Pipeline Concept Paper

Project title: Restoration, Protection and Sustainable Use of the Sistan Basin

- (PIMS 2848)
- Anticipated Workprogramme Entry: October 2005
- Anticipated GEF $4,000,000 (including PDF B):

GEF Implementing Agency: United Nations Development Programme

Countries in which the project is being implemented (All riparian countries are eligible for GEF support for International Waters)**:** Afghanistan and the Islamic Republic of Iran.

GEF Focal Area: International Waters

Operational Program/Short-term measure: OP9 (Integrated Land And Water Multiple Focal Area Operational Program)

Strategic Priority: 2

Global Environment Facility

CONCEPT PAPER for a FULL SIZED GEF PROJECT

Restoration, Protection and Sustainable Use of the Sistan Basin

The Governments of:

Afghanistan
Islamic Republic of Iran

and

The **United Nations Development Programme**

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Short Project Description:

The Sistan basin stretches across parts of south-western Afghanistan and south-eastern Iran. This inland basin is fed by the waters of the Helmand, Khash, Harut, Farah and other rivers originating in the Central Highlands of Afghanistan. The basin includes a complex and unique wetlands system consisting of three large shallow lakes (Hamun-i Puzak, Hamun-i Saberi and Hamun-i Helmand) and a series of smaller lakes and marshes with extensive reed-beds. The lowest point in the basin, and hence the ultimate destination for waters, is the saline *Godzareh* depression in Afghanistan. The basin constitutes an excellent example of large, permanent, freshwater wetlands within an extremely arid desert region. The wetlands provide a habitat for diverse and globally significant fauna and flora. They are also vital for sustaining the local economy and for regulating the regional micro-climate. They are also an integral part of the region's unique social and cultural structure.

Throughout the second half of the past century, the amount of water flowing into the Sistan basin has been declining. Over the past five years, a combination of low precipitation, unmanaged water abstractions and political instability have caused the wetlands to go dry. The precise extent of this desiccation is not fully known, but it is thought to possibly cover almost all of three larger lakes and to have lasted for over three years. The proposed project, as an integral part of a coordinated set of small, medium and large-scale initiatives addressing water management and sustainable development in the basins of the rivers flowing into the Sistan basin, will ensure that the medium and long-term needs of the Sistan ecosystem and of the communities using the lakes are met. The project will do this by establishing a coordinated management mechanism that ensures a regular, sufficient flow of water into the basin. The project will facilitate the development of a Strategic Action Programme (SAP) jointly endorsed by the two countries, and secure the commitment for implementing this Programme. It will also design and support specific measures aimed at restoring and protecting the unique wetlands ecosystem and its biodiversity. Management capacity able to respond to future natural and man-enhanced variations in precipitation will be established in the region.

This project is a foundational capacity building project in a water scarce area that has not been covered by any GEF interventions in the past. The area has a history of water conflicts and efforts are needed to promote coordination and cooperation among competing users for the waters. The project is designed to support transboundary cooperation at the bilateral level and strengthen country capacity for policy/legal/institutional reforms and investments needed to address key transboundary concerns. As such, the proposed project is closely aligned with the emerging Strategic Priorities of the International Waters focal area for the 3rd Operational Phase of the GEF.

1. Project title:

Restoration, Protection and Sustainable Use of the Sistan Basin

Lying across parts of southwestern Afghanistan and southeastern Iran is a unique and complex wetlands ecosystem consisting of 3 large shallow lakes (Hamun-i Puzak, Hamun-i Saberi and Hamun-i Helmand), a series of smaller lakes and marshes, extensive reed-beds and the saline *Godzareh* depression in Afghanistan. This inland wetlands system is fed by many large rivers, including the Helmand. This inland wetlands system is the focus of the present proposed project. Hereafter in this proposal the wetlands system will be referred to as the "Sistan Basin".

2. GEF Implementing Agency: United Nations Development Programme

3. Countries in which the project is being implemented:

Afghanistan and the Islamic Republic of Iran.

4. GEF Focal Area: International Waters

5. Operational Program/Short-term measure: OP9 (Integrated Land And Water Multiple Focal Area Operational Program)

Strategic Priority: 2

6. Country and Regional Drivenness

<u>Regional Initiatives</u>

The trans-boundary waters of the Helmand River are subject to a bilateral agreement signed by Afghanistan and Iran in 1973. Given instability in Afghanistan since the signing of the agreement, it has not been possible to fully implement this agreement. Recent moves towards stability in Afghanistan pave the way for improved implementation and regular cooperation between the two countries. However, given demographic, economic, political and climatic changes since 1973, it may be necessary to review and revise the 1973 agreement.

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 trans-boundary waters. For example, the Helmand River and Sistan Basin were on the agenda at a Presidential summit in Kabul on the 13th August 2002. This demonstrates the high priority given to regional cooperation on this issue by the two governments. A direct result of these talks was the one-off release by the Afghan authorities of significant waters from Kajaki reservoir into the Helmand River in October 2002.

<u>Afghanistan</u>

The Government of Afghanistan is starting an ambitious programme of rehabilitation and reconstruction of society and of its economy following more than 20 years of internal conflict.

This programme is described in the *National Development Framework* (NDF). The NDF bases future development on three strategic pillars, one of which addresses natural resources including the improved utilisation and management of water resources.

Collectively, 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. Moreover, almost one-third of all irrigated land in Afghanistan lies in the Helmand river basin. These facts emphasise the economic and social importance of these river basins to Afghanistan.

The international donor community has pledged over $5 billion in assistance to Afghanistan. Given that Afghanistan is a water scarce country, and that water is the main limiting resource for most socio-economic sectors (notably agriculture and energy), the rehabilitation of the nation's water management system is a priority for support by the international community. Water sector development activities are expected to address both hard and soft infrastructure, and to cover the rivers flowing into the Sistan Basin.

The Government of Afghanistan's public investment programme for the period March 2003 to March 2004 includes several related programmes and sub-programmes, the two most pertinent of which are:

- National River Basin Management: to establish improved water resource management systems, through adoption of river basin management approaches in the five river basins in Afghanistan;
- Environmental Preservation and Regeneration: to develop a national capacity for environmental management, conservation and regeneration.

The government also intends to hold related policy reviews in this planning period.

The 1981 Water Law provides guidance on the structures, standards and approaches to managing water. It also outlines the roles, rights and responsibilities of the various water users in Afghanistan. The Law provides a useful framework for present day action, although it may need some updating and revision to fully match the present situation.

The government has not yet prepared a National Environmental Action Plan (NEAP) or a National Conservation Strategy. However, in interviews[1], Afghani authorities at all levels expressed the importance of the Sistan Basin and expressed their intent to maintain the functioning of the Helmand/Sistan ecosystem. They also expressed a desire to cooperate with the Islamic Republic of Iran on these issues.

The Afghani parts of the Sistan Basin lie in Nimroz and Farah provinces. These provinces are very arid – most of the land is desert and all agriculture is irrigated. The population of farmers, nomads and traders of these provinces depend totally for all economic and social activities on the waters brought by the Helmand and other rivers from the central mountains. In interviews, provincial and district senior government officials emphasised that sustainable water management is the leading development objective in these provinces.

[1] Consultations were held with the Afghan authorities at the central and local levels during a UNDP mission to Afghanistan in September-October 2002.

FAO (1981) identified Hamun-i Puzak as one of the most important natural areas in Afghanistan, and recommended it be included as a Ramsar site and that a protected area be established. No follow-up was made on these recommendations due to the conflict in the country.

I. R. Iran

The government of I. R. Iran is committed to long-term sustainable development in the Sistan Basin. The Iranian parts of the basin lie in Sistan and Baluchistan province.

The drought and the conflict in south-western Afghanistan have created a social crisis. One result is that large numbers of refugees fled across the border to I. R. Iran. This placed a great strain on the social infrastructure in Sistan and Baluchistan province, and has created serious tensions. 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.

The government of I. R. Iran is highly committed to supporting the ongoing processes of stability and reconstruction in Afghanistan. It committed over $500 million to support reconstruction in Afghanistan. One sub-objective of this support is to improve socio-economic conditions in Sistan Basin, on both sides of the border, with pursuant clear benefits to the people and government in I. R. Iran at provincial and national level.

The Government of I. R. Iran and the provincial government in Sistan/Baluchistan province are highly concerned about water shortages. Over the years, indeed centuries, they have consistently requested the Afghani authorities to release more water – even when this has not been possible for hydro-meteorological reasons. In 1973, I. R. Iran started construction of a series of canals to divert water from the Helmand River into the naturally occurring *Chahnimeh* storage reservoir system, which commenced operations in 1976. The Government of Iran is presently increasing capacity of the Chahnimeh reservoirs from 0.7 to 1 billion m^3. The water in Chahnimeh is presently used as drinking water over a large region.

With regards to natural resources, the I. R. Iranian National Strategy for Sustainable Development identifies the following relevant actions among its list of priority actions and investments:

- Implementing projects to protect biodiversity…and international water pollution mitigation.
- Implementing a priority investment programme for “win-win” projects…investments that have both environmental and economic benefits…(such as) projects for watershed and forestry management.

Focusing specifically on the Sistan Basin, I. R. Iran recognizes the international importance of all three larger lakes in the Basin. It has taken management steps to maintain the ecosystem and its functions. These include placing parts of Hamun-i Puzak (10,000 hectares) and Hamun-i Saberi (50,000 hectares) on the Ramsar Convention’s List of Wetlands of International Importance. In addition, I. R. Iran recently established the Hamun protected area, covering 193,500 hectares in Sistan/Baluchistan province. This protected area covers all the lakes lying in Iranian territory. This is now managed by the Department of Environment. I. R. Iran is also fully committed to a full and close cooperation with the national and local authorities in Afghanistan.

7. Context

a) The Project Area

The proposed project area can be divided into two parts. The first part consists of the upper and middle reaches of the rivers that provide water to Sistan Basin. These rivers lie in Afghanistan. The second part consists of the lower reaches of these rivers and the Sistan Basin. The Basin is divided almost equally between Afghanistan and I. R. Iran. This latter area contains the unique, globally important ecosystem (The map in Annex 1a shows how the Helmand river basin stretches across Afghanistan. The maps in Annexes 1b and 1c show the rivers flowing into the Sistan Basin and the wetlands system in the basin.)

b) Hydrological and Environmental Situation

<u>The Upper and Middle Reaches</u> These upper and middle reaches all lie in Afghanistan and include the catchment areas of the Helmand, Farah, Harut, Gulistan, Khash and the Kajrud rivers.

The Helmand River originates at the western edge of the Hindu Kush mountains of central Afghanistan approximately 50km west of Kabul (see Map in Annex 1a). 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 4000m the mountains are initially free of vegetation, followed in descending altitude by pastures and steppes, small-scale agricultural activities and thin forests.

The mountainous upper reaches of the Helmand river basin (together with its tributaries) cover most of Vardak, Ghazni, Oruzgan and Zabol provinces. The middle reaches cover Kandahar and Helmand provinces, with their small mountains, foothills, and gently-sloped agricultural areas. The main tributaries are the Ghazni, Musa Qala and the Arghandab rivers. All major tributaries join the Helmand River upstream of the city of Lashkar Gah in Helmand Province; the river then slowly meanders for over 400km across the desert in Nimroz province and to the Iranian border. Just after passing the village of Char Bujak near the Iranian border, the Helmand river divides into two branches. The *Sistan* branch flows directly into I. R. Iran and into the Hamun-i Helmand. The northern, *Parian*, branch passes the city of Zaranj, and forms the border with I. R. Iran for approximately 20km, before turning back into Afghanistan and flowing into the Hamun-i Puzak.

The total length of the main Helmand River is 1188 km and the total drainage area is 166,000km^2. The total potential annual flow of the Helmand river and its tributaries is estimated at 7.5 billion m^3. Flow measurements have been carried out from the late-1940s up to 1978, and the peak record flow during this time was 1,582 m^3/s in May 1967.

The majority of water flowing in the Helmand originates as precipitation in the 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 these upper reaches, the river catchment area is semi-arid, arid or very arid.

A series of diversion and storage schemes have been constructed on the Helmand river, mostly in the 20th century. The large schemes include the Kajaki dam constructed in 1952 (1.7 billion m^3), Arghandab (or Dahla) Dam (479 million m^3) and the Helmand Irrigation schemes[2] (irrigating 99,400 hectares). When constructed, the principal objectives of these schemes were flood control, irrigation, and hydro-power. In addition to these large schemes, many small-scale

[2] this consists of 3 schemes, the Saraj, Boghra and Darweshan.

schemes exist at all points in the river basin (except the upper reaches). These include: irrigation from natural springs; *karez (*man-made underground canals) for collecting/distributing ground-water; small and deep-wells, both hand and motor driven; up to 60 mobile pumping stations; and small diversions from main 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.

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

Table 1: Flows and drainage area of main rivers flowing into Sistan basin (taken from FAO, 1997)

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

With regards to the Helmand river (for which the most information is available), the cumulative effect of all the withdrawals, particularly the Kajaki Dam and the Helmand irrigation systems, has been a great reduction in the flow of the lower reaches through Nimroz province. The river is now mostly dry for long periods in much of this province. This has greatly increased drought vulnerability in the province. In addition, in dry years, water reaching Iran is channeled from the Sistan branch to the Chahnimeh storage system.

As a consequence of the upstream withdrawals and diversions, the Helmand River is no longer a principal source of water for Hamun-i Puzak. The Khash river is now the major source. In fact, during dry years, no water flows from the Helmand into any of the three lakes (such as during the sustained drought from 1998-2002). During times of drought, the last areas to remain wet are the Chahnimeh reservoirs, the Godzareh depression and, sometimes, the Afghani part of Hamun-i Puzak.

<u>The Sistan Basin</u> The Sistan Basin stretches across the border of I. R. Iran and Afghanistan. The Sistan Basin is a very arid region with rainfall below 50mm/year and potential evaporation rates over 4,000mm per year. It consists of three freshwater, inland, permanent lakes; the deltas of several major permanent rivers feeding into the lakes, and; the wetlands and land between and immediately surrounding the lakes. Of the three lakes, Hamun-i Puzak lies mostly in Afghanistan, Hamun-i Saberi lies on both sides of the border, and Hamun-i Helmand lies in I. R. Iran (see Annexes 1b and 1c).

Under normal circumstances, the three lakes cover approximately 216,000 hectares (Puzak is 50,000 hectares, Saberi approximately 101,000ha and Helmand 65,000ha). The lakes are very shallow (on average 2-3 m deep) and, as they lie in a flat area, their surface area varies greatly

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

as a function of the incoming water. During great floods the three may join up to become one vast lake[4]. The main lakes are surrounded by permanent and seasonal wetlands, including vast and rich marshes, reedbeds and salt marshes.

In general water flows through rivers and underground canals from H. Puzak to H. Saberi to H. Helmand. In addition, H. Saberi receives water directly from the Farah river, and H. Helmand receives water directly from the Sistan branch of the Helmand River. Excess water flows from H. Saberi through a seasonal river to the Godzareh depression in Afghanistan. This depression is thought to be highly saline.

The Sistan Basin is a unique example of a complex wetland ecosystem within a desert area. The wetlands play a substantial hydrological and ecological role in the natural functioning of a major river. The wetlands are also an extremely important staging and wintering area for migratory waterfowl, as well as an important breeding area for many waterbirds, and are home to a large diversity of mammals, aquatic species and flora.

Due to low precipitation, the wetlands were largely dry during the period 1998-2002. However, in the lower reaches of the river courses, the rivers continued to flow seasonally, and small springs swell and run permanently over short distances. Even in times of intense drought, these areas provide healthy examples of the natural ecosystem, as well as genebanks for the region.

As can be seen from the land cover maps in Annex 4 (prepared by UNEP), the lakes have a history of drying up and then recovering. The maps, based on a time series of satellite images, show that the lakes became almost completely dry between 1976 and 1987, only to completely recover by 1988, and then be dry again by 2001.

Biodiversity in the Sistan Basin Water diversions in I. R. Iran implemented during the 20th century have contributed to the degradation of H. Saberi and H. Helmand. They have lost much of their original characteristics. However, H. Puzak has retained much of its original qualities, and it is representative of how the entire Sistan basin would have been in past times. The richest parts of H. Puzak lie in Afghanistan, for which unfortunately there are very few reliable recent records.

Bird Life International (1994) lists 8 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 squamatus flavirostris,* and *caprimulgus mahrattensis.* For example, in total, Bird Life International (1994) list 20 wintering and breeding bird species for which over 1% of the global population has been recorded in the Basin. In terms of wintering birds, in 1976 over 500,000 wildfowl were counted on Hamun-i Puzak alone, in what was considered to be a very poor year

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 particularly unique.

The mammals recorded in the Sistan basin, include the wolf (*Canis lupus*), golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*), striped hyaena (*Hyaena hyaena*), wild boar (*Sus scrofa*), caracal (*Lynx caracal*), goitered gazelle (*Gazella subgutturosa*), and jebeer gazelle (*G. dorcas fuscifrons*).

[4]Some reports indicate the lakes covering up to 400,000 hectares in wet years.

c) Socio-Economic Situation

Middle and upper reaches of the rivers This includes almost all of Farah, Vardak, Ghazni, Oruzgan, Zabol, Kandahar and Helmand provinces. One estimate of the total permanent population of these provinces is 4.6 million (calculated from figures provided in FAO/WFP, 2002). The provinces also include a large number of Internally Displaced Persons (IDP), and in summer a large number of *kuchi* nomads.

As a result of the prolonged and harsh military conflict, the socio-economic situation in this area is very poor. The economic infrastructure, such as roads, electricity generation and supply, 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 or destroyed. A WFP/FAO report prepared for the winter of 2002/2003 estimated that approximately one quarter of the population was vulnerable to food shortages, and this situation continues.

The pervading poverty in the region leads to other problems, such as drug abuse, cultivation of illegal narcotics, participating in other illegal and anti-social activities (e.g. trading in guns, drugs or people). The gender situation in many parts of the region is also challenging; official policy of previous regimes effectively banned girls and women from participating in any public activity.

The recent installation of the Afghan Transitional Authority (ATA) has created a unique opportunity and a sense of optimism that the situation can be improved. The international community is ready to provide much of the needed physical infrastructure, as well as support for capacity building. The development banks have recently recommenced lending to Afghanistan, and the international donor community has started supporting large-scale development projects.

The principal economic activities in the river basin are agricultural. Agriculture is largely irrigated (with most exceptions lying in high areas where rainfall is more common). The staple crop is wheat, with other crops grown including: corn, mulberry, pulse, grapes, pomegranates, tomatoes, watermelons, peaches, cotton, okra, and illegal crops such as opium and cannabis. For example, in Kandahar and Helmand provinces, all wheat is grown on irrigated land. However, the irrigation is restricted to flat areas lying close to the main river courses and to areas with good access to groundwater (most such land lies between 1,000 and 2,000m in altitude). On average, approximately 5% of the land is irrigated. The remaining land is pasture, desert or wildlands.

Sistan basin: Estimates of the population in the Sistan Basin are very unreliable, but it is estimated to be less than one million. This includes a considerable number of refugees and internally displaced persons. The population of the Afghani province of Nimroz is estimated at between 180,000 and 300,000. It is not clear if this includes nomads and internally displaced persons (IDPs), which could account for about half the population. The vast majority of these people depend on the Sistan Basin lake resources.

The Iranian authorities consider the social situation in Sistan/Baluchistan 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.

Generally, the socio-economic situation in the Sistan Basin is similar to that described above in the upper and middle reaches, with some important differences as discussed below.

Firstly, the basin lies on both sides of an international border. The social and economic infrastructure in I. R. Iran is far more effective than in Afghanistan, even for marginalized members of society and refugees. Hence poverty levels are lower, and the quantity and quality of schools and hospitals, roads, energy supply, etc. are all superior in I. R. Iran.

Secondly, the Sistan Basin has a large number of temporary residents. This includes Afghani refugees living in I. R. Iran and IDPs in Afghanistan. These people, often living in camps, place an additional stress on the environment and social infrastructure. The camps can also provide a focus point for illegal activities – such as smuggling and recruiting militia.

Until recently the basin's population included some unique tribes. The Sayyid hunter-gatherers were semi-nomads who used reed boats to net fish and predatory birds. Little is known of this tribe; 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 IDPs.

Third, the effects of the drought have been far more severe in the Sistan Basin area than in the upper reaches of the rivers. This has led to great hardship. In Nimroz province, many people have limited access even to drinking water. Groundwater is sinking and declining in quality. The same problem exists on the Iran side and agriculture has been very severely affected.

In the past, the economy was largely dependant on livestock rearing. It is reported that the Basin had an annual production of 3,500[5] tons of fish and was the home to 1.7 million cattle, goats and sheep. Apart from fish, people in the area utilised other lake resources: reeds were used for construction and energy; birds for protein; and the waters for recreation and transport. A unique breed of cow, the *Sistani,* grazed on *Tamarix sp.* and *Phragmites* reed beds, often wading into the lake and swamps for food[6]. Due to the ongoing drought, fish stocks as well as livestock numbers have been severely depleted. Traditional practices have been abandoned and in some cases traditional skills are being lost. A continuation of this situation could cause irreversible damage to the social and cultural fabric in the region.

The fourth difference between the Sistan Basin and the rest of the Helmand Basin is its location at an international crossroads and the corresponding important role it plays in regional trade. Likewise, trade plays an important role in the local economy. The importance of trade to the local economy has increased recently, as all water-dependant economic activities have stopped in the absence of water. In most cases trade makes a positive contribution to society and the economy. However, some trade is linked to illegal practices such as drug production. Other trade, although of legal products, may not follow formal trading procedures.

d) Political Situation

The political situation throughout Afghanistan is complex and unstable. In general, the ATA is stable and governs most of Afghanistan at the macro-level, including all the proposed project area. However, given its newness, the weakness of the public administration system, and the heritage of twenty years of conflict, it is not yet possible for the ATA to fully govern all areas of Afghanistan. For example, major one-off decisions on water allocation may be made by the ATA Ministries in Kabul, but the week-to-week decisions to use and allocate water are still made at the dam gates and well-heads. National decisions and policies may not have a due influence

[5] Other reports say 7,000 tons.

[6] The present status of this breed is not known. There is thought to be a small population living in Iranian research centers.

over these local decisions. The government is also limited, at present, in its ability to implement economic, fiscal or tax policy, and cannot effectively use such policy instruments to influence local actions. The national government is taking steps to address all these issues, and is making steady progress.

Afghanistan's political map reflects the existence of many tribal and historical affiliations. Neighbouring villages often have different affiliations. In such cases, coordination and cooperation between neighbouring villages can be challenging, and it may be difficult to implement activities involving several villages. The situation is complicated by the presence of a large number of arms and military hardware, and the pervading sense of insecurity (which in turn encourages people to use and display arms).

Local people, including both Baluchi and Sistani tribes, live across the project intervention area in Afghanistan and in I. R. Iran, as well as in neighbouring Pakistan. These people have travelled and traded across the region for many centuries. They represent an example of how coordination and collective decision-making can cross provincial and national borders. However, at present, efforts to fully integrate this and other tribes into modern state systems have not been fully successful.

8. Project Rationale and Objectives:

a) Problem statement

Environmental degradation and desertification is underway across the Sistan basin. The intensity, scope and length of dry periods and droughts have increased. The environmental degradation takes many forms including: loss of biomass and vegetative cover; loss of biodiversity; declining soil productivity; and declining availability and quality of both surface and groundwater. In general the degradation is not yet severe, although at some localised sites it *is severe and some environmental functions are in danger of being lost permanently.* For example, in the Sistan basin, erosion and sand deposition has greatly increased, and many villages have been lost in the sand, and great areas of agricultural land abandoned. The environmental situation is described in more detail in Annexes 2 and 3.

The status of the wetlands and the three lakes is of particular concern. All three lakes are reported to have been dry for several years. The marshes surrounding H. Puzak, usually the last of the lake to become dry, were dry in late 2002, and the surviving vegetation is being affected. If the drought persists, this globally unique ecosystem is in danger of being degraded, and globally important flora and fauna (especially avifauna) may be lost.

At almost all sites in the Sistan Basin (as well as in the lower/middle reaches of the rivers), the environmental degradation has already had a major impact on the economic, social and cultural situation. It has contributed to widespread and endemic poverty, to unemployment and underemployment, and to loss of traditional livelihoods. This socio-economic-ecological crisis is most acute in the area directly surrounding the Sistan wetlands. This crisis has ramifications over a large area; it affects a significant population (estimated to be in the range of one 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 manage development.

b) Threats

The environmental degradation is driven by many factors, both natural and man-enhanced.

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 five years[7]. This has undoubtedly contributed to the present drought. For example, CIA (2002) provides a map comparing precipitation over the three consecutive winters 1998-2001 with normal years. From this map, the south and eastern sides of the Helmand river basin, including much of the upland snow areas, 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 is that the low precipitation figures have been reported five years in succession[8]. Scientific interpretations of this situation differ -- some suggest that this is due to man-enhanced regional climate change, while others maintain that these are natural climatic variations. Initial reports for the winter/spring 2002-2003 seasons suggest that snowfall has been recorded at near normal levels.

An initial analysis (see Annex 3) reveals that the principal man-enhanced threats include:

<u>Water quantity</u>

- watershed degradation and deforestation;
- losses from long-term storage in open reservoirs;
- unsustainable withdrawals into large and small scale irrigation schemes, and through *karez*, wells and mobile pumping stations;
- diversions to *Chahnimeh* storage system, and;
- inefficient water use.

<u>Land degradation</u>

- unsustainable grazing;
- inappropriate agricultural practices, including conversion of pasture land, over-grazing, and road construction
- wind erosion and long distance sand deposition.

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

Finally, the deposition of silt carried by the Helmand river to the Hamun is possibly decreasing the size of the wetlands. UNEP (2003) estimate that the delta of the Helmand River into Hamun Puzak has advanced by over 20km in 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 last-century. They have notably increased in scale and complexity over the past twenty years of conflicts in Afghanistan. Together, these threats have greatly increased the likelihood of drought and have greatly increased vulnerability to drought in the Sistan Basin. Annex 3 also provides a conceptual diagram illustrating the processes and linkages of environmental degradation in the proposed project area.

[7] Some report the drought to have lasted five years, others three to four.

[8] Sharif (2001) estimates that precipitation deficits of this scope and magnitude occur every thirty years. However, anecdotal evidence and incidental reports suggests that the precipitation levels experienced over the past few years are lower, and for longer, than any in living memory.

c) Root Causes

Behind the threats lies a series of inter-linked root causes. To some extent, the threats lie upstream, whereas the impacts lie downstream. Likewise, many of the root causes of the environmental impacts are in Afghanistan. An initial analysis suggests the following root causes:

1. No mechanisms to improve agricultural practices, particularly in Afghanistan

Traditional agricultural methods and practices may no longer be sustainable given demographic and climatic changes. However, there have been no mechanisms to change or adapt practices. Local farmers have had little exposure to alternative systems. Hence the agricultural methods have not been modernised and they have not been adapted to the existing socio-economic and demographic situation. Very few new techniques for arid-land agriculture have been introduced into the region. In addition, many of the crops grown are water thirsty[9].

2. Poor Governance (in Afghanistan)

This is essentially a result of twenty years of conflict in Afghanistan. Key elements are:

- The public administration has little or no facilities: no computers, telephones, seeds, vehicles, etc. Competent individuals are often out of the country. Research and academic institutes are largely devoid of material and people;
- There is a lack of overall policy and strategy addressing water and/or drought management. The Water Law (1981) is outdated, incomplete and not well disseminated;
- There is a lack of rules, standards, regulations; and where they exist, they are poorly implemented. In general, traditional water distribution systems (involving *mirabs, hashers and shura*) were used until recently. These may not be able to adapt to modern conditions. However, even these traditional systems seem to have largely broken down during the conflict;
- There is a lack of information. Even basic information is unavailable. For example the vice-governor of Sangin District (Helmand province) did not know the population of his district. Very often, even when information was collected, it has been destroyed in conflicts or in inter-communal disputes (it is often asserted that the Taliban destroyed records). Water management is not possible without basic information on rainfall, river flows and storage capacities;
- During the conflict, military commanders often took control of villages, local independence and autonomy increased, and the role of scientists and sustainable management was marginalised;
- There is a total absence of coordination and collaboration mechanisms, across sectors, across villages, across districts and provinces, and across years. Notably, there are several ministries responsible for water management, and it is not clear how they coordinate and avoid duplication. Until recently, there were almost no linkages between national ministries and their provincial 'affiliates'.

3. Behavioral Issues

- <u>Low awareness and education</u>. Awareness of long-term environmental issues is low in the region. This is normal following two decades of conflict and social disturbances. This low-awareness notably extends to the international community cooperating with Afghanistan. The international community perceives the 'environment' as an unnecessary

[9] For example, cotton growing is common, and Sharif (2002) reports that there are even plans to increase the area of cotton grown.

luxury, but in reality protecting the environment in the Helmand/Sistan region is essential to maintaining the socio-economic fabric.

- An apparent absence of financial and economic incentives for water management. Ideally, allocation should be linked to the real costs of water service delivery, and the cash received should be used to improve service and efficiency. Due to the conflict and to the general development situation in Afghanistan, it has not been possible to introduce such a system in Afghanistan. At present, it is reported that users do not pay for water. In I. R. Iran, water is highly subsidized, when available.

- Trust There is a low level of trust and coordination across the international boundary. The communities are mutually suspicious. The 1973 Water Agreement has never been implemented, by either side, and a 'each-for-himself' regime has ruled;

4. Short-termism. Understandably, the decisions made in the region are based on short-term considerations, and often long-term impacts are neglected or over-discounted.

5. Demographic Pressure

The population in Afghanistan grew almost 300% from 8.96 million in 1950 to 22.7 million in 2000 (WRRI, 2001)[10]. In the absence of sub-national data, similar growth rates can be assumed for the Sistan/Helmand basin in Afghanistan. The population has settled along the river and near to the wetlands. This has led to increased withdrawals, particularly through informal irrigation schemes (small and large) and through wells (shallow and deep).

The rate of population growth has been even greater in I. R. Iran, due to the influx of refugees.

Superimposed on the population growth are the *changing* demographics. Largely as a result of the conflict, many new villages and new communities have formed. In Afghanistan, Internally displaced persons (IDP), refugees and returning refugees form temporary camps and require an immediate water supply. They take water from the nearest source, often with assistance from humanitarian organisations, although this may not be a sustainable source, and its extraction may lead to irreversible degradation. The camps can sometimes become semi-permanent.

d) Baseline Scenario

Afghanistan At present, the economic structure consists largely of small-scale, family and traditional activities. Foreign Direct Investment is virtually absent. Although the international donor community is very active, the majority of ongoing internationally funded activities are in response to emergencies and the post-conflict crisis. Hence, they have short-term, humanitarian objectives rather long and medium term sustainable development objectives.

After more than twenty years of political and military conflict, the present political situation in Afghanistan offers some grounds for optimism for stability. 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.

[10] Some estimates, eg US State Department 2002, put present population at almost 26 million, with large numbers of returnees still arriving.

In this context, at the Tokyo Ministerial Meeting held in January 2002, the international donor community pledged over $5 billion in concessionary and grant finance to Afghanistan. In order to effectively plan and programme this assistance, two national planning documents were 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 the rehabilitation of irrigation systems and improved water management as key objectives.

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/Sistan basin. These mid-term measures[11] can be summarised as:

- Rehabilitating small and medium irrigation schemes and watershed management;
- Planning and investment into large scale irrigation schemes;
- Establishing the basis for comprehensive water resources management (this covers institutional developments, policy, law, monitoring, information collection and management);
- Capacity building in national and local agencies.

The 2003/2004 Public Investment Programme (various Ministries, 2003) sets out to operationalise these policy aims, improving the management and efficient use of water resources.

The implementation of the recommendations of the CNAAg in the Helmand and other river basins constitute the *baseline*. As part of the baseline, a series of large and small-scale irrigation restoration projects and programmes are planned for the Helmand/Sistan basin. Most of these are at the earliest stages of identification. Initial signs are that the focus is 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. The internationally supported programmes will also increase capacity to manage the water sector, at the systemic, institutional and individual level.

In this baseline, over the coming decade, these programmes will lead to decreased water losses and wastage. They will also lead to a more water-efficient and cost-efficient agriculture. They should lead to increases in agricultural production and to decreases in poverty. They should also lead to decreased water shortages, both in the Helmand Basin and around the Sistan wetlands. They should help to regularize the economy, and facilitate the return of refugees from I. R. Iran, and the return of IDPs to their home villages.

The baseline will notably lead to 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.

[11] These recommendations are also in line with findings from other studies and reports, eg. *FAO, 1997a; CIA, 2002; FAO/WFP, 2002; Gujja, B., 2002, and; Sharif, 2001*.

In summary, the baseline programmes will have a strong 'one-off' effect in terms of efficiency. However, the trend over the past century has been of increasing withdrawals and decreased flows into the Sistan basin. Drought has been increasingly common throughout the basin and the region. In the baseline, after this one-off effect, the previous trend of gradually increasing withdrawals and decreased water flows in the lower reaches is set to continue, leading to increased environmental degradation. In the baseline, the long-term threats to the wetlands and to the Sistan Basin will not be removed. Notably, the wetlands are likely, one day, to become permanently dry; and the globally unique ecosystem is likely to be lost.

I. R. Iran

In the baseline, reconstruction and agricultural development in Afghanistan will encourage Afghani refugees in I. R. Iran to return to Afghanistan. This should reduce the population in Sistan/Baluchistan province and reduce pressure on social and environmental services. At the same time, increased water efficiency in the Helmand and other Afghani rivers should lead to more water flowing into I. R. Iran, initially. This should decrease stress on the social and economic fabric in Sistan/Baluchistan province, and have social and economic benefits to I. R. Iran.

In the baseline, even in the short-term, it is very unlikely that the above-mentioned one-off effect will result in more water flowing into the Sistan Basin wetlands. More likely, where possible, Afghani farmers will use any additionally available water. Then, given the lack of bilateral cooperation and lack of full trust, it is 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 I. R. Iran and Afghanistan. It will also lead to continuing water scarcity and increased risk of conflicts.

e) Alternative Scenario, with GEF support

The *overall* objective of the GEF support is to ensure that the quantity, and quality, of the water resources of the Sistan Basin meets the short and long-term needs of the ecosystem and of the communities using the ecosystem.

The GEF programme will complement and influence the on-going socio-economic processes in south-west Afghanistan and in Sistan/Baluchistan. It will pave the way for a long-term development which maintains the ecosystem in Sistan Basin and protects the regionally and globally significant environment resources in the Basin. It will help create a management system capable of avoiding conflicts and controlling scarcity.

This will be achieved through a series of GEF-supported[12] interventions:

i) Establish a bilateral coordination mechanism for oversight and management of the Sistan Basin hydrological resources and associated ecosystems;
ii) Hold a process of consultation with key stakeholders, including relevant sectoral authorities, regional and local government, local communities and resource users, to determine their concerns, roles and contributions;

[12] GEF will not be the sole supporter of all these interventions, many will be cofinanced.

iii) Prepare a Transboundary Diagnostic Analysis (TDA) of the present hydrological and natural resources of the entire Sistan Basin catchment area[13], the threats and root causes affecting the Basin, based on a thorough scientific understanding of the situation and processes[14].

iv) Develop a Strategic Action Programme (SAP) for the management of the Sistan Basin and its associated ecosystems, owned and agreed upon by national, regional and local authorities and representatives of local people in the two countries. The SAP will define needed actions, timelines, priorities, partners, and responsibilities for an ecologically sound development of the Sistan Basin.

Based on the findings and recommendations of the SAP, the following interventions may be supported by the project:

v) Review and revise the 1973 bilateral agreement covering River Helmand waters;

vi) Negotiate an agreement to ensure a minimum annual flow of water into the three Hamuns of the Sistan Basin;

vii) Awareness raising;

viii) Establish a system of multi-use zones across the Sistan Basin: some areas will be set aside for agriculture; others for harvesting fish and other lake/wetlands products; others for recreation; and others for protecting wildlife and water fowl;

ix) Strengthen capacity at the Sistan Basin to engage successfully in negotiations with upstream users;

x) Establish an intra-basin management mechanism, whereby water-users and uses in the Sistan Basin can effectively feed into and influence withdrawals and releases upstream;

xi) Implement demonstration measures for the restoration of the ecosystem and biodiversity;

xii) Establish joint management and monitoring committees for the three inter-linked lakes designated as Ramsar sites;

xiii) Improve biodiversity conservation through strengthening the protected area network and improving management, and through the establishment of community managed natural resource areas. This may include the enforcement of measures to check illegal hunting and over-harvesting of natural resources by the communities themselves.

The SAP will identify other measures to be implemented over the following years. Some may be implemented with assistance from GEF. However, most measures identified in the SAP will be implemented by the local and national authorities and people, in some cases with assistance from international partners. These measures may include:

i) Full hydrological survey of the Sistan Basin;

ii) Feasibility of pipes or closed-canals to directly carry Helmand river water to the Hamuns;

iii) Demonstration of improved land-use and range management in pilot areas in order to control land degradation and rehabilitate and restore areas affected by erosion;

iv) Sand dune stabilisation schemes;

v) Establishment of local stakeholder platforms to develop local sustainable development plans and priority project portfolios for local development and alternative income generation;

[13] The scope of the TDA will take in all the basins of the Helmand, Khash, Farah, Harut and other rivers feeding into the Sistan area.

[14] It is envisaged that the TDA/SAP methodology recently developed under GEF supported Train-Sea-Coast program will be used.

vi) Establishment and/or strengthening of local civil society organizations, including NGOs and CBOs in order to assist in mobilization of public participation, dissemination of information and outreach;

vii) Increasing understanding of public and decision-makers about the need for improved environmental management and sustainable development of the region, through regional fora, consultations, publications and other means of communication.

9. Expected outcomes and activities of Full Project:

The activities described in the above section will result in a basin-wide, multi-level capacity to avoid and manage water shortages and water conflicts. This capacity will include:

- A thorough knowledge and understanding of the water constraints and options in the basin;
- Coordination of activities across the two countries, and, if necessary, a new bilateral water sharing agreement and corresponding national implementation legislation;
- River Basin-wide and Sistan Basin-wide flexible and adaptive inter-sectoral coordination and management tools and mechanisms, developed and established through a participatory process, and responding to the needs of all stakeholders;
- National, provincial and local level expertise, skills, information and capacity to plan and manage use of water resources;
- Decision support information systems;
- Political and public awareness of the benefits of sustainable, equitable water management, and a corresponding commitment to this management;
- An effective biodiversity management/protection system in the biodiversity rich parts of the Hamun lakes.

In line with the SAP, a series of physical investment to improve and protect biodiversity and natural resources should be underway.

Water should be flowing into the three Sistan lakes, and the future of the unique ecosystems should be assured. At the same time, socio-economic activities should be assured and based on sound management principles, contributing to stability and prosperity in the region.

The Project PDF B phase (see Section 16 below) is expected to last two years. Following from this, the full project is expected to last three to four years.

10. Sustainability and Replicability of the full project

Several factors increase the sustainability of the proposed project's outputs:

1. The concerned national governments are strongly committed to regional cooperation on transboundary waters. The October 2002 release of water through Kajaki Dam demonstrates that when government commitment is present, breakthroughs can be made. In particular, the Government of I. R. Iran has pledged significant financial support to development in Afghanistan. It has been indicated that some of these Iranian funds could be used as co-financing for the project and for implementing follow-up activities.

2. The project will establish bilateral management mechanisms at the appropriate scales (both national and at the level of the lake basin). These mechanisms will ensure dialogue and

consultation to so that all concerns are taken appropriately into account, barriers to cooperation removed, and follow-up actions can be implemented.

3. The project will use highly participatory mechanisms to increase understanding and increase commitment for cooperation at the Sistan Basin level. This will help ensure that all stakeholders are committed to the long-term objectives of the project.

4. A key project output is the Strategic Action Programme. The SAP ensures that a comprehensive approach can be taken to systematically identify and remove the principal threats and root causes. The SAP will also clearly define responsibilities and time frames, therefore increasing the likelihood of follow-up.

5. Preparation of the SAP will involve the identification of the resources (including financial) needed to implement the SAP. The participatory process to prepare the SAP will start the process of identifying partners and financers. Although the poor infrastructure, high levels of poverty, and instability in the region may make it difficult to identify private sector investors in the SAP, the high levels of donor interest in the region should make it possible to attract significant funding for implementation of the key priorities identified in the SAP.

6. Finally, a key challenge to sustainability is the need for coordination between the needs of upstream and downstream users. The project will address this challenge head-on, from the very early stages of the PDF B.

Replicability

There are many wetlands, lakes and rivers under threat in the region and in the world. Many of these cross international borders. The technical and institutional lessons learned from the proposed project will be replicable at many other sites and water-bodies in the region and will be especially relevant in water scarce environments.

The project will apply the TDA/SAP methodology recently developed under GEF/UNDP/UNEP Train-Sea-Coast program in order to learn from the lessons and best practices from earlier GEF initiatives. During the PDF B phase it will be considered whether this project might serve as a candidate for delivery/validation of one of the TDA/SAP courses under development by Train-Sea-Coast.

11. Country Eligibility:

a) Programme and Policy Conformity

Afghanistan and the Islamic Republic of Iran are both eligible for technical assistance from UNDP.

Following a long period of internal conflict and international isolation, the new government of Afghanistan is taking steps to fully participate in the international community and to contribute to meeting international and regional goals. In this context, it recently ratified both the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD). It is also exploring ways to cooperate in the region on trans-boundary rivers and international waters, including the Amu Darya and the Aral Sea.

The Islamic Republic of Iran has ratified several global and regional conventions including the UNFCCC, the CBD, the Convention to Combat Desertification and the Ramsar Convention. With UNDP/GEF support it has prepared and is implementing a National Biodiversity Strategy and Action Plan and it has prepared a National Action Plan to implement the UNCCD. It is also presently cooperating in regional international waters initiatives in the Caspian Sea, Persian Gulf and on the Kura-Aras rivers.

In September 2002, UNEP sponsored a post-conflict assessment of the environment in Afghanistan. UNEP identified the Sistan Basin as an area of international importance and a priority for international support. Within the framework of the assessment, a joint UNEP/UNDP team visited the Helmand and Khash rivers and the Sistan Basin. This assessment led to the most up-to-date and comprehensive description of the environment in the proposed project area, and to an analysis of the threats and root causes of environmental degradation in the area. The present proposed project is fully in line with the findings and recommendations of that assessment.

More details of the findings of the UNEP and UNEP/UNDP assessment are provided in Annexes 2 and 3.

b) Program Designation & Conformity

The proposed project fully meets all the criteria of the GEF's Operational Programme 9: "Integrated Land and Water Management".

12. Stakeholders involved in project:

The project will be implemented in close cooperation with the following key counterparts and stakeholders:

Afghanistan:

- Ministry of Irrigation, Water Resources and Environment;
- Ministry of Water and Power (responsible for hydroelectric 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 Nimroz province;
- Provincial Administration of Farah, Ghazni, Helmand, Kandahar, Uruzgan and Zabol provinces;
- The 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 (MOAJ), including Shilat (Fisheries Corporation), Agricultural Research Organization, Natural Resources and Domesticated Animals Affairs Research Center;
- Department of Environment;

- Management and Planning Organization (MPO), including the Sistan Development Organization;
- Ministry of Foreign Affairs;
- Provincial Administration of Sistan and Baluchistan province and the Sistan Baluchistan Regional Water Board;
- National NGOs (e.g. Iran's Watershed Management Association);
- University of Zabol;
- Local NGOs.

International
Partnerships with the international donor community will be explored and developed during the PDF B, including coordination with the planned activities and programmes of the World Bank, ADB, UNEP, FAO and bilateral governments.

Also during the PDF B, the possibility of technical partnerships with appropriate international bodies and NGOs will be explored. These may include:
- Ramsar Convention Secretariat
- Sustainable Use Specialist Group, Central Asia
- IUCN
- Drylands Development Centre (DDC – formerly UNSO)
- UNESCAP
- National NGOs
- The Secretariat of the CBD
- The Secretariat of CMS

The project will be executed by a UN Agency with appropriate competence and experience in both countries.

13. Information on project proposer:

The joint project proponents are the Government of Afghanistan (Ministry of Irrigation, Water Resources and Environment) and the Government of I. R. Iran (Ministry of Energy). Given the cross-sectoral nature of the project, the proposing Ministries will be supported by inter-sectoral coordination mechanisms in the respective countries.

The Government of Afghanistan has been recently established and as of yet has limited experience in implementing internationally supported projects and no previous experience of GEF projects. However, many individuals within the administrative framework have significant experience in implementing international cooperation and humanitarian assistance projects over the past decade, mostly with support from international NGOs.

The international community is supporting many projects to strengthen capacity in Afghanistan. This includes two projects directly strengthening the institutional capacity of the Ministry of Irrigation, Water Resources and Environment - one supported by the ADB and one supported by UNEP (pipeline).

The Iranian Ministry of Energy is responsible for the management of all water resources in Iran. It is currently also involved in the preparation of the UNDP/GEF project proposal "*Reducing Trans-boundary Degradation of the Kura-Aras River Basin".* In each province, including Sistan-Baluchistan, the Ministry has a provincial affiliate responsible for implementing national programmes and policy at the provincial level, and for coordinating water related activities.

The Ministry of Energy has a strong cadre of officials and experts in Tehran as well as in Sistan-Balucistan province, covering the full range of issues addressed by the project. The Ministry also has access to specialist institutes in Iran, as well as to the vast range of experts in Iranian academic circles. The Ministry also has good databases and training facilities.

14. Financing Plan of Full project

The PDF B (see Section 16 below) will determine the project partners and their specific roles and involvement. This will include a clear identification of all financers and assembly of a financial package. It is estimated that the GEF contribution will be in the order of $3-4 million, including PDF B funds.

The following paragraphs provide information on closely related ongoing and pipeline programmes and funding sources in the region. PDF B will explore partnerships with these.

Afghanistan

The international community has pledged over $5 billion to the reconstruction and rehabilitation of Afghanistan. The vast majority of these funds have yet to be programmed by the government and the concerned donors. Indications are that some of these funds will be directed towards water-related issues in the proposed project area. During the PDF B, the project will explore possible ways of jointly developing and implementing projects.

Notably, the following initiatives have been already been identified:

- An anticipated major investment by the Japanese government in south-west Afghanistan, including Nimroz province;
- The Dutch Government/FAO $1.1million project titled: '*Community based irrigation infrastructure rehabilitation and institutional strengthening of the water resources and irrigation sub-sector in the Southern region*.'
- Mercy Corps' expected funding of $5 million for rehabilitation of irrigation schemes in Helmand province.

In addition, GEF IAs and EAs are developing related activities - see sections 15a and 15b below for further details.

It has also been reported that the Afghanistan Government is to allocate a further $10million of donor funds to the irrigation sector in Helmand province.

Finally, and as mentioned previously, the Government of I. R. Iran has pledged over $500 million to support the reconstruction of Afghanistan. The Government of I. R. Iran has indicated that some of these funds could be channeled into co-funding the present proposed project.

Iran

The Dutch Government is supporting the project "*Integrated Water Resources Management for the Sistan Closed Inland Delta, Iran".* This project, focusing only on the Iranian side of the Sistan basin, aims to develop methods and tools and raise capacity in order to achieve an integrated resource management in the basin. The overall aim is to contribute to sustainable agriculture and help conserve the ecosystems.

15. IA coordination and Linkages to GEF and IA programs and activities

a) UNDP Core commitments & Linkages

UNDP/GEF is initiating and implementing several similar projects in politically complex areas across the world, for example:

- Preparation of a Strategic Action Programme for the Tumen River (on the Korean Peninsula);
- Environmental Protection and Sustainable Management of the Okavango River Basin (South-West Africa).
- Reducing Transboundary Degradation of the Kura-Aras River Basin (in the South Caucasus);

Through these and other projects UNDP/GEF has gained considerable knowledge and experience in supporting projects addressing the management of trans-boundary waters in areas of conflict and/or water scarcity.

In I. R. Iran, UNDP has recently launched the Sistan and Baluchistan Province Community Recovery and Area Development Programme Trust Fund. This Programme is to become a major component of UNDP's work in I. R. Iran. It is an integrated and comprehensive approach to addressing sustainable development challenges in the Province. UNDP has already secured initial funding to the Programme Trust Fund, and aims to mobilise further funds. The Programme has three objectives, one of which is to: "*Rehabilitate biodiversity in areas of crucial environmental importance, which have been damaged or destroyed by problems caused directly by the Afghanistan crisis and drought"*. The present proposed project would be closely aligned and complementary to this component of the Programme Trust Fund.

In I. R. Iran, a UNDP/GEF Full Project proposal for the *Iranian Wetlands* project is presently being finalized for expected submission in July 2003. This project will focus on two priority freshwater wetland sites in north-west and central Iran, where the threats and potential solutions are likely to be relevant to the Sistan Basin as well. Appropriate linkages will be established and lessons exchanged with this project once it starts implementation.

In Afghanistan, UNDP is supporting the Government and people as they strive to create an effective and participatory system of governance, to reduce poverty and to recover from decades of conflict. Working with other UN agencies and within the framework of the UN Assistance Mission to Afghanistan (UNAMA), the UNDP programme is slowly shifting from quick responses to immediate needs towards longer-term development programmes.

UNDP is managing over $100 million of grant funds in Afghanistan. UNDP Afghanistan is well placed to mobilise cost-sharing and to ensure the coordination of related projects in Afghanistan.

At present there are no other GEF supported activities in Afghanistan.

b) Consultation, Coordination and Collaboration between GEF Implementing Agencies (IAs) and Executing Agencies (EAs).

Afghanistan

During the PDF B stage, partnership arrangements will be explored with the following initiatives:

The World Bank is at the early stages of starting up a programme in Afghanistan. The World Bank is known to be interested in funding a *Labour Intensive* Irrigation Project, possibly with components in either Helmand or Kandahar province.

The Asian Development Bank is taking the lead in the preparation of the CNAAg mentioned earlier. The CNAAg is tasked to assess needs in the environment sector and ADB will be developing its investment programme in Afghanistan based on the findings in this assessment.

In the water and related sectors, FAO has undertaken several surveys, reports and projects during the past two decades. In doing so, it has developed a significant body of knowledge and expertise. Subsequent to the preparation of the CNAAg, FAO became the secretariat of the Natural Resources Group[15] in May 2002. This group is responsible for coordinating UN (and other donor) assistance and investments in this sector.

UNEP is actively supporting the Government of Afghanistan in achieving environmental sustainability. UNEP, principally through its Post-Conflict Assessment Unit, is providing technical advice, institutional support and policy guidance. It is providing guidance on international coordination and access to sources of funding for international projects. UNEP is planning a large-scale capacity building project, focusing on the Ministry of Irrigation, Water Resources and Environment.

<u>I. R. Iran</u>

UNDP, UNEP and the World Bank are jointly assisting the Government of I. R. Iran in transboundary collaboration for the management of the Caspian Sea and the implementation of the Strategic Action Programme. The first phase of the GEF supported Caspian Environment Programme has been completed and the second phase is starting up with the re-location of the Programme Coordination Unit to Tehran.

Iran is also one of four countries involved in a regional UNEP/GEF Siberian Cranes project. The project will be focusing on the protection of a wetland in the Caspian region known as an important crane site.

16. Proposed project development strategy

In view of the considerable information and capacity constraints, and lack of effective bilateral coordination mechanisms between the two countries, it is important that this project is developed carefully allowing sufficient time and resources to address present constraints. As such, the next step in the further development of the proposed project is to request for a GEF PDF Block B grant in order to prepare a full project proposal with full consultation and participation of both countries. A draft PDF B Request has been prepared simultaneously with the present Concept Paper for GEF funding to be allocated in the amount of $678,600.

The PDF B will first establish the management mechanisms required for the project, and then design and establish the embryonic river and Sistan basin management mechanisms which, after the project, will be responsible for water management in the region. Under the guidance of

[15] 8 such groups exist. Each is chaired by the concerned ministry, with an international agency or donor providing logistical, technical and organisational assistance.

these management mechanisms, the PDF B will then support the collection of data, wide-scale consultations and scientific analysis leading to a full understanding of the present situation in the form of a trans-boundary diagnostic analysis (TDA). Further analysis, assessment, consultation and other planning activities will then lead to the development of a draft Strategic Action Programme (SAP), setting out the actions, responsibilities and investments required to ensure sustainable development in the Sistan Basin. Finally, a proposal for a GEF Full project will be prepared, to implement the SAP in partnership with national and local governments and other co-financers.

The management and coordination mechanisms established early in the PDF B will be closely involved in all subsequent steps, thereby developing their capacity to address water management issues.

Specifically, outputs of the PDF B phase will include

- Project management mechanisms at national and regional level;
- Embryonic Sistan and river basin coordination and management mechanisms at local, national and regional level;
- Local, national and regional ownership of the process and commitment to the project objectives;
- Stakeholder analysis;
- Transboundary diagnostic analysis (TDA);
- Draft Strategic Action Programme (SAP) and first annual implementation plan;
- Full financial package, including incremental cost analysis, identification of governmental, donor and other sources of funding, and outline proposal to other donors;
- GEF Brief and UNDP project document;
- Commitment to implementation by concerned governments, IAs and other donors, and other stakeholders.

17. Response to Reviews

None as yet.

a) Convention Secretariat

b) GEF Secretariat

c) Other IAs and relevant EAs

d) STAP

Annexes

Annex 1: Maps of the project region (separately attached)

1a) Map of river basins in Afghanistan, indicating Helmand River Basin
1b) Map of Sistan basin, showing position of Hamuns and of Godzareh depression

1c) Map of Hamuns

Annex 2: Report of the UNEP Post-Conflict Environmental Assessment Mission to Helmand Basin and lake Puzak

Annex 3: Description of threats, root causes and a diagram describing their linkages

Annex 4: Land cover images showing changes in land cover, Sistan Basin, 1976 – 1999 (separately attached)

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Annex 2 :Report of the UNEP Post-Conflict Environmental Assessment Mission to Helmand Basin and Lake Puzak

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Note: The following excerpts are provided from the" draft" report. At present only the draft report is available and can be provided upon request. The final version of the report is expected to be ready in the second quarter of 2003.

The factors contributing to low flow from the middle and upper reaches are:

a) Low precipitation
b) Watershed degradation
c) High storage
d) Large withdrawals
e) Inappropriate land-use

This Annex will first analyse these threats originating in the upper reaches, before analyzing the threats existent in and around the lower reaches.

Low precipitation.in upper and middle reaches

Total annual precipitation for all Afghanistan is estimated at 180 billion m^3 (FAO, 1997a). Based on these figures, FAO estimated total available surface water at 57 billion m^3, and total available ground water at 18 billion m^3 (see Table 1).

Table 1 – Outline Water Balance in Millions of m^3 (source: FAO, 1997a)

Water resource	**Potential**	**Present use**	**Future use**	**Balance**
Surface	57,000[16]	17,000	30,000	27,000
Ground	18,000	3,000	5,000	13,000
Total	75,000	20,000	35,000	40,000

From this and other work, FAO concluded that there are ample water supplies available to Afghanistan in general. Even if the figures in the Present Use column in Table 1 are a great underestimation (and by some calculations, for example, groundwater withdrawals already total 6 billion) there should be sufficient water resources for all users in Afghanistan. This led FAO, 1997a (just before the present drought!) to conclude '*the indisputable fact that there is no shortage of water in Afghanistan in the near future if the former hydraulic infrastructure (for irrigation, drinking and electricity) is… managed efficiently'*. The contradicts very sharply with more recent reports (eg. ADB, 2002a) which state that water is fundamentally scarce.

On average, 80% of the country's precipitation falls in the mountainous regions, mostly as snow, and clearly snowfall in the upper reaches is the major determinant of river flow.

Province or river-basin disaggregated data on precipitation is not available. The drainage areas of the rivers flowing into the Sistan Basin cover almost 50% of Afghanistan, and more than half of these drainage areas are mountainous. Hence, despite very high evapo-transpiration rates, it is reasonable to

[16] This figure is after allowing for water to flow into neighbouring countries, including 750 million m^3 (or 24 m^3/s) on the Helmand for Iran.

postulate that, with good water and agricultural management, the water balance in the Helmand basin should be manageable.

Conclusion: Low precipitation is not, in general terms, a major cause of environmental problems in the area.

No ecosystem or agricultural system can continue to function effectively if the water available changes suddenly and significantly, even if the baseline is plentiful water. There is anecdotal and scientific evidence to suggest that available water has changed significantly for the past five years[17]. For example, CIA 2002 provides a map comparing precipitation over the three consecutive winters 1998-2001 with normal years. From this map, the south and eastern sides of the Helmand river basin, including much of the upland snow areas, received between 25 and 50% of normal rainfall. The precipitation figures in Table 2 for cities lying in this part of the basin support this finding.

Table 2 - Annual precipitation in key Helmand Basin cities (taken from Sharif, 2001)

	Kabul	Ghazni	Kandahar
Long Term Average (LTA)	316	285	161
2000	115	138	51
2001	132.5	96	62
2001/2 as %age of LTA	39%	45%	34%

The CIA 2002 map also shows that many of the north and western parts of the basin also suffered less than average rainfall, although at 50 and 75% of average, this is closer to normal.

The region naturally is 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 is that low precipitation figures have been reported five years in succession. It should be stated that it has not been possible to obtain detailed records to fully confirm the low precipitation figures in the past years.

Sharif (2001) estimates that precipitation deficits of this scope and magnitude occur every thirty years. However, anecdotal evidence and incidental reports suggests that the precipitation levels experienced over the past few years are lower, and for longer, than any in living memory.

Conclusion: Although records are incomplete, less than average precipitation, particular winter snowfall in the upper reaches, sustained over a five-year period, has undoubtedly contributed to the present drought.

Watershed degradation and/or deforestation in upper reaches

Historically the upper reaches of the mountains, where most of the snow falls, would have been covered in thin forests. Under such conditions, much of the water from the melting snows would flow into the ground table before flowing on to lower reaches. This regulates flow to the lower reaches (both by lowering the peaks and increasing the minimums). As the water is quickly stored underground, it does not evaporate, and is not lost.

It is likely that the upper reaches are almost completely deforested. Hence, less water is stored in the ground table, and there is an increased run-off during peak times, and increased losses due to evaporation.

However, data available pre-1980 suggests that the watersheds were already highly deforested. It is possible that this area was deforested in previous centuries.

[17] Some report the drought to have lasted five years, others three to four.

Conclusion Whereas deforestation may have contributed to changing river flows in the past and generally contributed to overall drought vulnerability in the region, *recent* deforestation is not a specific driver of the present drought[18].

Long-term storage in open reservoirs in the Upper and Middle Reaches

Several dams have been constructed along the rivers (see Table 3), mostly in the upper reaches near the boundary with the middle reaches. Only incomplete date regarding these dams is available. Using available data (and therefore not accounting for many storage schemes), the major dams on the Helmand river have the capacity to hold at least 2.4 billion m^3 which would otherwise have been stored in the rivers, underground or in the natural lakes.

Table 3 – Existing and Potential Dams and Irrigation Systems on the Helmand and Sistan Basins (various sources)

Table 3a) Functioning					
Structure	Province	Status	Objective	Capacity	Comments
Kajaki Dam	Helmand	Functioning since the early 1950s.	Flood control Electric generation Irrigation	1.7 billion m^3 33MW	Increasing generation capacity by 16mw (construction stopped)
Helmand Irrigation System	Helmand	Saraj (poorly functioning) Bogra (functioning but damaged) Dareweshan (functioning)	Irrigation	101,000 hectares	
Dahala Dam	Kandahar	Functioning, but silted and quite empty		479 million	
Sultan Dam	Ghazni	Functioning, Reconstructed in 2002	Irrigation	19 million m^3, irrigates 10,000 hectares	
Sardeh Dam	Ghazni	Functioning. Constructed in 1959	Irrigation	200 million m^3 17,000 hectares	
Total Existing Functioning Capacity				At least 2.42 billion m^3 and at least 128,000	

[18] It should, however, be noted that WRI, 2001 indicate that total forest cover in Afghanistan declined by over 7% in the period 1990-1995. If these figures are applied to the Helmand catchment area, and are extrapolated over the twenty two years of the conflict period, there would have been significant deforestation during the conflict, with a consequent effect on water flows, flood and drought vulnerability.

			hectares	

Table 3 b) Planned, Not Presently Functioning or Unknown Status					
Kajaki dam extension	Helmand	Construction halted in 1991	Irrigation	1.3 billion m^3	
Olambagh Reservoir	Oruzgan, on Helmand River	Planned for 1975-1982, status unknown		1.7 billion m^3	
Farah Rud Irrigation system	Farah	Planned for 1975-1982, status unknown	Irrigation and electricity	24,000 hectares 19MW	
Lashkari Irrigation system	Nimroz	Abandoned in 1970's due to sand filling	Irrigation	18,000 hectares	
Kamal Khan Dam	Nimroz	Construction halted in 1979	Flood control Irrigation	Irrigate 210,000 hectares	
Total Potential Capacity				At least 3 billion m^3, At least 252,000 hectares	

In general, it was reported that the objective of the dams listed in Table 3a are flood control, irrigation and hydro-electricity. They were constructed in response to growing population, improved agricultural techniques and the demand for stability and electricity. Drought control was clearly a less important issue at the time of design. It could also be said that the dams were largely constructed at a time when engineering fixes were considered the most appropriate solutions to development problems.

These dams can lead to decreases of flow of water to middle and lower reaches, even in drought years, through the following dynamics:

- Increased water loss due to high evaporation levels when stored in the dams;
- Given the design focus on flood control or electricity production, the dams may not be able to release stored water in low precipitation years.

For example, in September (towards the end of the dry season and the irrigation season) 2002, Kajaki reservoir was estimated to be over half full (the water level was reported at 58m, compared to maximum height of 70m) and hence holding an estimated 900 million m^3. Only sufficient water to run the electricity turbines was being released. 900 million m^3 is sufficient to run the electricity turbines until spring 2003 and provide additional water to downstream irrigation and natural sites.

From Table 3 it can be seen that all of the major dams lie on the Helmand river or its tributaries. They were originally designed and constructed long before the present drought situation. The construction period does, however, correspond with significant drops in the water flows at many points lower down on the Helmand[19]. It is therefore very likely that the dams have contributed significantly to lowering both

[19] Illustrative of this is the fact that the annual flow of the Helmand river at Shele Charkh, just south of Puzak, fell from 3,777million m^3 in 1966 to 2,746 million m^3 in 1975, two representative years (Afghanistan General Directorate of Meteorology, 1976). Reports from earlier in the century suggest far greater flows were common at that time.

peak flows and annual flows of the Helmand river over the past century. In addition to lowering the measured flow of water in the river, this permanent lowering of flows will have led to a lowering of underground water stored across the entire basin.

Conclusion: Dams have decreased flows and underground water levels, and considerably increased the vulnerability of the Helmand and Sistan basin to drought. However, dam construction is not the specific, immediate cause of the present drought.

Given that the dams were constructed prior to the conflict, in no way can the conflict be considered to have affected their construction. It could have affected their maintenance. Reports indicate that all dams have been reasonably maintained during the conflict.

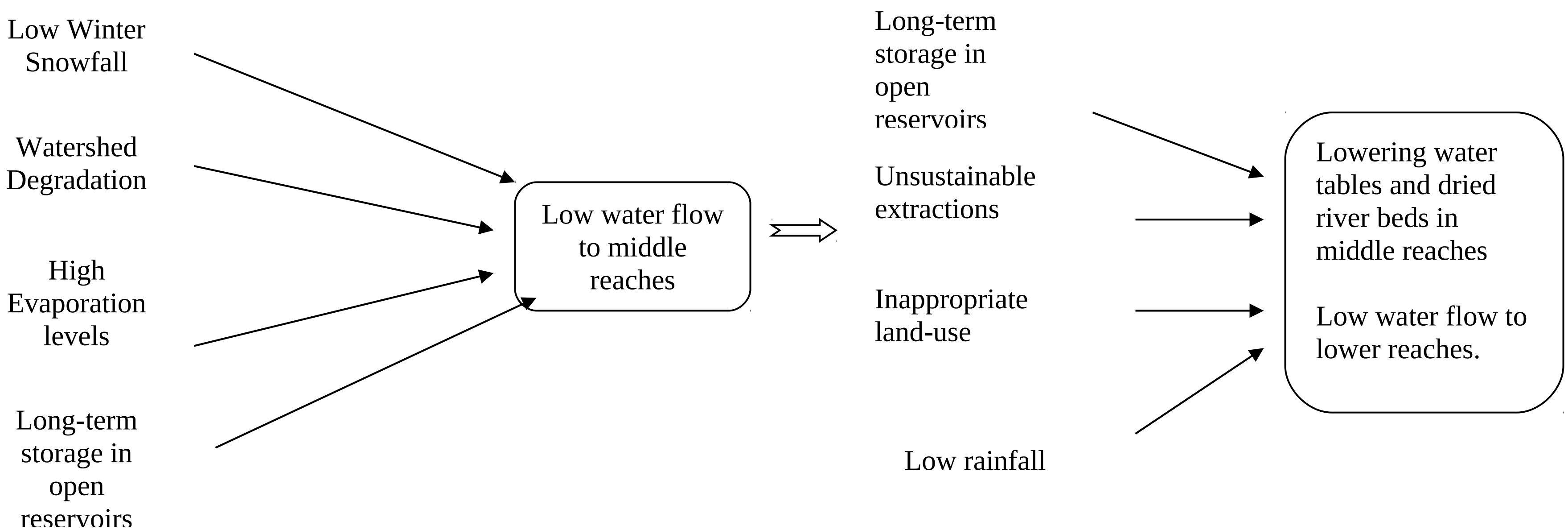
Notwithstanding, it is however reported that the conflict situation affected the dams in two ways. First, it has made the coordinated, integrated management of dams impossible. Due to the conflict, information is scare and not communicated. Due to the conflict, coordination between dams, reservoirs, catchment protection and water-users has been almost impossible. For example, there is no simple mechanism whereby lower reaches can insist upon higher water releases, even in crises. The conflict has ensured that any coordinated, strategic management of waters, involving dam management at the core, has not been possible. The conflict has restricted the use of dams as a drought management tool.

Second, the conflict has prevented any modifications and additions being made to the dams, due to financial reasons and reasons of instability. On the one hand, this has prevented upgrades to make dams more responsive to droughts. On the other hand, this has prevented new constructions to increase storage capacity. Afghanistan has longstanding plans to increase storage in the Helmand Basin by over 3 billion m^3 (see Table 3b). It is possible, for the reasons stated in the above paragraphs, that these schemes may have exacerbated the drought. In this scenario, one could say that the conflict has contributed to a lessening of the drought.

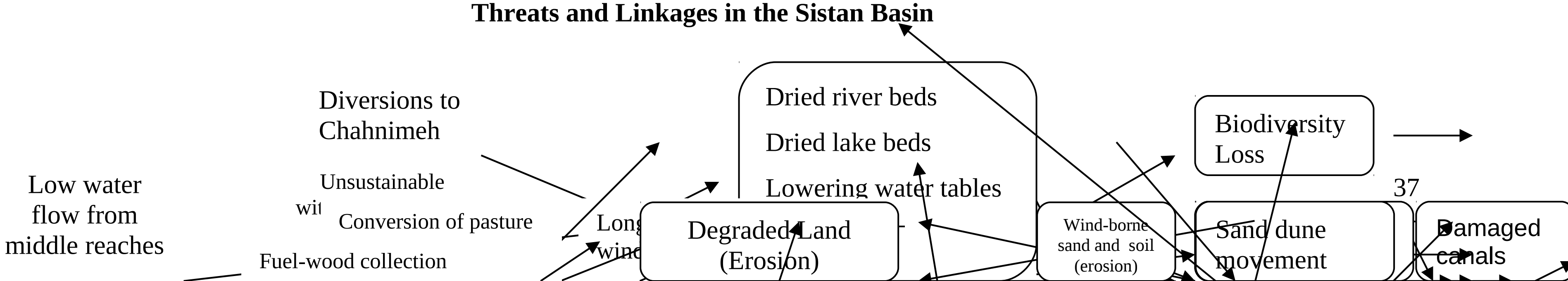
Conclusion the conflict in Afghanistan has been a factor in water scarcity, although the interactions are complex and not necessarily linear.

Annex 3: Description of threats and conceptual model – Sistan Basin

Threats and Linkages in the Upper and Middle Reaches of the Helmand and other rivers



Threats and Linkages in the Sistan Basin



<u>Description of Threats and linkages in the Lower Reaches and in the Sistan Basin</u>

<u>Unsustainable water withdrawal – general issues</u>

<u>Withdrawal rates are generally high</u>, particularly in the middle reaches, and are contributing to water shortages in the lower reaches. For example, total potential annul flow in the Helmand river and its tributaries is 7.5 billion m^3 (FAO, 1997a). Sharif (2002) lists irrigation withdrawals in Helmand Province in 1985 from the Helmand and Arghandab rivers during June – August at 85 m^3/s. This corresponds to a total withdrawal of over 650 million m^3 in a three-month period – almost 10% of the total potential annual flow. This does not account for water withdrawn via wells, or for water withdrawn (or leaked) during September – May. It does not account for all the rivers in Helmand province, and it probably does not account for all Karez.

Total withdrawals depend to some extent on the area of land irrigated. Some data suggests that total irrigated land in Afghanistan has shrunk. For example, FAO/WFP, 2002 suggests that the land under irrigation declined by as much as 50% over the past 25 years. Other sources show increases of irrigated land, eg. USAID (1993) provide figures rising from 2.39 million to 3.35 million hectares in the period 1967-1993. FAO (1997 b) puts the amount of irrigated land at 3.2 million hectares in 1991. However, even if land is no longer cultivated due to the conflict, it may be that the irrigation system continues withdrawing water during a period of conflict.

At a national level, available internal renewable water resources are estimated at 3,200 m^3 per capita (Guja, 2002). This is similar to France, a country with a similar surface area but with three times the population. It is estimated that France currently uses 18.6% of its renewable water resources, whereas Afghanistan uses an estimated 40.2% (Guja, 2002).

<u>Withdrawal rates have increased</u>. Water withdrawals have increased in a largely uncontrolled and unmanaged manner throughout the basin, particularly in the middle reaches, over the past half century, and possibly continuing through the time of conflict. In the region, this withdrawal takes many forms: withdrawal from groundwaters into wells (shallow and deep) and into *karez;* withdrawal from rivers and springs into small-scale informal irrigation systems; and large-scale withdrawal into formal irrigation schemes.

In general, the levels of withdrawal have increased for three reasons:

1. Demographic pressure. The national population has trebled since the 1950's and the region's population has probably followed a similar growth curve. This has combined with changing demographic patterns (IDP, returnees, refugee camps, abandoned villages due to conflict) to increase water withdrawal.

2. Decreased efficiency at the village level. As storage and diversion schemes become less efficient, it is necessary to increase withdrawals for the same agricultural output. This is largely a result of the conflict situation, where it has proved very difficult to maintain and restore infrastructure.

3. Decreased efficiency at the basin level. A stable and peaceful government can allocate water efficiently across its basin. This is not possible at times of conflict. Hence, water is taken on a first come, first served basis, and is not allocated to the most efficient uses. Also, in a stable and peaceful country, local food self-sufficiency is not necessary – food can be traded. Disruptions in the economy and in trade, due to the conflict, have meant that each small area strives to be self-sufficient - and therefore takes water, without considering the optimal use from a basin-wide perspective.

USAID (1993) give a breakdown of irrigated land by province for 1978 and 1991. Whereas Nimroz province (lower reaches) decreased by 28%, Helmand and Kandahar provinces, both with significant middles reaches, increased respectively by 80% and 130%. Notwithstanding the possible inaccuracies of these figures and the moving provincial borders, this suggest a substantial migration upstream of irrigation.

Management is inefficient. Traditional mechanisms for managing withdrawal consist of an hierarchy of persons/institutions responsible for water distribution, the *mirabs, hashers and shura.* These traditional mechanisms for managing withdrawal cover a limited geographical scale. As overall withdrawal rates rapidly increase, it may be necessary to complement traditional mechanisms with modern mechanisms, ideally covering the entire river basin and based on modern information management systems. Moreover, due to the conflict, the traditional mechanisms have largely stopped functioning and have been superseded by direct rule by local commanders. The conflict has prevented the introduction of modern management systems.

The following examples illustrate the scale and effect of poor management.

- FAO, 1997a estimate that of the 3.4 million hectares being irrigated across Afghanistan, only 30% is managed satisfactorily. 50% is considered damaged or destroyed, due to war and lack of maintenance, and the remaining 20% has poor on-farm management. This corresponds to huge losses of water.

- Sharif (2002) provides a table of water use in Helmand province (covering the Helmand river). From the table, 1 m^3 of Karez water can irrigate over 10,000ha, whereas 1 m^3 of water through a formal, large-scale irrigation system can only irrigate approximately 1,500 hectares. Informal irrigation canals lie between these two extremes. Although production per hectare can be higher from formal schemes, and karez schemes lose a lot of water outside of the cultivating season, these figures suggest that agricultural water could be used far more efficiently in Helmand province.

- Agricultural practices may not be the most water efficient for arid regions. The following crops are observed growing througout the region: corn, mulberry, pulse, grapes, pomegranates, tomatoes, cannabis, water-melons, peaches, cotton [20], ocra. Many of these crops are water-thirsty, and crops more appropriate to arid conditions could be grown. Also, local technologies for harvesting and collecting water could be more efficient.

It is important to note that the forms of withdrawal are often in competition. Increasing withdrawal at one site may lead to less water available at another site. For example, it is reported that construction of deep wells is Bakwa district, Farah province directly caused 2-300 karez to become dry (personal communication from UNHCR Diliram and Sharif 2000). In addition, new constructions such as wells often leads to a reallocation of water-user rights; the *stealing* of water as compared to the traditional allocation systems.

Conclusion In general, withdrawal rates are high, and they have increased over the past century and possibly in the past decade. Withdrawals have also migrated upstream, along with irrigation schemes. High withdrawal contributes significantly to drought vulnerability, by lowering river flows and ground tables.

The conflict situation has prevented management and coordination of withdrawals; it has prevented implementation of measures to increase efficiency, and so has contributed to the drought and the ensuing environmental degradation.

[20] Observed being transported, and mentioned in official reports.

Unsustainable withdrawal through large-scale irrigation.

For Afghanistan as a whole, formal irrigation schemes account for less than 15% of irrigated land (FAO, 1997a). In Helmand province, they account for up to 60% (Sharif, 2002). Given inefficiencies in these large schemes, this may be a source of water loss in the basin. Formal irrigation schemes in the province include the Saraj, Boghra and Darweshan schemes in Helmand province, the Dahala/Arghandab/Kandahar scheme in Kandahar province and the Lakshari/Zaranj scheme in Nimroz.

The three schemes in Helmand province, although having no influence over flow out of Kajaki dam, have the first call on water. Hence these areas have not suffered greatly from the present drought. Saraj was constructed before Kajaki dam, and for some time it has not been fully operational (it was reported by the Helmand and Arghandab Valley Authority (HAVA) that in 1985 it was running at below 30% capacity). However, it is likely that water continues to flow in its canals, contributing to water wastage and loss.

The Boghra canal is the most important canal in the region. It accounts for over 40% of the reported land irrigated directly from the Helmand river in the province[21]. This canal system was constructed in the 1950s. The main canal is 75km long, and has a design capacity of 74 m^3/sec (now reduced to 60 due to silting), and irrigates over 64,000 hectares. It is reported that agricultural production along this canal has been close to average in 2002. The team observed that water was wasted from this canal, due to seeping the canal walls, and leakages at gates and siphon systems.

The Darweshan scheme starts downstream from the Bogrha scheme and hence has second call on the water. The area irrigated is small, approximately 16,600 has. HAVA reported that production has been low in the recent, drought years. As seen from commercial aircraft flying overhead, the irrigated area appears green and healthy. Although recently constructed, the main canal is reported to be damaged and subject to seeping (it is a natural bed, mostly clay-lined). The main canal runs for 50km. It can be deducted that there has been significant water loss and wastage in the drought years.

The Dahala dam is officially reported empty, although unofficial reports indicate that it does have some water – possibly not enough for irrigation. There has not been significant irrigation in this formal scheme in 2001/2002. It was reported by the Kandahar department responsible for irrigation that all canals in the province are damaged due to years of neglect, leading to water losses.

The Lakshari canal was constructed to carry water directly from the Helmand river approximately 49km to Zaranj city, and from there on to lake Puzak. Presumably this would have lessened the water available to I. R. Iran. The canal was constructed in the 1960's with a design capacity of 20 m^3/s but suffered immediately from sand clogging. After several unsuccessful attempts to clear it, the canal was abandoned in the 1970's. In 1978, a pumping station was constructed near Zaranj to pump water directly into the northern end of the canal and so onto the agriculture and wetlands north of Zaranj. This pumping station has access to water only after the Iranian authorities have diverted water into I. R. Iran. The pumping station has not been functioning for several years, and is in need of major repairs.

Conclusion: All these systems have significantly declined in efficiency over the past twenty years. In general, this leads to losses of water that would otherwise have flowed into Lake Puzak. There is insufficient data to calculate the scales of these losses. These losses are very much a result of the conflict; the total lack of coordination, the lack of repairs and maintenance measures. Moreover, there has been reported direct damage to the system due to the conflict, probably due to the smaller inter-faction

[21] notably, although accounting for 40% of the recorded irrigated land, it accounted for 78% of the recorded water withdrawn.

conflicts. In this sense, the team concludes that the conflict has contributed to water loss through the large irrigation schemes, and so directly to the drought and to the drying of lake Puzak.

Unsustainable withdrawal through small-scale irrigation,

Small-scale irrigation includes small diversions from main rivers and springs, from main irrigation canals and from deep-wells when used to irrigate crops. Small diversions are an important way of producing food locally. However, they can lead to increased evaporation, they channel water away from aquifers and they can be used inefficiently.

All along the Helmand river, from Kajaki dam to Lashkah Gah, permanent small scale schemes supply water to agriculture. This means that even in drought years agricultural production has remained steady. These schemes have presumably grown in number over the past decades, as the population has grown. The area close to the river below Kajaki dam is apparently more prosperous than nearby areas.

Deep-wells with pumps are increasingly used in Afghanistan, and also presumably in the Helmand region (Sharif, 2000). They are often created in response to population growth, short-term community settlements and local droughts. As such, it is reported they are not based on an assessment of sustainable capacity, and may remove water otherwise flowing to traditional withdrawal sites. It is common to find ancient, traditional schemes running dry as a result of deep-well draining the nearby ground-water.

Conclusion: Again, data on the number of small-scale irrigation schemes is incomplete, but observations and anecdotal evidence suggest it is growing rapidly, and in an unmanaged and uncoordinated manner, contributing to the environmental stress. Efficiency of use is reported to be low. This adds to drought vulnerability in both the middle and lower reaches.

The conflict has contributed significantly to the situation in which these forms of withdrawal are common. In addition, these schemes may be inefficiently run, again as a result of the conflict.

Unsustainable withdrawal through *karez*

Karez are traditional, man-made underground canals that are used to collect and carry water from underground aquifers and deliver it to a village or collection of households for multi-purpose use. They can carry water over several 10’s of kilometres. In many cases, the karez were originally constructed centuries ago, and have been upgraded or maintained ever since.

Karez are mostly found in middle reaches, due to presence of low slopes and good aquifers. Data on the number of karez is incomplete and contradictory. Sharif (2000) gives figures of 18 for Nimroz, 631 in Kandahar, 276 in Helmand and 1516 in Ghazni. Across Afghanistan, an average Karez irrigates 25 hectares. In a personal communication Sharif suggested that the actual numbers of Karez are much higher than the official numbers.

It is reported that no new karez have been constructed in recent years, although it is possible that existing karez have been extended, widened or had their capacity increased through other methods (for example the deepening of bore holes which bring water into the karez via capillary forces, or the joining up of karez into a cascade of karez).

Karez may have contributed to the ongoing drought through the following mechanisms:
- a typical karez cannot be regulated. The water flows all day, every day, rather than when it is needed for irrigation. Hence much water that otherwise would have stayed in the aquifer or found its way to a river, is disbursed into the village by the karez and then lost as evaporation. The karez in Zamindawar district in

Helmand province yield 2 m^3/second (Sharif, 2002). This flow, for a single district, amounts to 17 million m^3 over a 100 day period. In winter, little of this water is used and the water may be lost.
- karez often lie very close to each other. Often 3-4 karez may be observed lying very close to each other. A series of close-lying karez through a water table may add stress to the water in the table. In conjunction with increased ground compaction and lower water inputs, this may lead to an irreversible degradation of the water table.

Conclusion Karez are contributing to water loss and probably to land degradation. Karez are also suffering greatly from the depletion of the ground table through wells.

The conflict has in general exacerbated this situation. It has prevented repairs and maintenance of karez, hence they are less efficient and water is wasted. The conflict has also prevented any measures to improve coordination and efficiency of water distribution across geographical areas.

Unsustainable withdrawal through small wells

This section refers to small wells for drinking water and for micro-irrigation. Many such wells are hand-dug and operated by hand-pumps or simple buckets.

The rapidly rising and moving population has led to a vast increase in the number of such wells. There are no figures on the total withdrawal via such wells. Many drilling sites can be observed across southwestern Afghanistan. Sharif (2002) reported seeing 10's of such drilling sites on the road between Kabul and Ghazni, including one site with 6 sets of drilling equipment.

The wells suffer the following symptoms:
- Increasing depth. The only possibly solution to the lowering of the water table is to increase the depth of the well. This is a short-term solution, and leads to a further lowering of the stored water;
- Increasing salinity. This leads to further damage of the water table, possibly of an irreversible nature (this was reported on several occasions, with scientific data being provided for two well in Zaranj by UNHCR);
- High levels of wastage. Poor technology and poor incentive mechanisms meant that in many cases the water is extracted and used in an inefficient manner.

Due to the conflict, it has been impossible to estimate carrying capacities, implement distribution schemes, and ensure efficient usage of waters from these well.

Diversions to Chahnimeh;

Just to the south of Zaranj, the remaining (after the Helmand province irrigation schemes) waters of the Helmand river flow into two branches. One, the southern or Sistan branch, flows directly into I. R. Iran. The other, the northern or Parian branch, at first forms the border between I. R. Iran and Afghanistan. It then continues into Afghanistan and Lake Puzak. Hence, naturally, at least half of the water travels to I. R. Iran.

In previous years, the Iranian government has constructed a series of three (some reports say 10) concrete channels to channel water from the Helmand River into I. R. Iran, into the man-made Chahnimeh reservoirs. This water came from the Sistan branch.

The diversion of waters to Chahnimeh and other reservoirs in Iran is both an impact of, and a contributor to, the drought. The Iranians constructed the reservoirs in response to several years of low river flow in the 1960's. If the river flow had been normal, they may not have constructed the reservoirs.

The storage capacity of the Chahnimeh reservoirs is 0.7 billion m^3. The water is reportedly used for only drinking. The reservoirs lie in a high evaporation zone. I. R. Iran is currently increasing the storage capacity to 1 billion m^3, through the construction of a fourth Chahnimeh reservoir

Conclusion:
Any links between diversions to Chahnimeh and the conflict are difficult to assess. A key objective of the Iranian government is to preserve a water supply in Sistan/Baluchistan[22]. In the absence of a stable government in Afghanistan, and faced with increasing withdrawals in Afghanistan, I. R. Iran is unlikely to achieve this objective by pursuing formal agreements and cooperation. Possibly, given the circumstances, the Iranian authorities have undertaken the next best solution – construction of reservoirs. It is not impossible that stability in Afghanistan would have facilitated the development and implementation of an agreement between I. R. Iran and Afghanistan, and would have rendered the need for diversions to Chahnimeh unnecessary.

Unsustainable grazing

Sustainability of grazing is generally a function of numbers of livestock and of grazing practices. Information on both of these is incomplete and unreliable.

Numbers of grazers

It is widely reported that in the early years of the conflict there were major drops in the livestock numbers, as animals died through the direct effects of conflict, and as farmers were forced to sell livestock. These cuts in livestock numbers decreased considerably the stress on the environment. However, according to (FAO, 1997a), by 1997 livestock levels had returned to pre-conflict levels.

Since 1997, following the onset of the drought, nationally, it is reported that livestock numbers have been decimated. This is supported by figures provided for Nimroz province (see Table 4).

Table 4 - Livestock figures, Nimroz Province (source: personal communication from provincial department of agriculture and livestock management)

	Camel	Cattle	Sheep	Goats	Horses	Donkeys
1989	7000	30000	60000	45000	2000	10500
2002	5000	7045	16420	20760	402	6900

For example, in Nimroz province, Char Bujak district, one individual farmer may have had as many as 12,000 sheep before the drought. Even poor houses would have 5 cows and 5 sheep, whereas rich houses would have up to 5,000 cattle and 2,000 sheep. These numbers seem high for an arid region. In the region, given rises in the population, aggregate livestock levels are likely to be far higher than at any time in history. The levels may have been unsustainable and may have contributed to land degradation, which in turn increased vulnerability to drought.

Grazing practices

There has been no serious recent study of grazing practices. Educated estimations based on informal observations can be made. As population increases, often, traditional practices stop being sustainable, and

[22] This is the Iranian province across the border from Nimroz.

if not enhanced, can lead to environmental degradation. This may have happened over the past fifty years. Observations suggest that grazing practices follow traditional management methods. Additionally, in Southwestern Afghanistan, the conflict has contributed to poor grazing practices through two mechanisms:

- Preventing the establishing of coordination and improved management mechanisms;
- Causing an influx of large numbers of IDPs and refugees to the area, bringing in additional livestock, and bringing in farmers without knowledge of the area, and farmers who do not have a long-term interest in maintaining the ecology.

Observations indicate that the land is highly grazed, and in many cases large herds of animals were looking for pasture. Despite the recent drop in livestock figures, large numbers of sheep and camel can be seen grazing throughout the region.

Conclusion. In isolation, grazing is unlikely to contribute to drought, as natural cycles would control livestock numbers. Moreover, recent drops in livestock numbers have led to decreased environmental pressure. However, it is possible that overgrazing associated with historically high levels of livestock, in conjunction with other factors (notably increased withdrawals), has led to soil degradation, disruption of the hydrological cycle, and so to increased drought vulnerability.

Conversion of pasture land to agricultural land:

This factor has contributed to land and water degradation in many arid areas. However, no information on this in south-western Afghanistan was made available to the team. Further study is needed to assess this, and in particular to determine the effects of the conflict on this factor.

Road construction;

Road construction has contributed to gulleying and erosion in the region, as can be seen by the large gulleys to be found downstream of roads throughout the region. In general, waters accumulate before crossing the road, and at times of floods the accumulated waters flush away top soils, causing erosion and gulley formation. This leads to a general lowering of the efficiency of the hydrological cycle.

This is not considered to be a major factor in the ongoing process of land/water degradation, however it deserves further study. The conflict, in the usual way, has prevented any measures aiming to mitigate or control gulleying and erosion, and so has exacerbated any effects.

Long distance, wind-borne sand.

Long distance wind-borne sand is very present at most parts in the lower reaches and in significant parts of the middle reaches. In summer the ‘120 day wind’ transports sand possibly over 100’s of km. The sand is deposited throughout the region. The sand can contribute to deterioration of soils (through increased salinity and decreased nutrient levels) and so to decreased productivity and biodiversity. Sand deposition can also lead directly to lower vegetative cover, therefore increasing runoff levels, lessening ground table recharging. Also, sand deposition can destroy infrastructure (notably irrigation canals). This lessens the efficiency of irrigation schemes and increases vulnerability to drought. This also increases vulnerability to flooding.

Again, there is no evidence that the conflict has contributed directly to these effects. However, there are measures and technologies to control sand deposition, and other countries in the region have made significant progress. As with the other drivers listed above, the conflict has helped prevent Afghanistan from developing and using these sand control measures.

Annex 4: Land cover images showing changes in land cover, Sistan Basin, 1976 – 1999 (attached separately)