,000 families rely. Even in times of intense drought, the Sistan area provides healthy examples of the natural ecosystem, as well as gene banks for the region. At the moment, the ecosystem is partially functioning in very minor sections of the Sistan Basin where the Farah River feeds Hamoun-e Pouzak and it provides the last chance for this huge gene bank to survive.

In 1981, the FAO identified Hamoun-e Puzak as one of the most important natural areas in Afghanistan and recommended that it be inscribed as a Ramsar site and that a protected area be established there. No follow-up was made on these recommendations due to the conflict situation prevailing in the country.

1.2 THE SOCIO-ECONOMIC CONTEXT

The Hamoun Lakes, the biggest fresh water lakes in Asia, are not only the main source of irrigation for arable lands of the Basin but, along with the Helmand River, they also support many economic activities associated with water. Such activities include hunting in the reed-beds, transporting goods and passengers across the lakes, fishing and handicrafts that use reeds as a raw material. – It also plays a pivotal role in the lives of the population of this southern edge of Central Asia.

In broad terms, the area can be divided into two parts from the sources of water to the very end point of water discharge. The first part consists of the upper and middle reaches of the rivers that provide water to the Sistan Basin and which are located in Afghanistan.



The second part consists of the lower reaches of these rivers and the Sistan Basin. The Afghan part of the Sistan Basin lies in the Provinces of Nimrooz and Farah which are very arid and where most of the land is covered by desert. On the other

side of the border, the Iranian Province of Sistan and Baluchestan controls a significant share of the Basin and this is very dry as well. The population of farmers, nomads and traders of all these provinces depend heavily for all their economic and social activities on the water brought down from the central mountains of Afghanistan.

The mountainous upper reaches of the Helmand River catchment (together with its tributaries) cover most of the Provinces of Vardak, Ghazni, Oruzgan and Zabol. The middle reaches cover Kandahar and Helmand Provinces, with their small mountains, foothills, and gently sloping agricultural land. Its main tributaries are the

Ghazni, Musa Qala and the Arghandab rivers and all the major tributaries join the Helmand River upstream of the city of Lashkar Gah in Helmand Province. The river then meanders slowly for over 400 km. across the desert in Nimrooz Province and up to the Iranian border. Just after passing the village of Char-Borjak near the Iranian border, the Helmand River divides into two branches. The Sistan branch flows directly into Iran and into the Hamoun-e Helmand. The northern, Parian, branch passes the city of Zaranj, and forms the border with I. R. Iran for approximately 25 km. before turning back into Afghanistan and flowing into the Hamoun-e Puzak.

The Hamoun Lake system has gradually dried out and almost all of its ecological and related economic activities have been diminished. The water shortage in the Helmand River that has occurred recently has posed serious threats to the environment assets of the region and to livelihoods across the Basin.

In parallel with this environmental crisis, the water shortage in the Sistan Basin has also led to a series of social and economic problems over recent years. All the aforementioned economic activities are disappearing as a consequence of this, while damage to agricultural practices in the lower reaches of the Helmand River and the Basin has forced thousands of local people to become displaced from the area. Moreover, if the current drought persists and the ecological crisis deteriorates further, it

is expected to increase the number of people displaced to other parts of both countries. In particular, drought-affected populations from Afghanistan may cross the Iranian border in large numbers. This possible eventuality is a matter of serious concern for the Iranian authorities, a number of UN agencies and for the international community as a whole.

1.2.1 POPULATION AND LIVELIHOODS

The southern section of the Afghanistan border forms the division between Sistan and Baluchestan province and it's the neighbouring Afghan Provinces of Nimrooz and Farah. The South-western stretches of the border running between the two countries effectively divide the Sistan Basin between Iran and Afghanistan in a ratio of 2:1. In better times, this area was the largest freshwater lake in southern Central Asia. Its abundant bio-diversity was unique for thousands of kilometres in all directions.

Local people live in the Basin on both the Afghanistan and the Iranian sides of the border. Until recently, the Basin's population included some unique Baluchi and Sistani tribes as well as the semi-nomadic Sayyad hunter-gatherers who used reed boats to net fish and predatory birds. Little is known of this tribe, although it is thought that they lived in reed houses that were moved according to the level of the lakes. It is not known if this tribe still exists, although some reports suggest that they are now living as internally displaced persons (IDPs).

These peoples have travelled and traded across the region for many centuries. For at least five thousand years there has been a thriving economy based on agriculture and trade, benefiting from the very fertile sediments of the Helmand River and the annual floods coming down from the mountains of the Hindu Kush. However, the pervasive poverty of the region leads to other problems, such as drug abuse, the illegal cultivation of narcotics and participation in other illegal and anti-social activities (e.g. trafficking in

guns, drugs or people). The gender situation in many parts of the region is also challenging. The official policies of previous regimes effectively banned girls and women from participating in any public activity.

Estimates of the population in the Sistan Basin are very unreliable, but it is thought to be less than a million. The lower reaches of the rivers of the Basin, within Afghanistan, lie in Nimrooz and Farah Provinces. The population of these two provinces is estimated to be between 180,000 and 300,000. It is not certain if this includes nomads and IDPs, who might account for about half the population. The vast majority of these people depend on the natural resources Sistan Basin lakes and wetlands. The Iranian parts of the Basin lie in Sistan and Baluchistan Province, of which Zabol District has a direct relationship with the Hamoun Lakes.

The population of Zabol District is estimated at 334,561. Until recent times, the population of Sistan and Baluchestan Province was about 1.2 million while it is now estimated to be 1.72 million, to which has been added four hundred thousand Afghans. The Province of Sistan and Baluchestan has traditionally been the poorest in Iran for all the main developmental indicators, and this situation has been greatly exacerbated by the negative impacts on local communities, services and the environment of the political instability in Afghanistan and ongoing drought. In other words, the drought occurred in parallel with the conflict in Southwest Afghanistan and this has created a social crisis. The combined effects of these two disasters – one natural and the other man-made - has conspired to render the area rapidly an unproductive desert and the remaining population dependant on food aid and subsidies for their basic needs.

Different provinces in this area are prone to many types of natural disaster, including drought, earthquakes and floods. Communities are exposed to these threats that increase their vulnerability in addition to the specific problems caused by the situation of the Basin in all its aspects and to the high natural levels of poverty to be found there.

Throughout the Basin, earthquakes and floods occur on a regular basis and cause many deaths and great loss of livelihood. It is one of the major concerns of the local populations and a real and actual constraint placed on development initiatives. Drought conditions in some areas are worse than in others. In many cases, long-term ecological damage has been caused, for example to groundwater or soil resources, as people rush to meet immediate humanitarian needs such as water and food. While this approach has alleviated short-term suffering, in many cases it will further exacerbate the humanitarian situation in the long term, as degraded groundwater aquifers and eroded soils may take centuries to recover.

Following the long-standing military conflicts in the Afghan part of the Basin, the economic infrastructure - such as roads, electricity generation and supply and irrigation systems - is badly damaged. There is almost no industrial production in the region. The social infrastructure, including schools, hospitals, community networks, is also badly damaged if not wholly destroyed. A WFP/FAO report prepared for the winter of 2002/03 estimated that approximately one quarter of the population was vulnerable to food shortages, and this situation continues. High levels of unemployment, a failing electricity supply network and assorted public health problems are having a profound effect on the quality of life in the Basin. The Iranian Ministry of Health has recently reported that birth weight, average child size, growth rates and most other basic health indicators have all decreased (for the first time ever) over the past five years. The loss of locally produced protein is a major contributory factor in this decline. The Government is forced to supply food aid to most of the rural population. This is both expensive and emergency in nature and most of the assistance is carbohydrate based (flour, rice, oil etc.) Subsidised flour is sold to villagers at 2500 Rials (about 30 cents) for a 40kg sack.

The publicly stated intention of the rural people of Zabol District to displace is very low compared with other areas of the Basin. However, these problems are compounded by the increasing numbers of people who are moving into urban areas to escape rural hardship and insecurity arising from degraded environments and the loss of livelihoods. The past six years of drought have worsened this damage. Restoring the environment of the area under consideration seems to be a vital action for assuring the long-term well being of the local communities.

The Helmand River catchment, consisting of the Sistan Basin is essentially made up of agricultural land. However, only a relatively small part of the total land area is suitable for farming or horticulture, including both irrigated as well as rain-fed farming. It is estimated that 75% of the population derive their main livelihood from farming, horticulture and livestock, commonly a combination of these. Therefore, in an area where over 75% of the population relies directly on the natural resource base to meet their daily needs, widespread environmental degradation poses an immense threat to human life and the future sustainability of livelihoods. According the long-standing historical records, yields have proved to be uncertain and crop failure is common. With rainfall being generally so low, most cultivation of crops in the area is seasonal or in villages that have access to irrigation water from *qanats* or seasonal streams. There is about 200,000 hectares of potentially irrigated land in Sistan which is now undeveloped and is in the process of being covered by wind blown sand.

Nimrooz and Farah Provinces, inside Afghanistan, and the Sistan District within Iranian Province of Sistan and Baluchistan are all very arid, most of the land being desert and all agriculture dependent on irrigation. In very general terms, although elevation and aridity frequently combine to make striking landscapes, such conditions in a vast area where livelihoods are largely based on agricultural and animal husbandry practices make survival a steady challenge. Furthermore, the livelihood of most people in the Basin is acutely vulnerable to climatic variations. In the Sistan Basin, the economic structure consists largely of small-scale, family and traditional activities. Agricultural practices are the principal economic activities in the river catchment on which over 67% of the population of Zabol District are dependent.

Of the total 915,000 hectares of the land area of Zabol District only 9.8% is arable. The remaining land comprises pasture, desert or wild lands. About 98% of total arable and permanent cropland was irrigated in 2002, mostly for wheat and horticulture. Crops grown in the area include wheat, barley, forage, garden products, beans, watermelons, melons, onions, Alfalfa and other greens. Traditional practices have been abandoned and in some cases traditional skills are being lost. If this situation is allowed to continue, it could cause irreversible damage to the social and cultural fabric of the region. In the past, the economy was largely dependent on growing livestock as a source of cash income and an integral component in most existing farming systems. The recent six years drought have had a major impact on livestock numbers which have suffered.

On the basis of reports from the Iranian Ministry of Agricultural Jihad, it is calculated that there used to be 1.7 million domesticated animals in Sistan of which only 0.7 million now survive. The average annual catch of 3.5 to 9 thousand tonnes of fish being harvested has decreased to zero owing to the drought and 354 households have lost their source of income as a result. Livestock grazing faces different problems, and people have decreased the number of their farm animals due to the water shortage, destruction of rangelands and inadequacy of the foliage. All these factors have caused economic and social problems in the region.

Apart from fish, it is reported that the Basin is the home to about 1 million cattle, goats and sheep. Human inhabitants of the area have also utilized other lake and wetland

resources. For example, reeds were used for construction purposes and for fuel, birds as a source of protein and the waters for recreation and transport. A unique breed of cow, the Sistani, has traditionally grazed on the *Phragmites* reed-beds, often wading into the lake and swamps for food. Due to the ongoing drought, fish stocks as well as livestock numbers have become severely depleted.

1.2.2 INSTITUTIONAL FRAMEWORK

Legal and administrative issues are regarded as the most important institutional factors to consider here. In order to have a better understanding of the situation pertaining in area either in the past, at present or in the future, careful examination of these frameworks is crucial. It is wrong to presume that these frameworks in Iran and Afghanistan are similar. Social crisis and military conflict during last two decades in Afghanistan have aggravated historical indicators of under-development. In contrast, the legal and administrative structure in Iran has been strengthened and developed in response to changing needs. In this section, these frameworks are studied on the basis of the information available on both sides of the border.

With regard to Afghanistan, the recent installation of a new government has created a unique opportunity for improving the situation and a sense of optimism that this can be achieved. In general, the Government is stable and controls most of the country at the macro-level, including all the area under examination in this report. However, given its recent establishment, the weakness of the public administration system and the [heritage] of twenty years of conflict, it is not yet possible for the Government to exert its control fully over all of its territory. For example, major one-off decisions on water allocation may be made by the relevant Ministries in Kabul, but the week-to-week decisions as to the use and allocation of water are still made at the dam gates and well-heads. National decisions and policies may not have the necessary influence over these local decisions.

The central Government is taking steps to address all these issues, and is making steady progress. For example, the 1981 Water Law of Afghanistan provides guidance on the structures, standards and approaches to managing the country's water. It also outlines the roles, rights and responsibilities of the various water users in Afghanistan. This Law provides a useful framework for action nowadays, although it may need some updating and revision fully to address the current situation. The lead agency for water management is the Ministry of Irrigation, Water Resources and the Environment (MoIWRE), which has affiliates in each province.

The capacity of the Iranian Government for developing, implementing and monitoring well-targeted, participatory and gender sensitive development programmes in the Basin is limited owing to a history of paternalistic or "top down" approaches to government assistance. A great part of the wealth of the country is generated from oil revenues and this money has traditionally been converted into services using a transfer/charity model. The challenge is to change this approach to another more practical and reliable one. Despite existing shortcomings, there are several administrative institutions that are responsible for different aspects of the Sistan Basin based on their sectoral mandates. The Government has a high capacity to reach communities as it has a well- developed network of offices and communications in most rural areas, as well as a good transportation network.

Meanwhile, I.R. Iran is very keen to invest in the infrastructure of the Sistan Area in order to promote the development process, such as by investing in management of the water and soil in Sistan. Technical and administrative frameworks are relatively well supported by financial and political backstopping from central and local Governments. This is the major cause for notable dissimilarities in institutional capacities between the two sides of the political border. Moreover, laws and regulations enacted and in force on the Iranian side for the preservation and correct utilisation of water and soil resources is another milestone in Sistan Basin.

The western half of the Hamoun-e Saberi and Hamoun-e Helmand, along with a large area of the neighbouring desert to the west, were formally designated as a Protected Area (Hamoun Protected Area) in August 1967. Its boundaries were revised in August 1969, giving a total area of 201,062 ha. The reserve was reduced in size to 193,500ha in the early 1970s and upgraded to a Wildlife Refuge. It has subsequently been downgraded again to Protected Area status. This Protected Area includes only the main open water area of the two lakes and their western shorelines and excludes the important marshes to the east.

In addition, I.R. Iran has recently established the Hamoun Protected Area in Sistan District in which all the lakes, wetlands and their surrounding areas lying within Iranian territory are included, now managed by the Department of Environment. Since the Iranian Ministry of Energy is responsible for the management of all water resources in I.R. Iran, it is also directly involved in policy discussions and administrative actions related to the Basin.

Despite the designation of parts of Hamoun Lakes as Protected Areas, several different factors contribute to inefficiency in its protection regime. These include the following.

- Severe natural conditions, especially drought. These have resulted in an unsustainable and fragile ecological situation in which ecological linkages are very weak and, in many cases, broken.

- Lack of an adequate infrastructure and facilities for protecting the area

- A very old-fashioned approach towards the design and management of protected areas in Iran.

In order to manage the Basin's ecosystem and to maintain its functions, I.R. Iran has also taken steps to inscribe parts of the Hamoun-e Puzak and Hamoun-e Saberi on the List of Wetlands of International Importance established under the 1972 Ramsar Convention.

1.2.3 POLICY FRAMEWORK

Without a full understanding of the political context in which water shortages have occurred in the Helmand River and Sistan Basin, existing challenges in the region cannot be addressed.

It's important to underline that the flow of the Helmand River is controlled by a number of regulatory structures, principally the Garishk, Kajaki, Daula and Boghra dams which were mostly constructed between 1947 and 1949 with US assistance. This has caused a

great deal of friction between the two countries and reconciliation negotiations were conducted from time to time between 1959 and 1973 when two countries reached an agreement that was, of course, never implemented.

In contrast with I.R. Iran, the political situation in Afghanistan is complex and unstable. The country's political map reflects the existence of many tribal and historical affiliations and even adjacent villages often have different affiliations. In such a situation, it can be challenging to establish effectiveco-ordination and co-operation between bordering villages and it may be difficult to implement activities that involve several villages. This situation becomes even more complicated in the presence of a large number of arms and military hardware, and the resultant pervading sense of insecurity. This, in turn, encourages people to use and display the arms as a result.

The Government in Afghanistan has initiated an active programme for the rehabilitation and reconstruction of society and of its economy. This programme is set out in the National Development Framework (NDF), in which future development is predicated on exploiting natural resources including the improved utilisation and management of water resources besides the other two strategic pillars. Given that Afghanistan is a water scarce country and that water is the main limiting resource for most socio-economic sectors of the country (notably agriculture and energy), the rehabilitation of the nation's water management system is a top priority for support from the international community. Water sector development activities are expected to address both the hard and soft infrastructure, and to cover the rivers flowing into the Sistan Basin.

Since 2003, the Government of Afghanistan's public investment programme has included several related programmes and sub-programmes, the two most pertinent of which are the following.

- The *National River Basin Management* programme aimed at establishing improved water resource management systems, through the adoption of river basin management approaches in the five river basins of Afghanistan.

- The *Environmental Preservation and Regeneration* programme designed to develop national capacity for environmental management, conservation and regeneration.

Nevertheless, senior provincial and district Government officials have stressed in interviews that sustainable water management is the leading development objective in the provinces concerned.

On their side, the Iranian authorities consider the social situation in Sistan and Baluchestan to be particularly challenging, given the additional pressures created by the drought and the large numbers of refugees in recent years. Social problems include very low agricultural productivity, drug smuggling, weapons proliferation and unemployment. The Government of I.R. Iran sees improved joint management of the Sistan Basin as a way to reduce these social challenges within its borders. It is also fully committed to a full and close co-operation with the national and local authorities in Afghanistan. Moreover, I.R. Iran recognizes the international importance of the existing lakes and wetlands in the Sistan Basin and it has taken management steps to protect the Hamoun Lake ecosystem and restore its vital functions.

1.2.4 INTERNATIONAL FRAMEWORK

The Iranian section of the Hamoun-e. Saberi along with the northern section of the Hamoun-e Helmand, comprising an area covering approximately 50,000 ha, was designated as a "wetland of international importance" under the terms of the Ramsar Convention on Wetlands on 23 June 1975.

Approximately 37,000 ha of the Ramsar Site lie within the Hamoun Protected Area. *Bird Life International* identified the Lakes as an "Important Bird Area" in 1994. Although the Hamoun-e Puzak marshes are not subject to special legal protection, personnel of the Iranian Department of Environment endeavour to maintain some control in the region and have a small office at Gorgori Village near the southern end of the Lake.

. FAO (1981) identified the Hamoun-e Puzak as one of the most important natural areas in Afghanistan, and recommended that it be inscribed as a site of international importance under the Ramsar Convention (1972) and that a Protected Area be established there. No follow-up was made on these recommendations due to the internal conflict in that country.

In 1990, the area was added to the Montreux Record of critically endangered areas because "wetland water levels were critically affected by problems caused by dam construction and water diversion schemes on the Helmand River in Afghanistan". The main cause of the lack of co-operation between the two countries was the weakened politico-administrative and technical controls in Afghanistan.

In fact, the Iran-Afghanistan dispute over the Helmand water rights has played a major role in determining the relationship between the two countries over the past 50 years. It has prevented co-operation between them and has had an increasingly disastrous environmental impact on Sistan and Baluchestan Province and its population. In other words, the area has a history of multiple water conflicts. Activities relating to the trans-boundary waters of the Helmand River are governed by a bilateral agreement signed between Afghanistan and Iran in 1973. Given the continuing instability in Afghanistan

since the agreement was signed, it has not been possible to implement this agreement fully. Recent moves towards achieving stability in Afghanistan pave the way for better implementation and regular co-operation between the two countries in this endeavour. However, given the environmental crisis and climatic changes that have occurred since 1973, it may be necessary for the two Governments to review and revise the 1973 agreement with regard to current ecological needs.

Since the establishment of the Afghanistan Transitional Administration (ATA) in May 2002, there has been a series of mid- and high-level bilateral talks on the trans-boundary waters. The Helmand River and Sistan Basin were on the agenda at a Presidential summit held in Kabul in August 2002. This demonstrates the high priority given to regional co-operation on this issue. Following the 2002 summit, there was a one-off release of water from the Kajaki Dam. Moreover, referring to existing mission reports and interviews, the Afghan authorities at all levels have stressed the importance of the Sistan Basin and expressed their intent to maintain the functioning of the Helmand/Sistan ecosystem. They have also expressed a desire to co-operate with I.R. Iran over these matters.

However, in order to realise these good intentions, the issue of inadequate capacities and resources must be addressed. The overall objective of the proposed UNDP / GEF support is to achieve the restoration of the Hamoun Lakes and to ensure the minimum flow of water needed to maintain the ecological, social and economic safety of the area. This project will assist in completing and building the necessary capacity for protecting the area through environmentally sound measures.

The proposed UNDP/GEF project is aimed at ensuring that the medium- and long-term needs of the Sistan ecosystem and of the communities using the wetlands and lakes are met. The project will do this by establishing a co-ordinated management mechanism that ensures a regular and sufficient flow of water into the basin. The project will help the two countries to develop a joint Strategic Action Programme (SAP), and secure the commitment necessary for implementing this Programme. It will also design and support specific measures aimed at restoring and protecting this unique wetland ecosystem and its biodiversity. Management capacity that is able to respond to future natural and man-enhanced variations in precipitation will also be established in the region.

This will be achieved through a series of targeted GEF-supported interventions, set out as follows.

- Supporting the establishment of a bilateral co-ordination mechanism for the oversight and management of the Sistan Basin hydrological resources and associated ecosystems.

- Facilitating a process of consultation with key stakeholders to identify their concerns, roles and contributions.

- Supporting the preparation of a Transboundary Diagnostic Analysis (TDA) of the present hydrological and natural resources of the entire Sistan Basin catchment area.

- Supporting the development of a Strategic Action Programme (SAP) for the management of the Sistan Basin and its associated ecosystems.[4]

2 ANALYSIS OF THE CURRENT SITUATION AND TRENDS

This part of the report is intended to analyse the current situation in terms of its socio-economic and ecological contexts. Moreover, by using existing information, predictable trends will be introduced. The purpose of this report is to bring the issue of the Sistan Basin water shortage to the forefront of an inter-country effort assisted and facilitated by UNDP to follow up on earlier activities and to identify win-win strategies and action plans for the integrated sustainable management of the Basin. Within the terms of the ToR prepared for this report, the field visit is limited only to that part of Sistan Basin that lies inside the Iranian borders. Despite this, some efforts has been made to illustrate the situation inside the Afghanistan through reviewing existing documented information.

2.1 STATEMENT OF THE PROBLEM

Throughout the second half of the past century, the amount of water flowing into the Sistan Basin has been declining. Over the past six years, a combination of low precipitation, unmanaged water abstractions and political instability have caused the wetlands to dry up. The precise extent of this desiccation is not fully known, but it is thought that it may possibly cover almost all of three larger lakes and to have lasted for over three years. The Governments concerned are planning a co-ordinated set of small-, medium- and large-scale initiatives aimed at water management and sustainable development in the basins of the rivers flowing into the Sistan Basin. The rivers flowing into the Sistan Basin have a catchment area covering almost one half of Afghanistan, with the Helmand River Basin alone covering approximately one quarter of it. Moreover, almost one third of all irrigated lands in Afghanistan lie in the Helmand River basin. This serves to underline the economic and social importance of these river basins to Afghanistan. Meanwhile, Afghanistan's agricultural and Natural Resources Management sectors are in recovery, after suffering the severe effects of six years of drought and 20 years of conflict.

At almost all the sites in the Sistan Basin (as well as in the lower and middle reaches of the rivers), the environmental degradation has already had a major economic, social and cultural impacts. It has contributed to widespread and endemic poverty, to unemployment and underemployment and to the loss of traditional livelihoods. This socio-economic-ecological crisis is most acute in the area directly surrounding the Hamoun Lakes. The consequences of this crisis have spread over a large area. It affects a significant population (estimated to be in the range of half a million in the Sistan Basin alone), it is of international proportions and it poses a challenge to national and regional efforts to establish stability and to manage development.

Environmental degradation and desertification resulting from destruction of the original ground-cover is increasing across the Sistan Basin and the resultant erosion is widespread and extremely serious. The intensity, scope and length of dry periods and

[4] The Caspian Environment Programme initiated by the five Caspian littoral countries and assisted by UNDP/GEF provides a good example of a regional international waters mechanism.

droughts have increased and the environmental degradation takes many forms. These include the loss of biomass and vegetative cover, the loss of bio-diversity, a decline in soil productivity and a decline in the availability and quality of both surface and groundwater. In general, the environmental degradation is not yet severe, although sites it is severe at some localised and some environmental functions are in danger of becoming permanently lost. For example erosion and sand deposition in the Sistan Basin has greatly increased, and many villages have been lost in the sand, while large areas of agricultural land have been abandoned.

The current condition of the wetlands and the three lakes is of particular concern. All three lakes are reported to have been dry for several years. International missions to the wetlands in 2002 and 2003 observed that they were mostly dry and that the surviving vegetation is being affected. During the team's most recent mission, it was observed that the lakes are completely dry. If the drought persists, this globally unique ecosystem is in danger of becoming permanently deteriorated, and globally important flora and fauna (especially avifauna) may be lost.

The Government of I. R. Iran and the provincial government of Sistan and Baluchestan are greatly concerned about the water shortages. Over the years, indeed centuries, they have consistently requested that the Afghan authorities release more water – even when this has not been possible for hydro-meteorological reasons. In 1973, in response to immediate need for drinking water, Iran initiated the design of a series of canals to divert water from the Sistan Branch of the Helmand River into the naturally occurring Chahnimeh storage reservoir system. These water stores became operational in early 1980s and are presently providing people with safe drinking water in Zabol, Zaranj and Zahedan to the tune of almost 60 million cubic metres each year even in dry conditions. It appears that this is the sole reason for rural people to remain in their villages and not to migrate to cities far from the Sistan Basin. The Government of I.R. Iran is currently increasing the capacity of the Chahnimeh reservoirs from 0.7 to 1 billion $m.^3$

2.2 PREDOMINANT UNDERLYING THREATS

Without any doubt, the effects of drought in the Basin have influenced not only agricultural and plant production but also all living organisms, including domestic and wild species of plants and animals as well as human beings. This means that damage has occurred not only in cultivated fields but also in non-cultivated and natural protected areas as well in human society.

At present, large numbers of people have been internally displaced and many villages lie empty because of the loss of livelihood as a result of the severe environmental destruction. These displaced people move to urban areas in search of work and end up living as marginalised poor urban communities, putting great pressure on the supply of essential services.

The environmental degradation is driven by many factors, both natural and produced by human activities. The key natural threat is low precipitation:although records are incomplete, there is anecdotal and scientific evidence to suggest that precipitation, in particular winter snowfall, has been significantly below average for the last five to six years. This has undoubtedly contributed to the present drought. For example, CIA (2002) provides a map comparing precipitation over the three consecutive winters of

1998 to 2001 with normal years. From this map, the southern and eastern sides of the Helmand River basin, including much of the snowy uplands, received between 25% and 50% of normal precipitation.

The region is naturally faced with large annual variations in precipitation, and to receive less than 50% of the average in one year is not unusual. What is very unusual, however, is that the low precipitation figures have been reported several years in succession. Scientific interpretations of this situation differ - some suggest that this is due to regional climate change exacerbated by human activities, while others maintain that these are natural climatic variations. Initial reports for the Winter/Spring seasons during 2002 and 2003 suggest that snowfall has been recorded at near normal levels.

These factors are, of course, interrelated and interdependent with the core issue being the destruction of the Hamoun Lakes and its related environments. It is a unique, invaluable and internationally recognised area of bio-diversity and the consequent impact of its destruction on agriculture and on a social system that has been sustained for thousands of years is significant. There are a number of issues that directly affect the living communities and have the potential to become compounded into serious social problems, with the potential for destabilising and delaying the recovery process in Afghanistan. An initial analysis reveals that the principal man-enhanced threats include water quantity and land degradation.

Pastureland is a principal source of conflict. Competition over this valuable resource engenders conflict among settled and nomadic land users and raises ethnic and territorial concerns. Forests have suffered extensive damage during the more than 20 years of conflict from which the country is now emerging. In particular, there is widespread concern about extensive harvesting of old growth cedar forest for lucrative export markets and the depletion of the pistachio forests through neglect and for firewood. At the current rate of deforestation, there will be no forest left in 25 years from now. Due to a lack of rangeland management and drought, the rangelands have suffered severe overgrazing.

Other possible threats include: the conversion of marshland to agricultural land near the lakes; the introduction of alien, invasive species, notably species of Carp; over-harvesting of wood for fuel; over-foraging of reed-beds; and overuse of pesticides and pesticide residues.

Finally, the deposition of silt carried by the Helmand River to the Hamoun is possibly leading to a decrease in the size of the wetlands. UNEP (2003) estimated that the delta of the Helmand River into Hamoun-e Puzak has advanced by over 20 km. over the past 120 years.

In general, each of these threats has been present over a long period and each has increased in scale over the previous century. They have increased notably both in scale and complexity over the past twenty years of conflict in Afghanistan. Together, these threats have greatly increased the likelihood of drought as well as the vulnerability to drought of the Sistan Basin.

Furthermore, Afghanistan has earned notoriety as the world's largest producer of opium, contributing some 75% of the global illegal supply in recent years. In 2003, the United Nations Office on Drugs and Crime (UNODC) estimated output at about 3,300 tonnes of opium gum from a total area of 81,000 ha. The drug trade is causing a deep social crisis

inside Iran and its trafficking costs that country $800 million per year on enforcement measures, with an average of 150 police or soldiers dying each year to enforce the international ban. At present, 95% of all drugs-related inmates in Iranian prisons are of Afghan origin and one third of all drug seizures in I.R.Iran occur in Khorasan and Sistan and Baluchestan Provinces.

Poverty and displacement pushes poor people into the arms of the opium producers and smugglers and heroin gives them an alternative source of livelihood. There are only a few people, unfortunately, who do not resort to this business. The resumption of the flow of water into the region and the renaissance of agricultural production would at least offer some hope to poor people who at the moment have little alternative if they wish to survive.

The principal challenges to be addressed can be listed as follows.

- Water rights over the Helmand River.
- Watershed degradation and plant cover deterioration.
- Extensive environmental degradation of productive agricultural land.
- Pressure on social welfare structures.
- A significant increase in drug smuggling since the ousting of the Taliban regime from power in Afghanistan.
- Instability and conflict caused by weapons proliferation in the region.
- Losses from long-term water storage in open reservoirs.
- Inefficient water use.
- Unsustainable withdrawals into large- and small-scale irrigation schemes, as well as through *karez*, wells and mobile pumping stations.

Major threats raised by land degradation include the following.

- Unsustainable grazing.
- Inappropriate agricultural practices, including the conversion of pasture land, over-grazing and road construction.
- Wind erosion and long distance sand deposition.
- The extension of salty lands and desertification.

2.3 STAKEHOLDER IDENTIFICATION

As described in documents prepared in support of UNDP/GEF activities, carrying out an analysis to identify stakeholders will help to determine the roles and responsibilities of each stakeholder in the overall management of the rivers and lakes and in the implementation of the proposed project. [unfinished sentence]

Such an Analysis that includes a strategy for promoting the appropriate involvement of all possible stakeholders, will be a key tool for identifying the membership and mandate of the bodies to be established through its planned activities.

It seems that the key counterparts and stakeholders for this project are the following bodies and institutions.

Afghanistan:

- Ministry of Irrigation, Water Resources and Environment.
- Ministry of Water and Power (responsible for hydro-electric schemes).

- Ministry of Rural Rehabilitation and Development (responsible for traditional and small-scale irrigation schemes).
- Ministry of Agriculture and Animal Husbandry.
- Ministry of Foreign Affairs.
- Provincial Administration of Nimrooz Province.
- Provincial Administration of Farah, Ghazni, Helmand, Kandahar, Uruzgan and Zabol Provinces.
- Helmand and Arghandab Valley Authority (HAVA).
- Science Research Centre, Afghanistan Academy of Sciences.
- Faculty of Agriculture, Kabul University.
- Locally active NGOs.

I.R. Iran:
- Ministry of Energy.
- Ministry of Agricultural Jihad, including Shilat (Fisheries Corporation), the Agricultural Research Organization and the Natural Resources and Domesticated Animals Affairs Research Center.
- Department of Environment.
- Management and Planning Organization, including the Sistan Development Organization.
- Ministry of Foreign Affairs.
- Provincial Administration of Sistan and Baluchestan province and the Sistan and Baluchestan Regional Water Board.
- National NGOs (such as Iran's Watershed Management Association).
- University of Zabol;
- Locally active NGOs.

3 RECENT IMPORTANT INFORMATION

Afghanistan

After more than twenty years of political and military conflict, the present political situation in Afghanistan offers some grounds for optimism for stability. Further political stability would offer an opportunity for sustainable development in the country. It is becoming increasingly possible for both the Government and donors to envisage implementing standard 'development' projects with long-term objectives.

In this context, the international donor community pledged over $5 billion in concessionary and grant finance to Afghanistan at the Tokyo Ministerial Meeting held in January 2002. In order effectively to plan and programme this assistance, two national planning documents have been prepared: the National Development Framework (NDF) prepared by the Government, and the Immediate and Transitional Assistance Programme for the Afghan People (ITAP) prepared with the support of the donor community. Both the NDF and ITAP have as key objectives the rehabilitation of irrigation systems and improved water management.

Building on this, the Government and the international community jointly undertook needs assessments in priority areas, including a Comprehensive Needs Assessment of the Natural Resources and Agricultural Sector (CNAAg). The CNAAg focuses on increasing agricultural production and sustainable development across Afghanistan,

particularly in rural areas. The CNAAg recommends a series of short- and mid-term measures related to water management. If implemented, these measures will contribute to easing environmental degradation and water shortages in the Helmand River and Sistan Basin. These mid-term measures can be summarised as follows.

- Rehabilitation of small and medium sized irrigation schemes and watershed management plans.

- Planning of and investment in large-scale irrigation schemes.

- Establishment of the foundations for comprehensive water resources management (this covers institutional developments, policy, law, monitoring, information collection and management).

- Capacity building amongst national and local agencies.

The 2003/2004 Public Investment Programme (various Ministries, 2003) sets out to make operational these policy aims, improving the management and efficient use of water resources. The NDF, CNAAg and Public Investment Programme set out the Government's development plans and the implementation of these three strategic documents represents the general [developmental?] baseline in Afghanistan. It is notable that implementation of the CNAAg's recommendations for the Helmand and other river basins constitutes the specific Baseline.

As part of this Baseline, the Government intends to implement a series of large- and small-scale irrigation restoration projects and programmes in the Helmand River and Sistan Basin area. Most of these are still at the earliest stages of identification. Major emphasisis likely to be placed on clearing sand out of irrigation canals, rebuilding and re-lining irrigation canals, rebuilding dams and dykes, restoring *karez* and increasing the scale and number of wells. These programmes will also increase capacity to manage the water sector, at the systemic, institutional and individual levels.

Over the coming decade, we can expect these programmes to lead to decreased water loss and wastage. They will also lead to a more water-efficient and cost-efficient agricultural sector. They should also lead to increases in agricultural production and to decreases in poverty, as well as decreased water shortages, both in the Helmand Basin and around the Sistan wetlands. They should help to regularize the economy, and facilitate the return both of refugees from I. R. Iran and of IDPs to their home villages.

In summary, the Baseline programmes will have a strong 'one-off' effect in terms of efficiency and will, importantly, lead to developing significant management capacity in the Basin, including the generation of adequate quantities of information and information management systems. The Baseline is also likely to lead to the establishment of an effective Helmand River Basin Management Committee.

However, the trend over the past century has been of increasing extractions from and decreased flows into the Sistan Basin. Drought has become increasingly common throughout the Basin and the whole region. Under the Baseline, after this initial one-off effect, the previous trend of gradually increasing extractions from and decreased water flows into the lower reaches of the river is set to continue, leading to increased environmental degradation. Moreover, under the Baseline, the long-term threats to the

wetlands and to the Sistan Basin will not be removed. Most notably, the wetlands are likely, one day, to become permanently dry and this globally unique ecosystem is likely to be lost.

I.R. Iran

Under the Baseline, reconstruction and agricultural development in Afghanistan will encourage Afghan refugees in Iran to return to Afghanistan. This should reduce the population of Sistan and Baluchestan Province and reduce pressure on social and environmental services. At the same time, increased water efficiency in the Helmand and other Afghan rivers should lead to more water flowing into Iran, initially. This should, in turn, decrease stresses on the social and economic fabric in Sistan and Baluchestan Province and provide social and economic benefits to Iran.

Under the Baseline, it is very unlikely even in the short-term that the aforementioned one-off effect will result in more water flowing into the Sistan Basin wetlands. The more likely outcome is that Afghan farmers will use any additionally available water themselves, where possible. In view of the weakness in bilateral co-operation and the lack of full trust, it is then likely that I.R. Iran will channel any additional water into its storage schemes and store it for future use. In the long term, as extractions progressively increase water flows into the Sistan Basin will decrease again. The Baseline scenario will lead to a permanent destruction of the Sistan wetlands in both Iran and Afghanistan. It will also lead to continuing water scarcity and increased risk of conflict.

CONCLUSIONS

The main points highlighted in this report can be set out in the following conclusions.

1. The Iranian section of the vast Hamoun-e-Puzak, Hamoun-e-Saberi and Hamoun-e-Helmand wetlands, a significant part of which used to lie in Afghanistan, until recently consisted of a complex of shallow freshwater lakes with rich submerging vegetation and extensive reed-beds. It was an internationally important area for wintering water birds. Complete loss of certain bird species has occurred due to the widespread restriction in water flow and vegetation degradation occurring in the Sistan Basin.

2. The part of the Hamoun Lakes that lies within Iran has been designated as a Protected Area, although the Iranian authorities only have jurisdiction over this part. The Iranian authorities have no control over the inflow of water from Afghanistan.

3. The Hamoun Lakes are located in a closed drainage basin and, consequently, encompass special environmental problems. There has also been increasing pressure from urbanisation and agricultural irrigation. This creeping environmental disaster that is taking place on the southern edge of Central Asia is almost an exact repeat of the Aral Sea catastrophe.

4. Almost the entire area of the Iranian part of the Basin is formed out of sediments from Helmand River, creating one of the most fertile lands in Iran. Unfortunately, utilisation of its fertility can not be maximised because of shortage of water and precipitation. A major climatic feature of the Basin is a high velocity northerly wind blowing from the mountains

of Afghanistan in the Spring and early summer months. This wind, together with high temperatures, causes intense evapo-transpiration of the sheets of water in the Basin.

5. The cumulative effect of water extraction from the Helmand River has led to a great reduction in the flow of water reaching the Sistan Basin and Hamoun Lakes. Further irrigation structures are under construction in Afghanistan and the completion of the Kamal Khan diversion dam will likely deepen the environmental tragedy in Sistan and will undoubtedly exacerbate the rift between Iran and Afghanistan.

6. The removal of vegetation cover in the Hamoun Lake area has led to a serious threat of wind erosion in the Sistan Basin. Furthermore, there has been much environmental damage induced by human activities, such as the over-grazing of livestock, excessive foraging of reeds from the reed-beds, the over-harvesting of forests and the over-use of pesticides.

7. The traditional economic wealth of the Basin has diminished as a result of the reduction in water flowing from the Helmand River into the Hamoun Lakes. In general, agricultural production throughout the Basin, including the upper and middle reaches of the Helmand, is highly dependent on irrigation water. It employs five basic types of irrigation systems. These are modern surface systems, traditional surface systems, springs, *karezes* and wells. Modern systems constitute approximately 10% of the total irrigated areas while *karezes* traditionally make up about 5%. Springs represent slightly more than 5% and over 80% are traditional canal irrigation systems with intakes from various rivers and streams.

8. There is a serious socio-environmental problem in Sistan and Baluchestan Province that has been intensified by factors related to the drought and the Afghan crisis and, in particular, the water shortage in the watershed of the Helmand River and in the Sistan Basin. The socio-economic context implies a number of issues and challenges, of which the major requires a focus on the implications of the water shortage and the impacts of periodic drought for and on the affected communities of the Basin.

9. Traditional knowledge, skills and practices that are important to achieving the sustainable use and management of natural resources are being lost.

10. The gender situation in the Sistan Basin presents a big development challenge, caused in part by previous official policy (such as the exclusion of women and girls from public activities) but also the result of the social and cultural attitudes of the region. Furthermore, a history of paternalistic “top-down” approaches to government assistance has meant there is a limited capacity to develop targeted, participatory and gender-sensitive development programmes. This presents the challenge of changing the traditional transfer/charity model to a more practical, reliable and sustainable one.

11. In the Iranian parts of the Basin, technical and administrative frameworks are relatively well supported by central and local government and there is good capacity to reach local communities through existing local offices and communications infrastructure.

12. The existing dispute between I.R. Iran and Afghanistan over the Helmand River water rights has played an important role in relations between the two States and has

prevented bilateral collaboration at a time when a large environmental catastrophe is threatening the Sistan Basin and its inhabitants.

13. The institutional breakdown of water management has had a significant impact on water distribution within irrigation systems. These problems are increasingly affecting the productivity of the agricultural economy and rural livelihoods.

14. The importance of focusing on the implications of the water shortage will require a reconsideration of the existing institutional, political and international frameworks on both the Afghan and Iranian sides. Development of appropriate mechanisms to achieve regular co-ordination and co-operation among existing actors would be of particular importance. There is also the need to develop a firm basis for bi-lateral negotiation and the necessary skills for this and a strengthened regional administration, well-targeted local management and the establishment of an effective infrastructure. Lastly, it will need a good communications strategy for promoting the benefits for local stakeholders in the area of alleviating disastrous environmental consequences.

15. The recent succession of dry years prior to 2003 have significantly reduced the annually rain-fed area under cultivation on both the Afghan and Iranian sides of the Basin and have contributed to the exodus of farmers. However, the agricultural and natural resource management sectors are in recovery, after suffering severe effects from the 6 years of drought preceding 2004.

RECOMMENDATIONS

The following recommendations would appear worthy of consideration in the hope of paving the way for a morally and technically acceptable solution to the existing problems of the Sistan Basin. They are as follows.

1.Carry out thorough surveys of the economic value of environmental goods and services supported by the three lakes and the scale of the annual costs of environmental degradation of the natural ecosystems of the Sistan Basin determined.

2. Determine the ecological needs [of?] the Lakes to the [Helmand River?] water and of releasing the Helmand water to the Basin in accordance with identified water needs.

3. Address the man-made factors in the drying up of the Hamoun Lakes as far as possible in order to reduce its vulnerability to natural causes. Further, mitigation of the effect of floods and earthquakes by creating an improved management capacity to respond to these.

4. Build into any management and/or development programmes recognition of the importance of economic activities dependent on the water in the area, such as hunting in the reed-beds, fishing and river and lake transportation.

5. Reduce the local population’s reliance on Government food aid by addressing the causes of the loss of locally available sources of protein, mainly fish and livestock.

6. Reconsider management approaches in the Hamoun Lakes Protected Area to include local participation and the consideration of the environmental/social nexus for achieving environmentally, socially and culturally sustainable development.

7. Achieve the complete separation of the Helmand River question from political and national interest considerations by both Afghanistan and I.R. Iran.

8. Develop a full awareness in both I.R. Iran and Afghanistan that control over and exploitation of the Helmand River below the Arghandab River confluence (particularly below Band-e Kamal Khan) is the exclusive right of neither. Furthermore, recognition that the Sistan Basin residents on both sides of the border have rights to the river in accordance with their agricultural and water needs.

9. Improve bilateral co-operation in the management of the Sistan Basin in order to address both the ecological as well as the social challenges that are shared by both countries in the region. This could include revision of the 1973 Agreement on the trans-boundary waters of the Helmand River to take better account of current ecological needs and conditions.

9. Undertake joint projects between I.R. Iran and Afghanistan for investment in the construction of regulatory and reservoir dams in suitable places below the confluence of the Arghandab River.

REFERENCES

Asian Development Bank (ADB). 2004. *Securing Afghanistan's Future: Accomplishments and the Strategic Path Forward - Natural Resources Sector in Recovery.* Technical Annex, South Asia Department.

Christensen, P. 2003*,* "Middle Eastern Irrigation: Legacies and Lessons", *Section I: Agriculture and Pastoralism.* University of Copenhagen.

Cullather N. 2002. *From New Deal to New Frontier in Afghanistan: Modernization in a Buffer State, The Cold War as Global Conflict*. Working Paper: No.6. International Center for Advanced Studies. New York University.

Global Environment Facility (GEF)/United Nations Development Programme (UNDP). 2001. "Restoration, Protection and Sustainable Use of the Sistan Basin (Lakes and Wetlands)". *Concept Paper* for a Full Sized GEF Project*.*

Global Environment Facility (GEF)/United Nations Development Programme (UNDP). 2002. "Protection and Sustainable Use of the Sistan Lake Basin. "*PDF Block B.*

Global Environment Facility (GEF)/United Nations Development Programme (UNDP). 2002. "*Sistan and Baluchestan Province Community Recovery & Area Development Programme" Project Concept.*

Global Environment Facility (GEF)/United Nations Environment Programme (UNEP). 2003. *AFGHANISTAN POST CONFLICT ENVIRONMENTAL ASSESSMENT***,** Available at (January 2003) http://www.earthprint.com.

Global Water Partnership (GWP). 2004. *Catalyzing Change: A Handbook for Developing Integrated Water Resources Management (IWRM) and Water Efficiency Strategies*, GWP Technical Committee/Ministry of Foreign Affairs, Norway.

Sloane, P. 2001. *Food Security Strategy for Afghanistan*, prepared for the Working Team on Food Security, [name of organisation?], islamabad..

United Nations (UN). 2000. *The Drought Situation in the Islamic Republic of Iran.* Technical Mission Report on the Drought.