AFGHANISTAN HUMAN DEVELOPMENT REPORT 2011

The Forgotten Front: Water Security and the Crisis in Sanitation

CPHD

Afghanistan has sufficient water to meet the domestic, industry, environment, and agriculture use but due governance challenges t|s u|n|a|b|le to use the water for the human Af
development of its citizen. Consequently, Afghans are suffering from poor health and loss of livelihood and (6 children die of diarrhea every hour);
drought (many migrate to neighboring cour
to find jobs as their land is left fallow; droughts (loss of livelihood/property); conflict (over water sharing). 27% have access to safe drinking water source, 5% have access to im
to improved sanitation. Afghans are extremely vulnerable to water shocks (drought/floods) irrigation water is not shared with equity. Upstream land can access more water and
grow rice and make more money while the downstream lands con not even grow beans for household use. This is a source of conflict. Government and donors have ignor the
have ignore the water sector. The government political commitment is missing. The donor have only allocated 5% of development aid to the water sector.

AFGHANISTAN HUMAN DEVELOPMENT REPORT **2011**

The Forgotten Front:
Water Security and the Crisis in Sanitation

Centre for Policy and Human Development
Kabul University
Jamal Mena
Kabul, Afghanistan

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The report team has consulted with more than 4,500 women and men across the 34 provinces and many cities and village of Afghanistan to seek their input through in-depth interviews, focus group discussions and round-table discussions.

Case studies have been designed and conducted on the following themes in various provinces:

- Water use in unplanned settlements in the Kabul metropolitan area
- The impacts of drought on various socio-economic groups in Samangan and Kandahar provinces
- Aid effectiveness in drinking water projects in Faryab Province
- The impact of drought in Faryab and Wardak provinces
- Conflicts over irrigation water in upstream and downstream areas in Baghlan, Kunduz and Takhar provinces
- The social realities of the management of karezes in Wardak Province
- The challenges facing vulnerable households in accessing water from small private sector water suppliers in the city of Kabul
- Children who collect drinking water in the city of Kabul

Talks with hundreds of farmers, maliks, mirabs, irrigation officers, teachers, village elders and members of community district councils and provincial councils in all 34 provinces have helped us learn more about the vulnerabilities caused by water shocks. The recommendations of these people have taught us much about overcoming the challenges.

Focus group discussions have been facilitated by CPHD and Kabul University research teams on the following topics:

- Informal water distribution systems
- Understanding the mirab system
- Water conflicts
- Water management and distribution systems
- Challenges in access to drinking water and sanitation
- The role of government and donors in the water sector at the local level
- The impact of drought
- The water challenges faced by Kuchis
- The difficulties of reforming water rights
- Challenges in communities relying on rainfed water
- Formal and informal water management systems
- The water challenges in provinces facing security risks

A monthly guest lecture series has been organized at Kabul University for students and affiliates in state and non-state institutions to facilitate dialogue and discussion on water and development issues. Capacity-building through training in human development and social research methodologies has been arranged for lecturers and students at Kabul University to encourage additional

field-based research on water and the links among water, sanitation and human development. The chapter authors have benefited from the research outcomes. To promote ongoing advances in research and capacity-building, an international exchange programme has been arranged for Kabul University lecturers and students. More than 50 lecturers have attended training sessions in human development and social research methodologies during two separate trips to India.

The AHDR research team has also arranged a special consultation meeting with street children and youth to hear their stories and views about water. With the support of the Regional Studies Centre of Afghanistan, the Fine Arts Faculty and the Journalism Faculty at Kabul University, Ashiana, the Sanayee Development Organization, local schools for orphans and street children, this effort has led to the development of a book about water challenges of Afghanistan by and for youth.

Background papers

Various experts have contributed papers as input for the report. Selected papers are available on the CPHD website. The following are examples:

- 'Water and Sanitation Project Effectiveness: A Case Study of Two Projects in Bagrami District of Kabul', Mumtaz Ah-mad
- 'Vulnerability, Water and Human Security', Sultan Barakat
- 'Floods and Droughts: The Afghan Water Paradox', Jelle Beekma and Joel Fiddes
- 'Water and Conflict', Co-operation for Peace and Unity
- 'Islam and Water', Mohammad Ismael Labib
- 'The Significance of Water in Afghan Culture', Abdul Ghafoor Lewal
- 'Water and the Illegal Economy', Peter Middlebrook
- 'Kuchis and Water Use in Afghanistan', Alan Rao
- 'Poverty and Water: Case Study of the Role of Irrigation in Reducing Poverty', David Thomas

Members of the national advisory board

The following individuals supported the report team through significant advice on a regular basis:

- Abdullah Aini, Manager, Mobile Team, Tetra Tech ARD/Afghan Sustainable Water Supply and Sanitation
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Review panel

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- Goursankar Ghosh, former Chief, Water, Sanitation and Environment Cluster, United Nations Children's Fund
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Khwaga Kakar CPHD/
AHDR Coordinator

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Abbreviations and acronyms

ANDS	Afghanistan National Development Strategy
CPHD	Centre for Policy and Human Development
CSO	Central Statistics Organization
GDI	Gender-related Development Index
GDP	gross domestic product
GEM	gender empowerment measure
GER	gross enrolment ratio
HDI	Human Development Index
HDR	Human Development Report
HPI	human poverty index
IDP	internally displaced person
IWRM	integrated water resources management
jerib	2,000 square metres, 0.2 hectares; 21,528 square feet, 0.49 acres
l/s/ha	litres per second per hectare
MAIL	Ministry of Agriculture, Irrigation and Livestock
MDG	Millennium Development Goal
MEW	Ministry of Energy and Water
MPI	multidimensional poverty index
NGO	non-governmental organization
NHDR	National Human Development Report
NRVA	National Risk and Vulnerability Assessment
PPP	purchasing power parity (in United States dollars)
RBA	river basin agency
RBC	river basin council
ser	7 kilograms; 15.4 pounds
SRI	system of rice intensification
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WUA	water user association

Overview

The forgotten front: water security and the crisis in sanitation

The water crisis claiming many lives and is destroying livelihoods on an alarming scale

"We see all this water abundance in our rivers, but most of it is flowing out of the country, and we can't even access it for our basic needs!"

—A farmer in Badakhshan Province

"This is the first time I've seen water flowing in this village in the last 30 years. I actually forgot we had rights to water from the canal."

—A farmer in Baghlan Province

"We have made a *kanda* and store water in it and then use it for drinking, livestock and irrigation. The children become sick from drinking the water."

—A woman in Kandahar Province

"We are *Kuchis*. We do not have our own water, and the owners of the *karezes* do not give us water during periods when there is less water."

—A Kuchi man in Kabul Province

"People used to have a good number of livestock, but the recent drought [in 2007–2008] caused the death of many livestock. At least 90 percent of the livestock were killed by the drought and the harsh winter in our village."

—A farmer in Faryab Province

"In this village, 40 to 50 percent of the households have land. There has been no rain in our area, and many households are not cultivating their land. Now, they do not have any wheat to eat."

—A man in Wardak Province

"There is no latrine in our village. People go in the open fields. We do not make latrines in our homes; it is considered a disgrace in our village."

—A man in Faryab Province

These voices do not speak of insurgency, war, reconciliation, or international terrorism. They are the voices of Afghans who are facing water shortages every day. Most of the world thinks of Afghanistan in terms of deteriorating security and a growing insurgency. Beyond these problems, there is another crisis, however. Today, almost 10 years after coalition troops first arrived, millions of Afghans are without access to safe drinking water and sanitation. Water and the lack of water are at the heart of this daily crisis, one that is claiming many lives and is destroying livelihoods on an alarming scale.

"By means of water", says the Koran, "we give life to everything." The words of this holy book capture a deep wisdom. People need water as surely as they need oxygen; without it, life would stop. People need clean water and sanitation to sustain their health and maintain their dignity. Beyond household needs, water also sustains ecological systems and maintains livelihoods through irrigation and industry.

limited access to safe water, the lack of improved sanitation facilities, the inequitable sharing of water resources and the extreme vulnerability to water-related climate shocks are largely being ignored

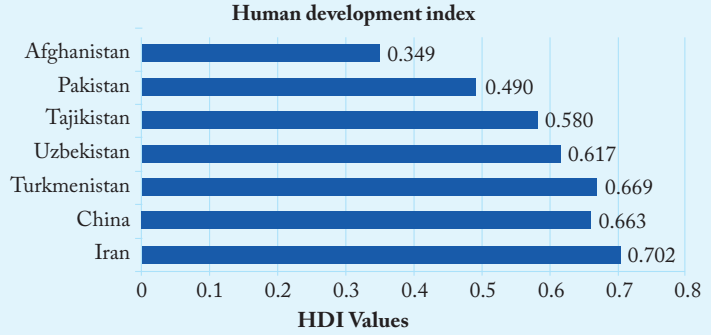
The *Afghanistan Human Development Report 2010* is appearing at a critical moment. The world's attention is focused on this impoverished landlocked country on the threshold of the 10-year countdown to the 2020 target of the Millennium Development Goals. There are worrying signs that scarcity is looming. During the past nine years, Afghanistan has achieved gains in health, education and the standard of living. Yet, the number and magnitude of the remaining difficulties are significant. Access to safe water is one of the chief challenges. Indeed, the goal of halving the proportion of Afghans without sustainable access to safe drinking water will not likely be met until at least two decades beyond the deadline. Inequalities in access to water for life and for livelihoods remain a major contributor to the substantial disparities in the distribution of wealth and opportunity.

The Forgotten Front: Water Security and the Crisis in Sanitation shows that the limited access to safe water, the lack of improved sanitation facilities, the inequitable sharing of water resources and the extreme vulnerability to water-related climate shocks are largely being ignored in the face of internal military and political struggles and the global security agenda. The report makes the case that water security is integral to human development and the prospects for peace in Afghanistan. The government, together with the international community, must now scale its efforts up to improve access to water and sanitation for all. Relegating this effort to a remote future fails to recognize the role the related issues play in the struggle against poverty and insecurity today. The government, civil society and donors must act on a shared commitment to deliver on the pledges enshrined in the Afghanistan National Development Strategy. Time is running out.

Water Security and Human Development

Human development revolves around the ability of individuals to live lives that they value and to provide themselves with the means to realize their full potential as human beings. It includes the opportunity to read and write, be free from illness, access the resources necessary to attain a decent standard of living, participate equally in society and enjoy fundamental freedoms so they may alleviate or avoid penury.

Figure 1 **Regionally, Afghanistan ranks lowest on the Human Development Index**



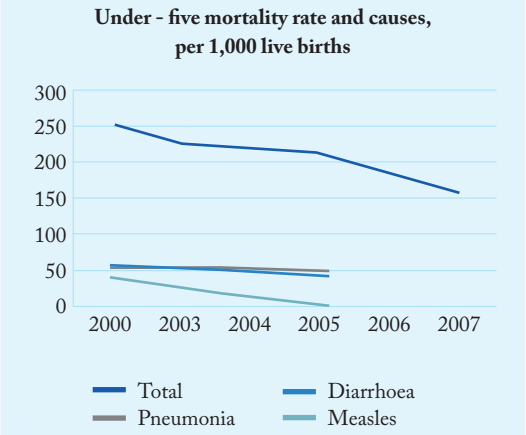
Source: UNDP Global HDR (2010).

Assessing human development in Afghanistan

The analysis of human development in Afghanistan reveals that there has been progress in recent years, but the progress has been uneven and far too slow. According to the Human Development Index for 2010, Afghanistan is ranked 155th among 169 United Nations member states (see figure 1). This reveals the profound difficulty the country faces in seeking to advance the well-being of its citizens.

There have been encouraging advances in health service accessibility and the reduction of the under-5 and maternal mortality rates over the last decade (figure 2). Yet, most standard health indicators place Afghanistan near the bottom in international rankings. Every day,

Figure 2 **Despite a decade of progress, child mortality is still among the highest in the world**



Note: The figure relies on a median scenario.
Sources: UNICEF. Best Estimates (2005), MRRD and CSO (2009).

600 under-5-year-olds die because of a variety of causes, 23 percent because of problems associated with diarrhoea. Afghanistan has the second highest maternal mortality rate in the world, at 1,600 deaths per 100,000 live births.

Primary and secondary enrolment rates—a critical Human Development Index indicator—have expanded considerably, with more children attending school than ever before (figure 3). In 2007, 61 percent of school-aged children (or 4.7 million children) were enrolled across the country. Nonetheless, not all children enjoy equal access to education. Female enrolment rates still trail far behind the rates for males. In 2008, girls accounted for only 37.4 percent of all students. Geographically disaggregated data reveal consideratble discreapencies in education opportunities across provinces. Inequitable educational access means inequitable opportunities to engage in full and productive lives and enjoy plenty of room for social and economic advancement.

Describing poverty in Afghanistan

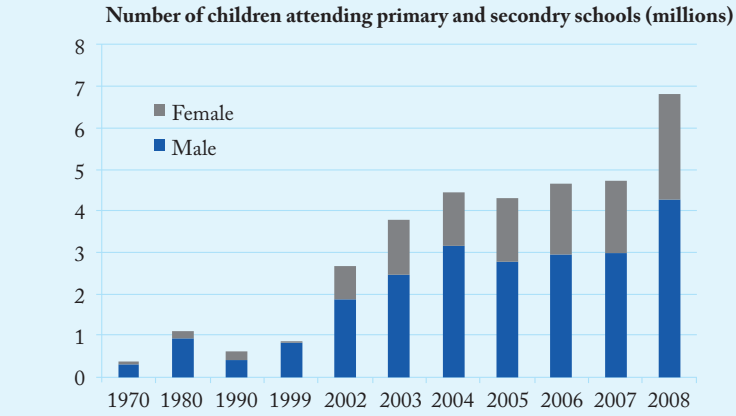
In Afghanistan, 36 percent of the population is unable to obtain the means to satisfy their basic subsistence needs. Thus, from an income-based perspective, an estimated 9 million Afghans are poor. Urban households are as impoverished as rural ones.

The new multidimensional poverty index of the United Nations Development Programme provides a more nuanced perspective on poverty that is based on deprivation in three main areas: health, education and standard of living. It shows that 84 percent of Afghan households are multi dimensionally poor. This share is much higher than the share according to the income-based approach (36 percent).

84 percent of Afghan households are multi dimensionally poor

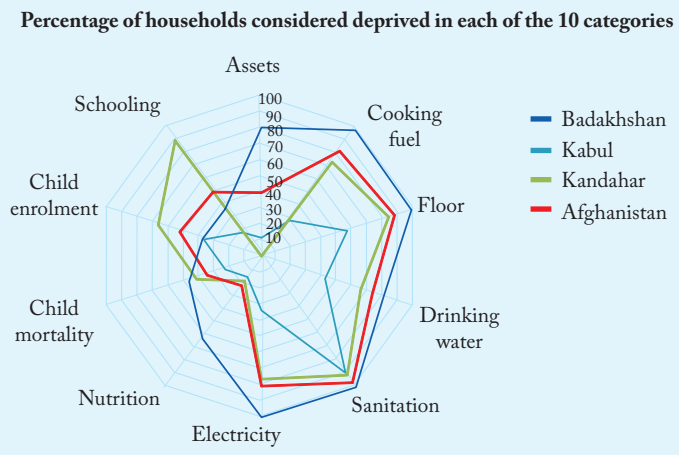
Extremely low living standards, that is, lack of access to clean water and improved sanitation, are the main driver of poverty. The poverty and deprivation profile at the national level hides provincial differences (figure 4). The multidimensional poverty index also reveals that there is an important urban-rural divide. The Kuchis (nomadic pastoralists) are the most deprived group in the population.

Figure 3 **Since 2001 educational opportunities for school-aged students have increased**



Source: Giustozzi (2009).

Figure 4 **Poverty profiles are highly variable between provinces.**



Source: Based on MRRD and CSO (2009) data.

Reliable access to sufficient and safe water is integral to all aspects of human development

Gender inequality: a major impediment to human development

Since the Bonn Agreement (the initial agreements to recreate the state following the coalition invasion of Afghanistan), women have made advances in constitutional rights and political participation and representation. Afghanistan ranks among the world's top 20 countries in the number of women parliamentarians. Nonetheless, despite the progress, particularly with respect to education among girls, gender discrimination is pervasive. According to Human Development Report 2009, the country ranks at the bottom in the gender-related development index, at 154th, with an index of 0.331.

Linking human development and water security

Reliable access to sufficient and safe water is integral to all aspects of human development. Its presence or absence is the difference between prosperity and poverty, good health and bad. Access to water or the lack thereof facilitates or blocks the ability of Afghans to live full, secure and productive lives.

Water is essential to a long and healthy life. It is also critical for education. Proximity to clean water means that children do not have to travel long distances to collect water and, thus, risk losing out on an education because they are too tired in the classroom. Water is also necessary for a decent standard of living because a healthy agricultural sector depends on the regular supply of water .

The concept of water security reflected in this report builds on the notion of human security. Water security contributes to the seven domains of human security, namely, economic, food, health, environmental, personal, community and political security.

Managing Water Resources, Scarcity and Climate Shocks

Securing access to water for all—regardless of gender, ethnicity and socioeconomic status providing protection against water-related shocks are two critical human development challenges facing Afghanistan. A household that is deprived of water is deprived of human development potential.

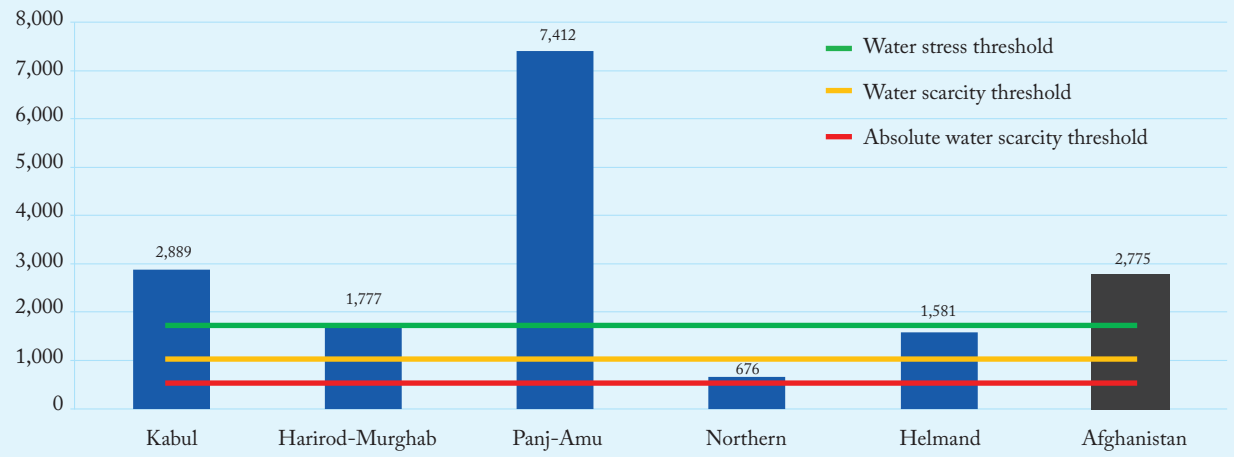
Rethinking water scarcity in Afghanistan

How much water does Afghanistan have? Is Afghanistan a water-scarce country or does it possess sufficient quantities of water to meet current and future needs?

Indicators suggest that Afghanistan is not a water-scarce country. It possesses an estimated overall surface water availability of 2,775 cubic metres per capita per year. Experts consider 1,700 cubic metres per capita per year sufficient to satisfy the water demand of a given population for domestic, food production, industrial, energy and environment. The country is thus endowed, in theory, with sufficient water to meet domestic, agricultural, industrial and environmental needs.

Nonetheless, it remains burdened by constraints that limit the capacity to make full use of the potentially available resources. The relatively significant amounts of water available in the country hide important variations within and across river and sub-river basins. The distribution of the available water does not always correspond with the location of the irrigable land and the settled populations (figure 5). For example, while the Panj-Amu river basin holds almost 40 percent of the country's available water resources, at more than 7,400 cubic metres per capita per day, it only accounts for 13 percent of the irrigated land. In contrast,

Figure 5 **Afghanistan is not water scarce, but the geographical distribution of water is significantly uneven**



Sources: Adapted from Government of Afghanistan (2008), Favre and Kamal (2004).

the Northern river basin holds 20 percent of all irrigated land; however, only 3 percent of the country's total water resources flow within the basin's hydrological borders. This represents less than 700 cubic metres per capita per year, which is perilously close to absolute water scarcity.

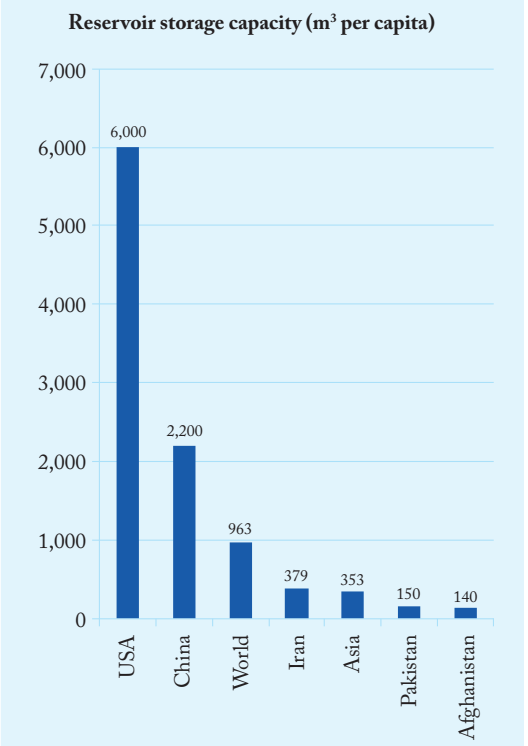
The availability of water in Afghanistan is characterized by considerable intra- and inter-annual variations. The country also has the lowest water storage capacity in the region (figure 6). If water becomes abundant during certain periods in the year, it cannot be stored to meet demand during periods of shortage. This reduces the opportunity to harness surface resources and renders the country more vulnerable to drought and other climate shocks.

Despite the limitations, Afghanistan should possess sufficient water to meet the basic needs of the population and allow the performance of the agricultural sector to improve. Currently, however, irrigation reaches only an estimated 1.8 million hectares of land, only 60 percent of the levels of the mid-1970s.

Groundwater resources: preventing over exploitation and safeguarding quality

The availability of groundwater requires more research. Although estimates on availability in various river basins indicate that untapped groundwater resources abound, communities are concerned that over extraction because of the reliance on high-yield mechanized wells is depleting the resources for traditional, sustainable technologies such as karezes (groundwater extraction structures). These bad practices need to be addressed.

Figure 6 **The water storage capacity of Afghanistan is among the lowest in the world**



Sources: World Bank (2005), UNESCAP (2006).

Significant dependence on agriculture, the lack of water storage infrastructure and ongoing land degradation render Afghanistan particularly sensitive to the effects of floods and drought

Drivers of water scarcity: population growth and economic development

Population growth, economic development and improved standards of living will be the main drivers of water scarcity in coming decades. As economies grow, the demand for water for domestic uses, agriculture and industry will increase.

It is projected that, in Afghanistan by 2025, the amount of water available per capita will have declined by approximately 36 percent relative to 2004 (figure 7).

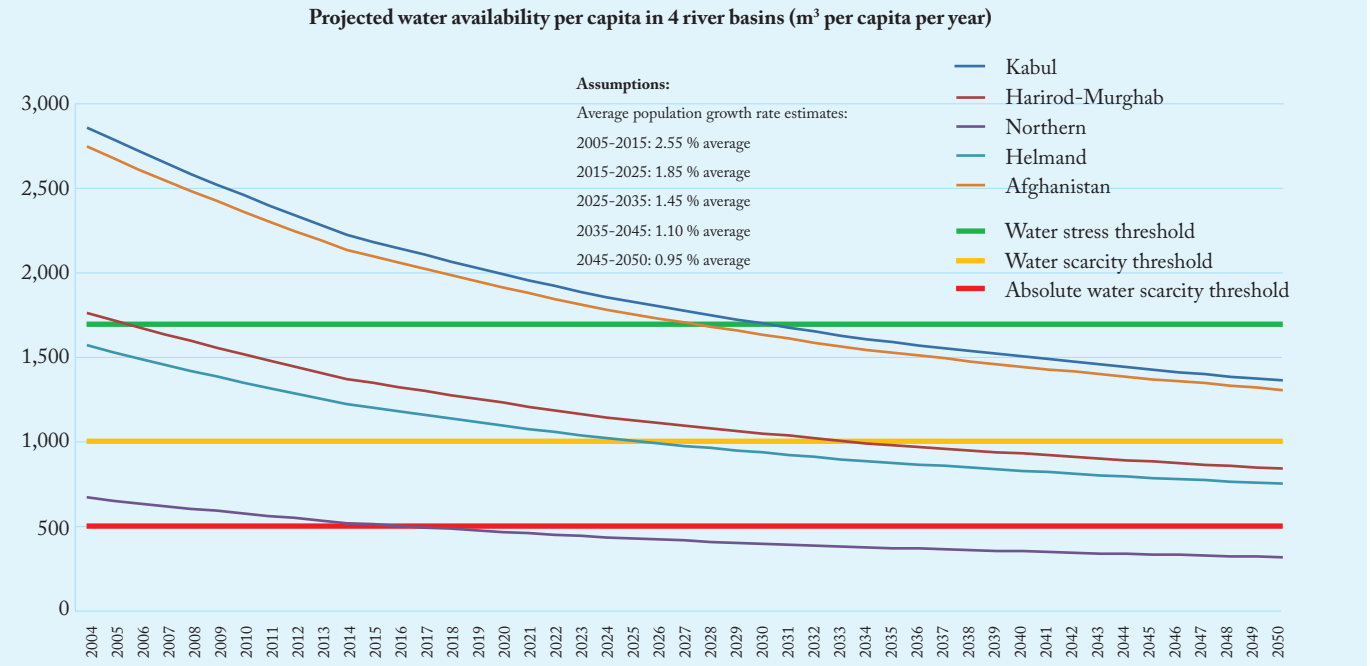
Urbanization will also result in more demand, which, in the case of Kabul, is already causing grave concern. Projections for the capital city indicate that, by 2050, six times more water will be required.

The human development implications of water scarcity

The prospect of water scarcity in most river basins of Afghanistan raises serious human development issues. First, food security and food self-sufficiency are threatened. Feeding the population and limiting the country's dependence on commercial food imports are becoming more challenging.

Second, if relative peace returns to the country, urbanization will proceed apace, and industrial and municipal demand for water will gather momentum. As the availability of water per capita declines, competition across water uses will inevitably intensify. This has already begun to occur elsewhere in developed and developing countries alike. Failure to anticipate the impact of mounting demand will certainly lead to an all too familiar scenario: households that depend heavily on agriculture, but that do not have secured water rights, other economic assets, or political influence will be the first to lose out. Growing scarcity may also accelerate the process of environmental degradation, as illustrated by the ecological disaster in the Hamoun wetlands in the Sistan depression between Afghanistan and Iran in the early 2000s.

Figure 7 **The per capita availability of water may decline by 50 percent between 2004 and 2040**



Note: Calculations of the baseline scenario assume 57 billion cubic metres of surface water availability. The Panj-Amu river basin is not shown because the related Falkenmark indicators are likely to remain high during coming decades. The estimates of the population growth rate are derived using the cohort-component method. The estimates in the census bureau database for various years (2005, 2015, 2025 and so on) have been averaged to arrive at the estimates for the various periods (2005–2015, 2015–2025 and so on). This approach has limitations, and the projections remain hypothetical, though they are best estimates.
Sources: Baseline population data: Favre and Kamal (2004); population growth estimates: International Data Base, US Census Bureau, http://www.census.gov/ipc/www/idb/country.php (accessed 26 April 2010).

Risk and uncertainty: the threat of drought and floods

Significant dependence on agriculture, the lack of water storage infrastructure and ongoing land degradation render Afghanistan particularly sensitive to the effects of floods and drought, which are common in Afghanistan, an arid to semi-arid country. The severity of drought in Afghanistan can be quantified by data on declines in cereal production: during periods of drought, the declines are 40 to 55 percent relative to an average year (figure 8). Rainfed agriculture is the most severely affected, with reported declines reaching more than 80 percent.

The effects of climate events on individual lives best illustrate the impact of water scarcity. Nowhere are these more evident than in the livelihood strategies and risk management arrangements Afghan families must adopt to survive during water shortages. These coping measures deplete productive assets and drive poor households deeper into poverty.

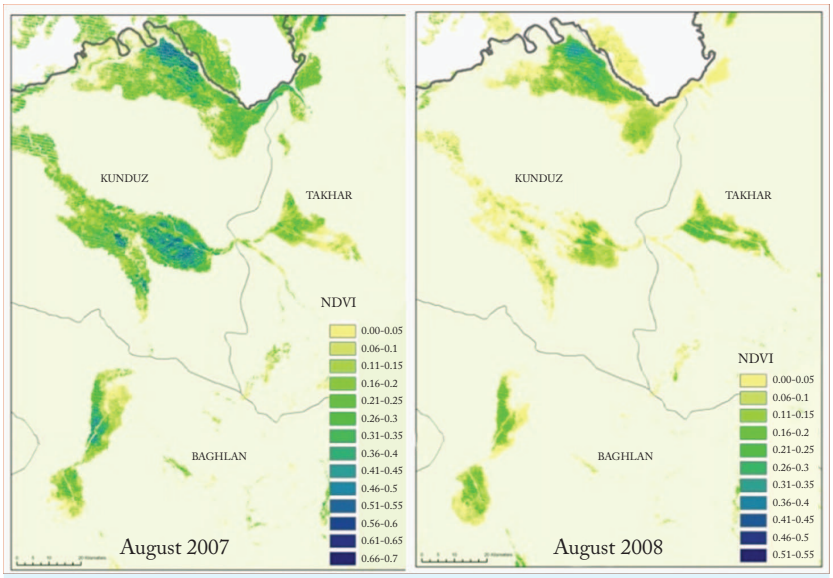
Close to 70 percent of all Afghan households lose livestock during periods of drought. By the end of the 2000 drought, the number of domestic livestock had dropped by more than 50 percent. Drought affects food production, transport and labour capacity. It can also result in significant migration to urban areas and abroad, usually to Iran, a strategy that is both expensive and hazardous.

A large majority of households accumulate substantial debt as a result of recurrent drought. In 2002, after four years with little or no rain, an estimated 60 percent of households were extremely debt insecure. Drought also exacts a high toll on the nutritional status of families; it erodes health and undermines educational attainment. Following the dry year of 2004, 37 percent of the population across several heavily affected provinces had become food insecure. This is almost 20 percent greater than the corresponding share in 2007, which is considered a normal year.

In general, drought widens the divide between those people who manage to retain or increase wealth and those who fall deeper into poverty. While wealthier households may be able to deepen wells to continue irrigating crops, buy costly fodder to feed livestock, or use grain stocks to lessen dependence on markets characterized by rising prices, the poor lose their most productive assets, such as land, contract more debt, or send their only sons to the neighborning countries.

The capacity of communities to draw on social or institutional resources is a critical factor explaining the resilience of many households and the absence of famine during the worst years of drought. Nonetheless, certain methods of managing risk are exploitive and can exacerbate the gap between rich and poor. Drought and other disasters can be hugely beneficial to informal moneylenders and large landowners, who may enrich themselves at the expense of impoverished families. For the poorest households, this translates into the loss of livestock and land (including associated water rights) or houses if they are forced to default on loans. Some desperate families are forced to marry their young daughters. Such outcomes directly contradict the principles of equity and human security.

Figure 8 **The global impact of the 2008 drought on crop production in the grain basket of Afghanistan**

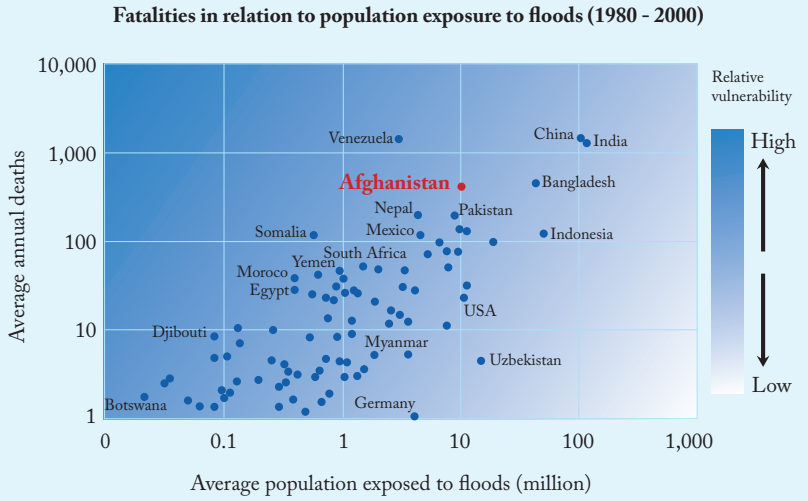


Source: Beekma and Fiddes (2010).

Afghanistan must address transboundary water management issues so as to reap the human development benefits

Floods also exact a major toll on livelihoods. Poor socio-economic conditions, deficiencies in infrastructure and a lack of preparedness partly attributable to a lack of data and forecasting systems conspire to render Afghanistan more vulnerable than most countries to floods. This explains why the estimated average number of fatalities is almost 20 times higher in Afghanistan than in the United States, which faces a similar level of flood risk (figure 9).

Figure 9 **Afghanistan is among the most vulnerable countries with regards to floods**



Source: Adapted from UNEP/ GRID Geneva as quoted in ICIMOD presentation – Kabul – (May 2008).

Managing the transboundary challenge

Most of Afghanistan's neighbours depend on surface resources originating from within Afghanistan. The country's water resources must therefore be shared with other riparian nations. Because Afghanistan is planning to develop domestic water resources, it must address these transboundary water management issues so as to reap the human development benefits. There is a strong incentive to develop local water management infrastructure, including through large-scale infrastructure projects, but Afghanistan must also engage in dialogue with riparian countries. Chief among the constraints to this step is the lack of the skilled expertise and reliable and credible data necessary to undertake sound, evidence-based planning and decision-making.

Looking to the future: climate change and water insecurity

It is likely that climate change will lead to the following during the 21st Century:

- A progressive increase in the water necessary to irrigate crops and meet the demand for food
- Changes in the seasonal behaviour of rivers, with less snow melt during the warm season, meaning that less surface water will be available to irrigate summer crops
- Increases in the incidence and intensity of drought and floods

Scarcity and climate shocks must therefore be well managed.

Developing supply

Developing supply and building infrastructure and capacity would minimize the effects of drought and river floods. The construction of large-scale storage infrastructure such as dams requires that the government consider the interests and constraints of downstream riparian countries.

It is important to capitalize on the many traditional methods that have proven so effective in the arid and semi-arid climate of Afghanistan over the centuries. These include the construction of snow harvesting pits and water harvesting ponds and the rehabilitation of karezes.

Rehabilitating canal infrastructure is critical to improving access to irrigation. Donors and the government should focus on large-scale canal infrastructure, but also on low-cost micro-irrigation, which can be beneficial to farmers in lowland plains and remote valleys.

Reducing the demand for irrigation water

Testing and adopting seeds and crop varieties that are more drought tolerant could help the poorest families avoid resorting to sur-

vival strategies. Efforts to promote less water-intensive crops and cultivation methods and improve efficiency in water applications should focus on water users and local government agencies. Developing the capacity of government agencies is important if sustainable on-farm water management practices are to become more widespread. Investing in soil and water conservation is critical in mitigating the effects of floods and drought.

Watershed and rangeland conservation and management will be necessary to reduce vulnerability to floods and drought. Technical and material supports will be required to ensure the sustainable use of natural resources. Improving rangeland management calls for the active participation of local communities, especially herders and farmers. It will include the establishment of local decision-making bodies and agreements on the community management of rangeland.

Realizing integrated water resources management and river basin management

The new Water Law passed in 2009 adopted integrated water resources management and river basin management through multi stakeholder platforms as the core concepts of water resources management in Afghanistan. Multi stakeholder platforms mean that the adequate representation of all categories of water users must be ensured in the decision-making process on water resources management. The development of river basin management plans and the prioritization of water use, including through drought management plans, is critical in these concepts. Indeed, because of the progressive decline in the per capita availability of water, more effective governance is needed so as to foster the fair allocation of water within and across uses. Beyond the management of the demand for water, multi stakeholders platforms such as river basin councils are particularly relevant to development projects aimed at increasing water supply.

Improving data collection and forecasting

Data collection and analysis are over arching requirements in the development and management of water resources. Government agencies and donors need more information to refine their understanding of water scarcity in sub-river basins. A national flood forecasting programme is also essential to preventing loss of life and reducing the destruction of farms and livestock caused by floods and drought. Pilot initiatives in the Panj-Amu river basin are providing a foundation for relevant actions. Without reliable data gathering based on practical agreements between riparian countries, transboundary water management is unlikely to move forward.

Implementing groundwater policy

Groundwater has been now been recognized as a strategic preserve at the national level. The government must therefore ensure that sub-river basin councils restrict unsustainable development and use, particularly during periods of drought. Technical and informational support by the international community will be essential in decision-making. The establishment of a groundwater-monitoring network would be important in the implementation of groundwater policy, though the lack of enforcement capacity will be a constraint at least over the short term.

Raising the awareness about water conservation

Most water conservation activities require changes in behaviour and attitudes: usually a slow process. Sporadic ad hoc public awareness campaigns are not effective. Water authorities should plan continuous, long-term activities. Local institutions such as community development councils, water user associations and irrigation associations have been established in recent years. These offer relevant platforms and entry points from which to conduct awareness raising. Mobilizing Islamic principles to promote water conservation can also be a valuable approach.

Because of the progressive decline in the per capita availability of water, more effective governance is needed so as to foster the fair allocation of water within and across uses

Only 27 percent of the population has access to an improved water source. The share of the population with access to improved sanitation facilities is even lower, at 5 percent nationwide and only 1 percent in rural areas

Capitalizing on support funds to address climate change

The National Adaptation Programmes of Action of the United Nations Framework Convention on Climate Change provide a process through which least developed countries such as Afghanistan may identify priority adaptation activities on climate change. Given the responsibilities and costs associated with climate change, donor countries must help invest in responses to save lives, economies and natural resources.

Calling for support in preparation for transboundary water management dialogue

Tackling the transboundary challenge would involve improving the hydro-meteorological knowledge base in Afghanistan and throughout the region. This is a prerequisite for appropriate policies and sound water development projects.

Besides data collection and maintenance, strong technical capacity is also needed to interpret data and support planning. Plans must take into account current and future needs and the equitable distribution of benefits among riparian states.

It is imperative that the international community assist Afghanistan to fill the technological and expertise gap. The government could take advantage of the current international attention on security to improve development that forwards Afghan interests. Ultimately, it is the government that must take responsibility for engaging in active dialogue with riparian countries.

Water for Human Consumption and Water for Sanitation

Since 2001, more people have been able to access clean water in rural and urban areas through government and donor-driven projects. The share of households that now enjoy access to municipal water is growing in the cities of Herat (85 percent), Kabul (35 percent) and Kunduz (50 percent). The construction of an estimated 100,000 new waterpoints is another sign of progress.

Nonetheless, many Afghans are still falling ill and dying because of unsafe water and poor sanitation. Only 27 percent of the population has access to an improved water source, the lowest share in the world. The share of the population with access to improved sanitation facilities is even lower, at 5 percent nationwide and only 1 percent in rural areas, making Afghanistan the worst place in the world for sanitation. At the current rate of progress, Afghanistan will not meet the Millennium Development Goal for water until 2042, 22 years after the target. The sanitation goal will also not be met.

Afghan children bear a disproportionate cost of the poor water quality and inadequate sanitation. The under-5 mortality rate is around 161 per 1,000 live births. Of these deaths, 23 percent are directly attributable to contaminated water and poor sanitation. Thus, every hour, six children die because of the effects of diarrhoea. Repeated bouts increase the likelihood of persistent diarrhoea, which is associated with malnutrition. About 54 percent of children aged 6–59 months are stunted (low height for age), and over 67 percent are underweight.

Water distribution for consumption

Provincial distribution: undermining the universality principles of water access

Water supply and sanitation coverage differs significantly from province to province,

ranging from only 6 percent in Helmand Province to 56 percent in Kabul Province, where water authorities are focusing on the rehabilitation of water systems (figure 10). Geographical barriers explain the rates of poor coverage in some provinces.

The urban-rural divide

A significant urban-rural divide characterizes the disparities in access to improved water sources (figure 11). Nationally, 27 percent of Afghans enjoy access to improved water sources, but the share falls to 20 percent in rural areas, where 75 percent of the population resides.

The challenge of unplanned settlements

An estimated 70 percent of Afghanistan's urban population lives in unplanned areas or in illegal settlements. Poor sanitation and lack of access to safe drinking water are common in such areas. Conflicts over water access are one aspect of the daily routine of collecting water, which causes mental stress and can affect the well-being of entire households. The most daunting challenge facing people living in illegal settlements and settlements for internally displaced persons is the state of sanitation. In the absence of proper facilities to dispose of excreta safely, surface runoff has unpleasant implications for people living farther downhill.

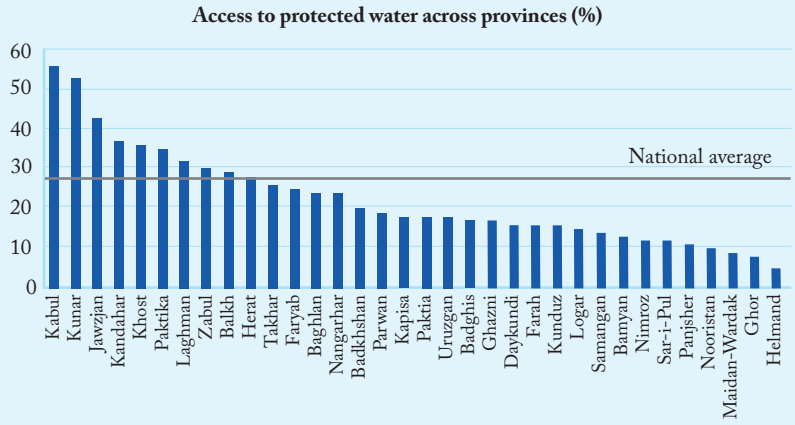
Kuchis at risk

In every region of the country, Kuchis have the least access to improved water sources. Urban households are 60 times more likely than Kuchi households to have access. Kuchis also comprise the largest population segment reporting that they must travel one to three hours to collect water, which is more than four times longer than the national average.

The sanitation deficit

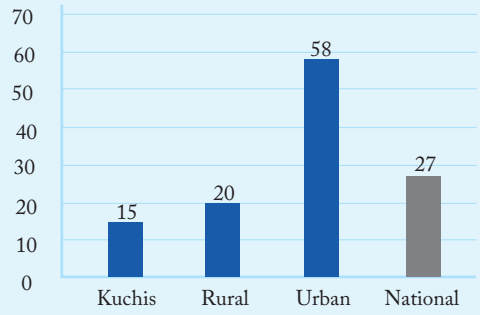
Around 95 percent of the population lacks access to improved toilets. This is an affront to human dignity. Access to improved sanitation facilities is poor everywhere. However, differences exist in the type of sanitation available. One in five Afghans resorts to open fields, bushes, or pits. While nearly two thirds of nomads defecate in the open, only 1 percent of urban residents do so.

Figure 10 **Accessibility rates across provinces**



Source: Calculated based on MRRD and CSO (2009).

Figure 11 **Access to improved water sources is characterized by a strong urban-rural divide**



Note: Kuchis are nomads.
Source: MRRD and CSO (2009).

Why water and sanitation coverage is so low

The Afghanistan National Development Strategy has identified various obstacles to the delivery of clean water and improved sanitation. Chief among these are the following:

- *Lack of institutional capacity:* Limited technical expertise and the reliance on inappropriate technology lead to wastage in time and resources. A lack of capacity at the pro-

Recognizing the human right to water and sanitation would be an important starting point for public action to improve the access to water and sanitation

vincial and national levels to monitor water quality is hampering progress. Provincial departments suffer from shortages of staff and skilled personnel. There is a flight of expertise from provincial departments to non-governmental organizations and the private sector, where the pay is higher.

- *Lack of quality building materials and spare parts:* The lack of spare parts is a major constraint on the sustainability of water system infrastructure. It is estimated that 30 to 50 percent of the water-points in the country are not being used because of poor maintenance and the lack of quality construction materials and equipment.
- *Lack of management information systems:* The lack of tracking and of a uniform database across the country often leads to incoherent development efforts. For example, some villages have more water-points than they require, while others have no water-points.
- *Lack of coordination among partners:* For many years, the lack of coordination among non-governmental organizations, donors, the government and provincial reconstruction teams has led to duplication in projects and the unbalanced distribution of aid.
- *Lack of monitoring and evaluation:* Implementing agencies have independent evaluation systems for projects and programmes, but there are no sector wide monitoring and evaluation mechanisms.
- *Low demand for sanitation:* The absence of social marketing, limited hygiene education and the lack of awareness campaigns that link sanitation and health mean that Afghans are not demanding that government leaders provide basic services. In the absence of community awareness and social mobilization, leaders are more likely to ignore needs.
- *Poverty barrier:* The poor experience more insecurity and lack the purchasing power and capacity necessary to upgrade infrastructure and gain access to water.
- *Gender barrier:* Social practices and gender segregation mean that women and girls are less likely to have access to safe water, although they are more likely than men and boys to experience the impact of poor sanitation. The voices of women need to be heard, and the participation of women is critical to decision-making on water security.
- *Inefficient community mobilization and participation:* Insufficient investment in meaningful participatory processes in the design, implementation and follow-up phases of water and sanitation projects constitutes a major hurdle to sustainable programmes and projects.

Delivering safe drinking water and sanitation

Reducing inequity in service delivery across provinces, between urban and rural dwellers and between formal and informal settlements should be given as much importance as increasing coverage. This approach may include adopting a new Millennium Development Goal benchmark for equality. Reducing inequities in services should at least be an integral part of national water policies. Reaching equitable outcomes would also involve establishing coherent pricing and a targeted subsidies strategy, as well as sound policies that promote equal access.

Political leadership matters

Establishing a dedicated water and sanitation ministry led by a senior minister would send a clear signal to the government and the public that water and sanitation rank among the major national policy priorities. It would establish a political structure capable of overcoming policy fragmentation and reducing challenges incoordination.

Recognizing the human right to water and sanitation would be an important starting point for public action to improve the access to water and sanitation. It would represent a

powerful moral claim and help advance the policies necessary to pressure the government and donors to prioritize water and sanitation. It would also help raise public awareness and motivate water users to take responsibility for the shared water resource.

Reducing inequalities and extending coverage to the poor

The government should supplement the Millennium Development Goals by adopting the target of halving the gap between urban and rural populations in water and sanitation coverage rates. A similar target could also apply to the corresponding gap across provinces. Adopting a new benchmark will not be sufficient, however. Pro-poor initiatives are also required, particularly in the effort to reach populations in unplanned settlements. The most urgent challenge is to extend access and improve the quality of water among those people who are the most poorly served.

The role of the private sector

While the private sector may have a role in the delivery of water and sanitation, there are difficulties. The private sector could support new low-cost technologies to enhance access to sustainable water and sanitation. However, high levels of corruption, insecurity, a complicated bureaucracy and widespread poverty limit the commercial viability of the delivery of affordable water to all through private sector entities. If this situation should change, policies and mechanisms would have to be established so that both private and public service providers would be held to account.

Developing, testing and applying targeted subsidies and pro-poor pricing

A plan for financing water services is a key to expanding access. The aim must be to generate sufficient revenue to cover recurring costs without excluding the poorest users from enjoying access to piped water, thereby compromising the larger goals of health and development.

Cross-subsidies, that is, transferring resources from higher- to lower-income households through utility pricing, are one strategy worth exploring. This is because affordability represents an important component of equity. Thus, no household should spend more than 3 percent of its income on water and sanitation.

To hold providers to account, contract arrangements under public-private management agreements should reflect a clear goal to expand access to include slum dwellers. This would involve supplying the government with regular reports outlining the number of people reached, the level of investment and the pricing arrangements. Non-performance should lead to financial penalties.

Community participation is essential

To identify and develop water and sanitation projects, planners will need to work closely with communities to maximize benefits, ensure long-term sustainability and confer a sense of local ownership.

Monitoring the quality of drinking water

Water quality must be monitored according to strict international standards. This means training professional staff and establishing testing laboratories in the capital and all other major cities.

Focusing on long-term operation and maintenance

Without adequate operations and maintenance, water and sanitation projects will not be sustainable, and the Millennium Development Goal of halving the share of people without improved water sources and sanitation facilities is unlikely to be met by the target of 2020. The government and donors can play an enabling role by fostering an environment in which effective and efficient operations and maintenance can be established. As a starting point, a national operations and maintenance strategy should be developed, and the relevant capacity could be strengthened. The procedures for supplying spare parts must be examined and reformed.

Without adequate operations and maintenance, water and sanitation projects will not be sustainable

The role of non-governmental organizations is critical to the implementation of sanitation programmes throughout the country

Promoting hygiene

A nationwide campaign to promote the use of hygienic toilets should be run until appropriate facilities are available in all Afghan villages. Because much effort and repeated visits are required to maintain community involvement, enhance awareness and encourage users to adopt new and safer practices, hygiene promotion requires a long-term commitment. To be successful, it must be adapted to local realities.

The role of non-governmental organizations is critical to the implementation of sanitation programmes throughout the country. The entire range of training initiatives, including information sharing, education, communication, implementation and follow-up should be the responsibility of a single non-governmental organization. Experience shows that, if work is divided among various organizations, responsibilities are also divided, which hampers progress.

Technological fixes

Sanitation is a technology, and it requires an appropriate level of investment. Two key strategies to accomplish this are highlighted here, as follows:

- The implementation of on-site sanitation facilities through the construction of double- or single-pit latrines in areas subject to water shortages
- The conversion of traditional latrines into improved single-pit latrines or, wherever possible, double-pit latrines

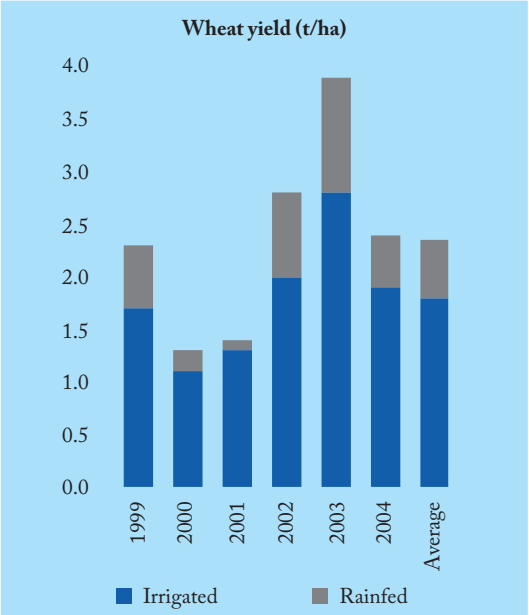
Sharing Irrigation Water Equitably

Improved irrigation has the potential to reduce poverty

Providing reliable irrigation water to Afghans will result in multiple socio-economic benefits because it represents one of the most important interventions to reduce poverty in a country heavily dependent on agriculture. At 37 percent of gross national income, agriculture is a key component of Afghan livelihoods and economic growth. Agriculture also consumes more than 95 percent of the water used in the country. If properly managed, irrigation systems can support a wide variety of human development outcomes, including those related to the most vulnerable segments of the population, such as the landless.

Irrigation plays a vital role in crop production and therefore in rural livelihoods; it is used to grow 85 percent of Afghanistan's crops. Of the households engaged in agriculture, 79 percent rely on irrigated land. The harvested yield of wheat on irrigated land is three times the corresponding yield on rainfed land (figure 12). Irrigation also confers greater resilience in the face of the effects of climatic shocks such as drought. While rainfed wheat production may fall by 80 per-

Figure 12 **Average irrigated yield of wheat is three times greater than rainfed yield**



Source: Adapted from Chabot and Dorosh (2007).

cent during a drought year, irrigated wheat production only declines by an estimated 20 percent. Irrigated land with secured access to water is a critical asset with a value 4 to 14 times higher than the corresponding value of rainfed land.

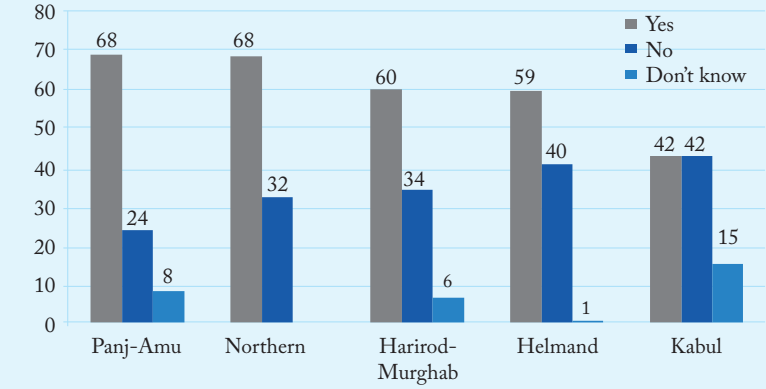
Unfortunately, irrigation is currently performing appreciably below potential. Afghanistan has the capacity to cultivate more than 7.5 million hectares of cultivated land, of which 60 percent would be irrigated. In the mid-1970s, over 3.0 million hectares of cropland were sustained by some form of irrigation. Today, only an estimated 1.8 million hectares are being irrigated. This means that the country is currently missing out on the related human development opportunities. While efforts are underway to expand the amount of irrigated land, a central pillar of human development should not be overlooked in the process: ensuring equity in water sharing for all Afghans, whether wealthy or poor.

Water distribution is highly inequitable

Farmers manage most irrigation systems. Also playing a role are mirabs, who are community-based service providers. The nature of local water management structures varies according to the socio-political context,the constraints and the opportunities. Yet, in most local institutions, the mirab election process lacks inclusiveness and transparency, two principles of human development. More than 60 percent of the water users surveyed in 15 canal systems across the five main river basins believe the mirab election process in their canals is unfair and should be changed (figure 13).

Despite differences across river basins, most systems maintain, in theory, relatively fair water rights based on the principle of the allocation of water proportionally to the amount of land. However, in numerous locations,assigned rights are no longer respected. Indeed, the gap between the water subject to rights and the amounts of water distributed looms large as a major impediment to the equitable management of irrigation systems.

Figure 13 **The mirab election procedure is widely contested**



Note: Data is based on a sample size of 1,252 water users in 15 canals equally distributed over 5 river basins.
Source : CPHD survey (2010).

In most parts of Afghanistan, de facto inequitable water sharing is practised within and between canals. In many cases, including during periods of drought, upstream farmers use more water than necessary to grow lucrative, water-intensive crops such as rice or cotton, while downstream farmers are obliged to use far less water merely to grow subsistence crops (figures14 and 15).

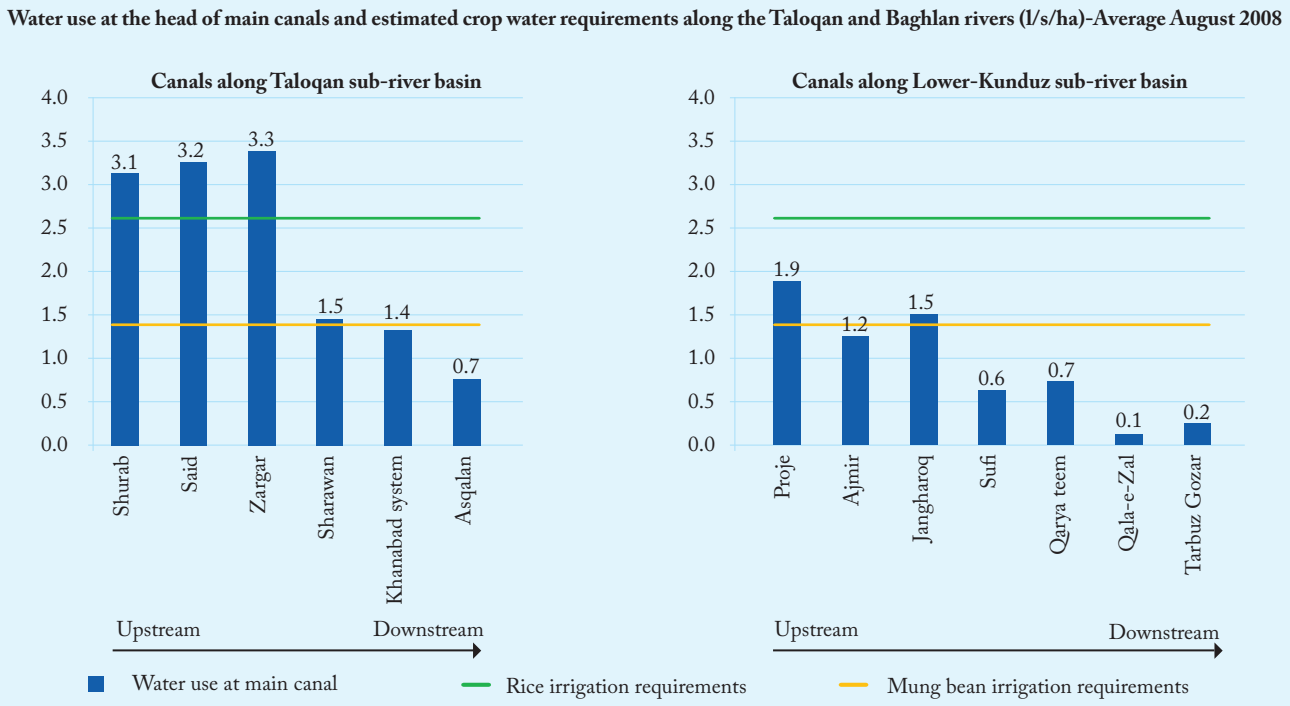
The inequity in water sharing is well captured by local proverbs noting that access to irrigation water is mainly based on the location of fields within a canal system: "Better to be a servant in the upstream area than a king in the downstream area."

The human development cost of inequitable water sharing

Inequitable water sharing directly threatens the realization of social equity and justice as guiding principles of human development. It leads to unequal food-production and income-generating opportunities, the disempowerment of downstream communities, and the emergence of conflicts over water sharing, as follows:

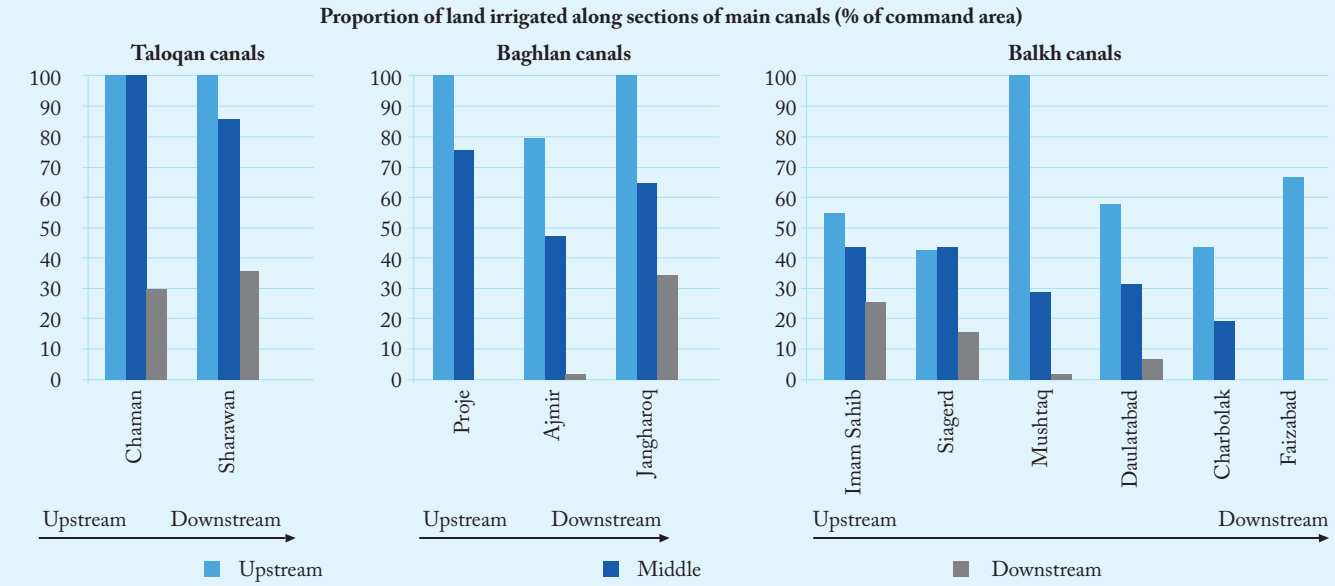
- Inequitable water sharing means that downstream farmers may earn three times less than upstream farmers.

Figure 14 **Irrigation water access decreases from upstream canals to downstream canals along rivers**



Note: Rice irrigation requirements estimated based on 50% irrigation efficiency and 5 mm/day soil infiltration rate. Mung bean irrigation requirements based on 45% irrigation efficiency.
Sources: AKF (forthcoming a), Welthungerhilfe (2008), AHT (2009).

Figure 15 **Irrigated areas shrink in downstream canal sections**



Source: Adapted from AKF (forthcoming a), Welthungerhilfe (2008), SMEC (2006b).

- The transaction costs of accessing water are higher in downstream areas.
  The land assets of downstream farmers are, on average, worth three times less than upstream land because of unsecured or otherwise limited access to water.
- If the availability of surface water declines, farmers at the tail reaches often resort to expensive and often unsustainable alternatives such as pumping.
- Over the long run, inequitable water distribution undermines the resilience of downstream farms to climate shocks such as drought.

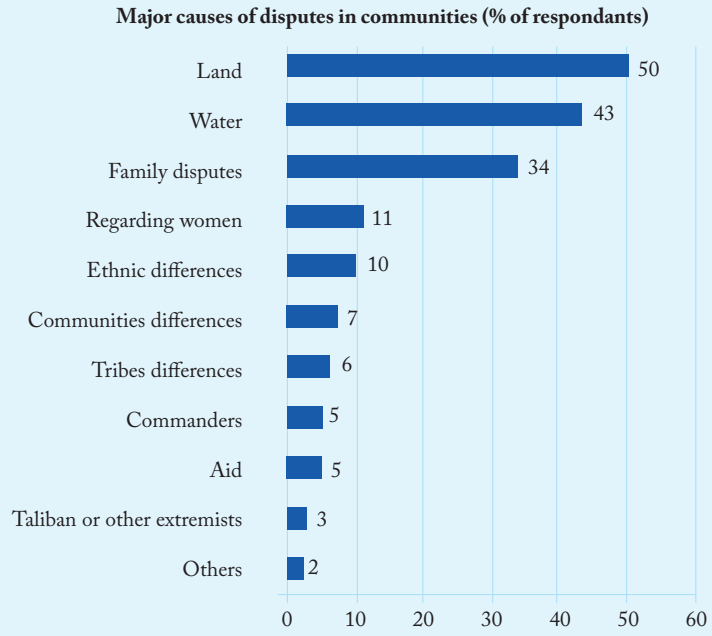
- Ongoing inequitable water sharing practices can predispose frustrated farmers to resolve disputes through conflict or violence. A Centre for Policy and Human Development survey indicates that, in the majority of cases, governance and management-related issues are the main causes of ongoing conflict (figure 16).
- Bribery and resorting to alternative channels for conflict resolution, including structures related to the insurgency, are common consequences of inequitable water sharing and unequal access to water farther downstream.

Understanding the root causes of inequitable water sharing

Despite apparent signs of resilience in the mirab system, local institutions have not managed to adapt to the new challenges during a period of conflict and a rapidly changing political and institutional environment. The following are the most serious challenges faced by local institutions in recent decades:

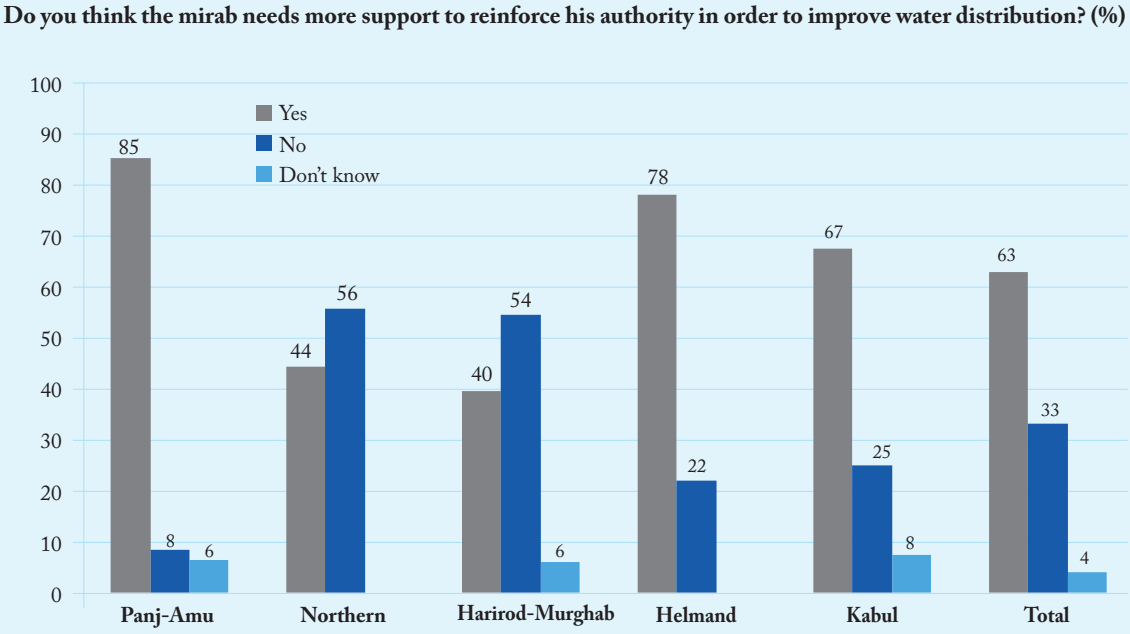
- A fivefold increase in population has led to more competition for decreased irrigable land and resources. This has meant greater problems for mirabs and other actors involved in controlling water distribution (figure 17). Because of more competition among more numerous water users, the chances that local

Figure 16 **Water is the second major cause of disputes at the community level**



Note: Water is seen as a major cause of dispute in 217 of 500 interviews. The study covered six provinces: Herat, Nangarhar, Balkh, Ghazni, Daykundi and Kandahar.
Source: Adapted from Waldman (2008).

Figure 17 **Many call for the reinforcement of the authority of the mirabs**



Note: Data based on a sample of 1,252 water users in 15 canals equally distributed over 5 river basins.
Source: CPDH survey, (2010).

agreements may be bypassed are heightened if negotiations become more difficult.

- Combined with a collapse of local government capacity to support mirabs and local institutions, the erosion of social capital has led to an increase in illegal practices. These include an expansion in the cultivation of water-intensive crops, such as rice or cotton, in the head reaches of canals; the unregulated construction of new offtakes, which allows upstream farmers to siphon off more water, and the proliferation of mills and micro-hydropower units, which increases the demand for canal water. These developments have translated into more unregulated use of water in upstream canal command areas, particularly in the upper reaches of river basins. As a result, farmers in the tail reaches are suffering the consequences of reduced access to water.
- Collective maintenance has decreased partly because the erosion in social capital has contributed to a reduction in the conveyance capacity of canals and poor infrastructure performance. The low irrigation efficiency subsequently contributes to limiting the access to water in downstream areas.
- Mounting insecurity in some regions is contributing to a decline in canal and water management capacity. Overall, the performance of local institutions in the provision of water resources to all farmers is deteriorating in numerous canal systems.

Reducing inequity through an integrated approach

Any attempt to tackle the complex and sensitive issue of inequitable irrigation water sharing will have to follow an integrated approach that revolves around three interdependent components, as follows:

- Reducing the demand for water without compromising crop production and economic returns
- Rehabilitating and upgrading infrastructure
- Improving governance and collective water management practices

Although improving equity is essentially a management-oriented task, reducing the demand for water at the plot level is also critical. Water conservation methods and on-farm delivery techniques will assist water user associations and the government in addressing inequity because they help alleviate the pressure on natural resources. This can be accomplished without compromising on crop production and will thus contribute to a more extensive use of the resource, while also ensuring that infrastructure rehabilitation and upgrades have the maximum impact.

Any attempt to limit the over exploitation of water through improved and socially acceptable water sharing rules and regulations will have to be supported by technological improvements that facilitate the application of the rules and regulations.

Although inequity might not be fully resolved through the building of infrastructure, the existence of infrastructure creates more favourable conditions for controlling water. This assumes that the building of infrastructure is undertaken through a participatory and consultative process that gives farmers decision-making power in design, operation and maintenance. The financing of the operation and maintenance of rehabilitated or upgraded systems needs to be given more attention, preferably during the design phase, to avoid implementing unsustainable projects.

The new approach to management would include establishing water user associations through methods that focus on a process, rather than specific predefined blueprints or models of organizational structure. Judicial support and stronger enforcement capacity will also be required to back up the newly proposed associations as they implement management decisions.

The need for governance in the water sector

Water governance involves a range of political, social, economic and administrative systems designed to develop and manage water resources and the delivery of water services (figure 18). It is complex and requires the participation of many interests in decision-making. How individuals, communities and institutions choose to govern their water resources has a profound impact on livelihoods, human development and environmental sustainability.

Good water governance is based on a human development approach, one that reflects equity considerations and provides equal opportunities. It requires open communication and significant cooperation both horizontally (across sectors and between urban and rural populations) and vertically (from local to international) and is facilitated by an appropriate legislative and regulatory framework.

Institutional reform and key conceptual approaches for a new water sector

The water sector reform in Afghanistan is designed to tackle the challenges highlighted in the Water Sector Strategy, including the following:

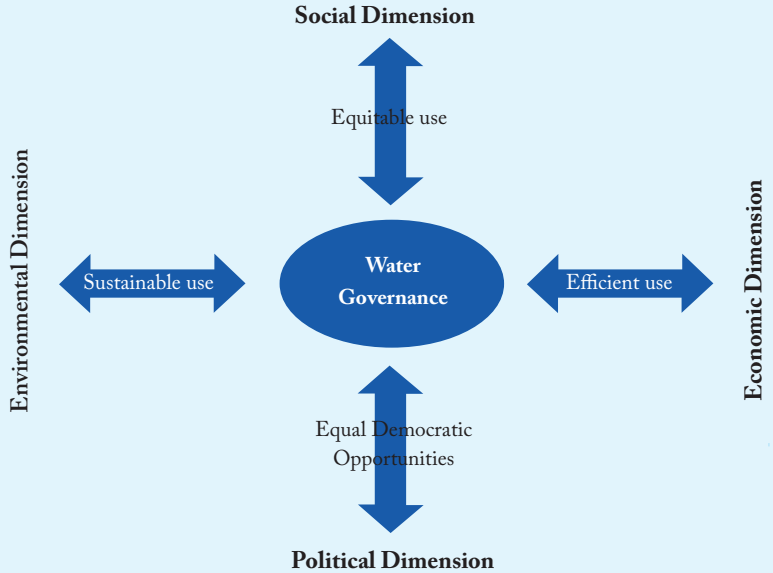
- The lack of the institutional, human and financial resources necessary to deliver adequate water services effectively to the population
- The lack of mechanisms to regulate the use of water for irrigation, domestic use, sanitation and hydropower generation
- The lack of integrated water sector governance
- The lack of reliable hydrological, metrological and water quality data
- The lack of adequate infrastructure
- The lack of project coordination

Without substantial improvement in water resources management, including reform and building technical and management capacity at the local and national levels, Afghanistan will not be able to reach the Millennium Development Goals related to water and sanitation. Most of the targets proposed in the Water Sector Strategy will not be achieved on time. This is evidence of the lack of commitment and investment, particularly by the international community.

Integrated water resources management is a key concept for water resources planning and development. It has been adopted by the government as a conceptual framework in the water sector vision statement.

The river basin approach and decentralization involve a shift from administrative to resource-based management so that natural river boundaries form the basic unit for resources management and the establishment of the related institutions.

Figure 18 **The four dimensions of water governance are linked with human development concerns such as equity and equal democratic opportunities**



Source : Adapted from Tropp (2005).

In Afghanistan, the implementation of new laws is challenging because of inadequate enforcement capacity

Stakeholder participation is to be fostered through the establishment of multi stakeholder platforms such as river basin agencies and river basin councils. These institutions are designed to facilitate inclusive participation in water resources management in river basins.

In this new model of water resources management, three levels of functions are distinguished, as follows:

- The legal and policy functions of ministries
- The organizational functions involved in river basin management
- The operational functions,including outsourced operations and maintenance and the functions of service providers

Challenges and limitations in implementing water sector reform

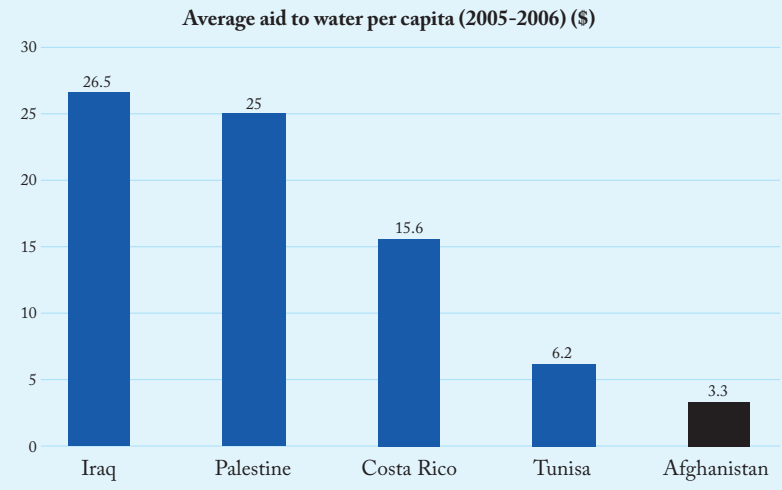
Recent experience has revealed that the establishment of river basin organizations and the implementation of integrated water resources management concepts are fraught with difficulty. During the past five years, various non-governmental organizations have taken on a clear goal to establish water user associations. This has been the case particularly in the government-led pilot Panj-Amu River Basin Programme. There have been gains, such as an expansion in the amount of land brought under irrigation downstream along canals and reductions in conflicts and in the inequities between head and tail reaches of canals. However, the water user associations have not been assigned a formal institutional status, and this represents a major hurdle. Little judicial, technical,or financial support is available for new entities such as river basin agencies.

Even in the best of times, the implementation of new laws is a painstaking process. In the case of Afghanistan, this is even more challenging because of inadequate enforcement capacity. This deficit is critical because legislation and new regulations can have no impact unless they can be administered and enforced. The major gaps include the following:

- *Shortages in human resource capacity:* Alack of sufficient skilled personnel with expertise in the water sector is a major impediment to the reform of government water agencies and the implementation of policies at the subnational and national levels. Individual technical capacity might be developed through higher education and training programmes.
- *Gaps in the knowledge base:* The lack of reliable data and information is a major barrier to water resource development and management. Policies and plans are constructed and adopted largely on the basis of historical data that have many limitations. In addition to data collection, efforts are needed to improve and consolidate knowledge systems and to supplement these with other sources of information such as research, assessment and feasibility studies. A sector wide monitoring and evaluation mechanism is still absent. This is a crucial oversight: new information is needed to ensure that a wide range of stakeholders are involved in decision-making, desired outcomes are delivered and deviations from stated goals are accounted for.
- *An inexperienced local private sector:* The problem of inadequate capacity is not limited to the government sector; non-governmental organizations and private sector agencies alike are plagued by a lack of skilled personnel.
- *Weak enforcement capacity:* Legislation requires vigorous enforcement and systematic monitoring that relies on well-established indicators to assess the efficiency of new arrangements and improve system performance. Unless a judiciary system can adjudicate disputes in an effective, expeditious and transparent manner, there is little likelihood that rules will be respected and obeyed.

An underfunded water sector and poor aid effectiveness

Figure 5 **Despite its water crisis, Afghanistan received negligible funding for its water sector.**



Sources: OECD and World Water Council (2008) for Iraq, Palestine, Costa Rica and Tunisa. Ministry of Finance for Afghanistan (2010).

Even if all the necessary policies and laws are put in place, the lack of funding will continue to hamper progress. From 2001 to 2009, international bilateral and multilateral aid to the country reached $24 billion. Only $1.2 billion, or 5 percent, of this total went to the water sector. In 2005–2006, Afghanistan received a per capita sectoral allocation of only $3.31 (figure 19). This is much lower than the corresponding allocations going to other countries, such as Iraq ($26.50), Palestine ($25.00) and Tunisia ($6.20). This raises serious questions about the priority assigned to water on the road to recovery and development.

A picture of aid is emerging that is characterized by fragmentation, unpredictability and distorted allocation and delivery. A plethora of factors accounts for this dismal picture, including a lack of well-developed policies, the absence of coherent, prioritized and needs-based programmes, insufficient capacity and a complex governance environment.

The Paris Declaration on Aid Effectiveness focuses on five dimensions of aid: ownership, alignment, harmonization, managing for results, and mutual accountability. The application of this approach in the assessment of aid effectiveness in the Afghan water sector reveals the following.

Ownership: Although a stand-alone national water strategy has been integrated into the Afghanistan National Development Strategy, stakeholders lack a shared vision on the development of the sector. The sector is not well represented in the national budget, nor is it associated with mechanisms that would link the policy and programme priorities of the water strategy with the budget process. The individual policies should be synchronized with the Afghanistan National Development Strategy and the budget process, and the sector priorities should be linked with aid and public expenditures.

Alignment in the water sector is weak. The proportion of aid delivered to the water sector using public finance management systems, including the procurement system, accounts for only approximately 30 percent of the total aid provided to the water sector. This is considerably lower than the corresponding national baseline of 48 percent in the case of the total aid delivered to the country. Moreover, aid delivery to the water sector has been project based, and the aid has been planned and delivered in poor alignment with government priorities. From 2003 to 2009, less than 30 percent of total aid provided to the water sector was delivered through common arrangements such as national programmes or programme-based approaches. Building public finance management and budget execution capacity in the water sector is critical. Without this capacity, donors are unlikely to increase the aid delivered through government budgets.

Harmonization in the water sector is only moderate. Mechanisms such as the Afghanistan Supreme Council for Water Affairs Management have been established to coordinate and direct the development of parameters for investment in national water resources. Their effectiveness has yet to be demonstrated, however.

Managing for results is considered weak in the water sector. Various agencies have developed water sector information systems in

Even if all the necessary policies and laws are put in place, the lack of funding will continue to hamper progress

complete isolation from each other. There is no clear monitoring framework or review process in place to review the sector, report on progress and contribute to national policy and budgeting.

Mechanisms for *mutual accountability* are almost non-existent. Initiatives are ad hoc; the analysis of benchmarks is too general; and there is little impact on government and donor policy decisions.

Improving water governance

Filling the information gap and sharing and disseminating knowledge: Developing reliable and timely information about water availability, demand and access is a priority. This information must be tailored and made accessible according to the educational levels and needs of stakeholders, thereby ensuring effective and inclusive participation.

Providing infrastructure: The development of infrastructure represents an opportunity to control water use more effectively and to expand the efficiency of operations and management. The creation of infrastructure supports trust building vis-à-vis external support agencies.

Developing skills and enhancing capacity: The collection, analysis and presentation of data to support decision-making require expertise that has not yet been developed in Afghanistan. Sufficient capacity must be built to enhance the knowledge and awareness of individuals and institutions about the issues involved in water resources management. This process might include on-the-job training through guided learning. The Water Sector Strategy contains a recommendation that universities focus on educating current and future water managers. So far, this has not occurred, and it appears that skilled Afghan personnel will not be available soon. The international community should therefore shoulder more of the responsibility for filling this critical gap.

Focusing on conflict management and rules enforcement: The sustainable functioning of newly formed organizations such as water user associations requires facilitating conditions. This includes rules of water access and management that are locally devised and straightforward, ease of enforcement, affordable adjudication procedures, and regulations that ensure that monitoring agents and other officials are accountable to users.

Developing self-financing procedures: Building capacity, improving communication and enhancing information management are costly. It is unrealistic to expect to be able to initiate self-financing during the first years of such important institutional changes. Users will not be interested in financing a new and unfamiliar system that has not yet proved its worth. Users must first become convinced that the benefits of the new system will outstrip the costs.

Priority Recommendations

Recommendations are outlined hereafter for improving governance capabilities so as to address the challenges in the water sector.

Filling the data and information gap

Reliable high-quality data are not available on the water sector in Afghanistan. Accurate information is a prerequisite for effective project planning, management and monitoring and the reduction of risks and vulnerability against climate shocks. Accountability and transparency mean that more detailed information is also needed on the work of national and international institutions.

Data should be developed on water quality, groundwater extraction, water balance,

water resources and so on. Remote sensing and forecasting technologies should be applied, particularly to monitor floods and drought.

Many actors are collecting data and information on the water sector to support specific interventions, including non-governmental organizations, governmental entities, provincial reconstruction teams and donors. The amount and quality of the data vary by region and by institution. Some institutions are reluctant to share information. The data are often contradictory. A system of data harmonization and centralization should therefore be established with the support of the Central Statistics Organization.

Stimulating public awareness and developing the capacity for action

The awareness and capacity of the communities and groups affected by water policy are important in water sector development. These communities and groups are the focus of projects. The success of future service delivery systems will depend on them.

Developing community awareness and capacity

Developing hygiene awareness and raising the demand for improved sanitation facilities are critical in the effort to scale up development efforts so as to reach the Millennium Development Goals.

Promoting water conservation in households and communities is required to improve the access to water in areas with limited supplies of water.

Developing maintenance and cost recovery capacity is essential to the long-term sustainability of any infrastructure development effort.

Communities must become involved in risk alleviation, efforts aimed at disaster preparedness and water resources management so as to reduce overall vulnerability to climate shocks.

Supporting water user associations and other local institutions

The establishment of water user associations is promoted in the new Water Law. The process will involve maintaining traditional approaches such as the mirab system, while introducing new management systems that are able to foster equitable water sharing.

The development of a cost recovery capacity is required to enhance the sustainability of rehabilitated infrastructure.

The provision of financial support through small grants for project development is required to encourage water user associations to upgrade canal and other water infrastructure and develop skills in collective project management.

Developing the capacity of government staff

The development of the technical capacity of government staff is needed in all areas of water resources management. This includes, for example, transboundary management, water resources planning and development, infrastructure design and maintenance, river basin management, water sector coordination, regulation, monitoring and enforcement capacity.

Developing capacity in the private sector

Small and medium enterprises that can carry out local operations, supply repair and maintenance expertise and offer technical capacity must be nurtured. These enterprises could rely on Afghan technicians. Local technical skills in water resources development and the construction of hydraulic infrastructure must be encouraged. Non-governmental organizations could be the focus of training.

Developing capacity in higher education

The capacity in technical engineering must be enhanced to ensure that the country can be weaned from its dependence on external expertise in the development of water resources and supply infrastructure.

Promoting and supporting independent research and monitoring are essential to the effort to create national expertise and critical skills in water sector reform. The establishment of an independent water institute could facilitate the drafting of appropriate policies, progress monitoring and the identification of shortcomings in the effort to reach the Millennium Development Goals through development projects. It could also support professional training in the water sector.

Improving supply and promoting soil and water conservation

Addressing the threat of water scarcity means that the supply of water must be increased, including through soil and water conservation. In many sub-river basins, the infrastructure is inadequate to supply users with safe domestic water and sufficient water for irrigation. Scarcity can also be mitigated by reducing the demand for water, especially for irrigation, without compromising crop production.

Filling the infrastructure gap

Eliminating the infrastructure gap requires a variety of approaches so that all population groups in all parts of the country can benefit from equitably shared water resources.

Small, medium and large storage infrastructure must be developed to tap into the potential of the country's water resources. This will ensure better control over these resources and help compensate for the significant seasonal variability in the availability of water.

Restoring and improving traditional water infrastructure are also necessary to improve supply. This infrastructure is usually simple, based on indigenous local knowledge and less likely to raise tensions with downstream countries.

Irrigation infrastructure rehabilitation is critical to reviving irrigation productivity and, ultimately, enhancing food security. It will support water user associations in the effort to ensure equitable water sharing.

Upgrading traditional latrines is a priority considering the poor access to improved sanitation facilities. The development of this infrastructure must be accompanied by hygiene awareness campaigns.

Better coverage among the poor in the provision of drinking water must be a high priority. Water supply systems serving informal settlements in the capital city should, for instance, be a major focus in urban development plans.

Laboratories should be established to monitor water quality. This will ensure that better data are available to build awareness about the need for safe water and in drafting relevant development plans.

Ensuring community participation in the infrastructure design process should be an over arching goal. Not only would this help empower water users in decision-making on water supply issues, but it would also encourage water users to take responsibility for the operation and maintenance of infrastructure.

Adopting soil and water conservation measures

The application of soil and water conservation measures would help mitigate the impact of water scarcity during periods of drought. Thus, the promotion of less water-intensive crops and cultivation methods would reduce the demand for water for irrigation. The system of rice intensification is an example of a successful method that requires less water, while increasing yields. In general, drought-resistant crops that do not compromise on economic returns should be encouraged, particularly in water-scarce sub-river basins.

Improving efficiency through on-farm water delivery would also reduce the demand for irrigation water. Techniques such as land levelling, improved basin and furrow irrigation, or mulching should be fostered, especially in water-scarce areas.

Promoting the conservation of watershed,

forest and rangeland would enhance the conditions for biomass regeneration and erosion control. Vulnerability to floods and drought would be reduced in the long term through the adoption of these and other practices on a large scale.

Supporting water governance reform

Institutional change is needed to meet the critical challenges in the distribution of improved water sources and sanitation facilities. The recognition of the right to water and sanitation as a human right and the establishment of a ministry focusing exclusively on ensuring access to improved water and sanitation should be two components of the change. While integrated water resources management has wisely been adopted as the core principle of water resources management in the new Water Law, this principle must now be made a practical reality. This would involve support for water user associations and the development of river basin management plans through multi stakeholder platforms. Additional regulations must also be drafted to guide the practical implementation of the law. Ensuring that water users participate actively and meaningfully in decision-making on project development is essential to achieving progress and long-term sustainability.

Introducing institutional change and increasing international aid

Institutional change and the support of international aid are necessary to the effort to scaleup coverage and establish equity in the access to water and sanitation. The recognition of the right to water as a human right represents a powerful moral claim and would help create policy tools to exert pressure so that improved water and sanitation become priorities. It would also motivate public awareness and encourage the shared responsibility of water users.

The coverage rate of improved water and sanitation in Afghanistan is among the lowest in the world. The establishment of a dedicated ministry of water and sanitation led by a senior minister would send a clear signal across the government and among the public that water and sanitation rank among primary national policy priorities. It would also create a structure capable of overcoming the fragmentation in policy and enhancing the coordination in interventions.

Halving the gap in water and sanitation coverage rates between urban and rural areas and between well-covered and poorly covered provinces should supplement the goal of expanding coverage.

Transforming integrated water resources management into a practical reality

Enforcing rules and regulations and resolving conflicts would support water user associations in challenging the status quo in the inequitable application of water rights and water sharing agreements.

River basin management plans must be drawn up based on resource development priorities. As the demand for improved water increases, priorities will have to be established across water user needs, particularly as a hedge against the rise in demand during periods of drought. The creation of multi stakeholder platforms to ensure the representation of all categories of water users will provide a basis to ensure that management plans are owned by representatives of all beneficiaries and stakeholders.

Developing regulations to support the implementation of the Water Law

Rules and regulations should be adopted and enforced to support the practical implementation of the new Water Law. A first step would be the passage of regulations to promote the establishment of water user associations and irrigation associations and the use of enforceable water use permits.

Ensuring community participation in design, implementation and monitoring

Community participation is critical to ensuring that the choice of infrastructure is relevant to local needs, but also adapted to local capacity in operations and maintenance.

Operations and maintenance

The government should play an enabling role by fostering an environment for effective and efficient operations and maintenance. A national strategy for operations and maintenance should be drafted, and the relevant capacity created.

Enhancing aid to the water sector

A lack of adequate funding for the water sector is partly to blame for the poor coverage of improved water and sanitation and the poor performance of the irrigation sector. A significant increase in funding is therefore required to achieve the Millennium Development Goals related to water and to achieve greater food security. This is an over arching requirement for harvesting the human development benefits of improved access to water and sanitation.

Aid effectiveness also needs to be enhanced to render the increased financial support meaningful. This might be accomplished through greater budget support, more predictability in aid flows and lower transaction costs through improved harmonization and coordination. It would also include independent evaluation of aid programmes against the targets in the water sector set out in the Millennium Development Goals and in national strategies so as to improve the understanding of donors and aid recipients about programme effectiveness.

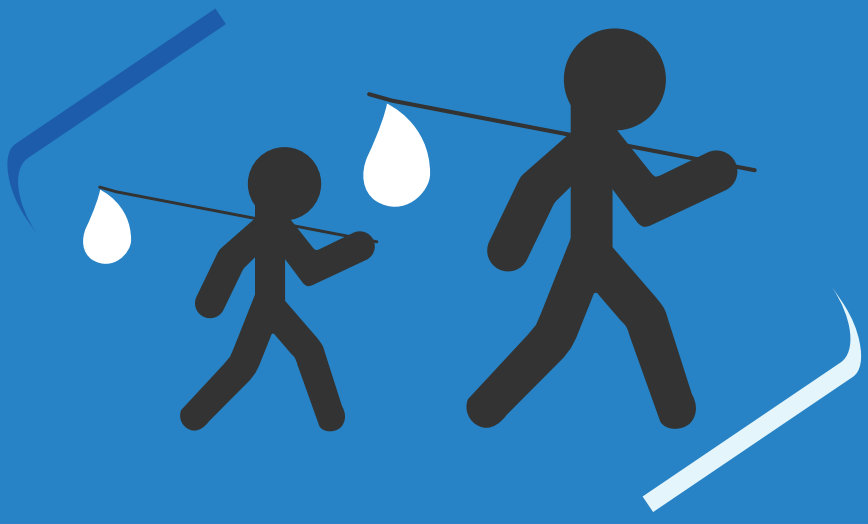
For sustainable financing of the water sector, partnership opportunities, such as public-private and public–civil society partnerships, should be investigated.

While generating sufficient revenues to cover recurrent costs is ultimately the goal, pro-poor pricing and subsidy policies for drinking water and sanitation should be included to reach those segments of the population most in need, including the poorest urban users and users in remote rural areas. By transferring resources from higher-income to lower-income households through utility pricing and cross-subsidies, for example, the negative impacts on health and development can be reduced.

Capitalizing on the funds assigned to address climate change is one way to channel financial support to adapt to the incidence of water scarcity and to reduce the vulnerability to climate shocks such as floods and drought.

1

Water security and human development in Afghanistan



"I find it hard to feed my children let alone help with their education, clothing, medical and other expenses. My husband died last year. Two of my eldest sons—Qudratullah, 16, and Esmatullah, 15—have quit school to work full time and support their younger brothers and sisters."
—A mother of 10 children

"Our village was affected badly by the drought in 2007 and 2008: 90 percent of the livestock were killed. The majority of the men migrated to other countries. Many people were killed while crossing the borders, and many others were turned back at the border, but, still, people migrated because of the unemployment and severe poverty in our village; they have no other option if they stay in the village."
—A villager in Faryab Province

CHAPTER 1

Water security and human development in Afghanistan

Authors: Christopher Kuonqui, Vincent Thomas, Atal Ahmadzai

Clean water and sanitation are essential to human development. They are fundamental in the exercise of capabilities: what people can do and what they can become. Access to water is not only a basic human right and an intrinsically important indicator of human progress. It also gives substance to other human rights; it is a precondition for the attainment of wider human development goals.

Human development involves enabling people to live lives that they may value and giving them the means to realize their full potential as human beings. An analysis of human development in Afghanistan reveals that there has been progress towards this goal in recent years, but that the progress has been uneven and far too slow. According to the latest Human Development Index (HDI) assessment (2010), Afghanistan is ranked 155th among 169 United Nations member states. This underscores the profound difficulties that the country faces in advancing the well-being of its citizens.

Despite increased school enrolment rates, educational opportunities remain unequal. Similarly, despite enhanced access to basic health care services, life expectancy in Afghanistan is the lowest in the world. After nearly a decade of government and donor efforts to combat poverty, the vast majority of Afghans—a staggering 84 percent—still face deprivation in key aspects of human development. Low standards of living, including poor access to improved water sources and sanitation, are major contributing factors in the high levels of poverty.

Reliable access to sufficient and safe water is integral to all aspects of human development: the presence or absence of reliable access represents the difference between prosperity and poverty, good health and bad health. Access to water or a lack of access to water facilitates or blocks the ability of Afghans to live full, secure and productive lives.

Today, Afghanistan faces a water crisis. Three in four Afghans—16.8 million men, women and children—lack access to safe drinking water. Every hour, six children die because of poor sanitation and the want of clean water. A poorly performing irrigation sector, coupled with highly inequitable water sharing practices, results in missed human development opportunities. Drought and floods are propelling thousands of households to adopt survival strategies that often deplete their most productive assets—such as livestock or land—and trap them still more deeply in poverty.

This chapter offers an assessment of the status of human development in Afghanistan by presenting data gleaned from human development indicators. It provides an analysis of the advances and challenges in education, health, poverty and gender equality. Because water is central to all these dimensions of human development, we also present an analytical framework to capture the mutual relationship between water security and human development.

Human development involves enabling people to live lives that they may value and giving them the means to realize their full potential as human beings

The Concept of Human Development

The concept of human development was introduced into the public policy arena with the launch of the global Human Development Report 1990.[1] The aim was to go beyond economic concepts of human progress as the accumulation of goods and services and embrace a broader definition of human well-being.

The early global and subsequent National Human Development Reports (NHDRs) drew on the work of economic theorist Mahbub ul Haq, philosopher Martha Nussbaum and Nobel laureate Amartya Sen to frame a concept that put individuals and the quality of life at the centre of the development perspective.

It is now broadly accepted that the concept of development includes the overall well-being of peoples, the ability to read and write, freedom from illness, the availability of sufficient resources to establish a decent standard of living, the opportunity to participate in society on a basis of equality, and access to substantial freedoms to overcome deprivation and seek improvement in the human condition. Without these basic building blocks of development, people are denied free choice and access to opportunity.

The human development perspective focuses on fostering an environment in which individuals can develop to their full potential and lead creative and productive lives in accord with their values. People, not goods or resources, constitute the true wealth of nations.[2] What people possess or the income at their disposal is not so important as what people can accomplish or what they may become using the resources they possess. In human development theory, this is the significance of capabilities: the freedom to be or to do according to the values of the individual, the family and the community.

At the core of human development lie the principles of equity, participation, efficiency and sustainability. All human beings should enjoy equal opportunities according to their values. Thus, a young girl should not be prevented from becoming a lawyer simply because she is a girl. Policy decisions should reflect a consideration of the views of those people who are directly affected. For example, agropastoralists should not be excluded from participation in the agricultural policy decisions that affect their lives. Moreover, in providing people with opportunities to live lives of value, the participatory process should not deprive future generations of similar opportunities.

The human development perspective has become part of the mainstream development discourse. That development also refers to overall well-being—the ability to read and write, freedom from illness, access to a decent standard of living and access to the opportunity to participate in society—has become broadly accepted. The human development approach now informs more than 600 national and regional Human Development Reports (HDRs) that provide a framework within which to assess public policy and guide the development debate.

Despite the two decades of global debate initiated by *Human Development Report 1990*, the human development perspective has exerted only limited influence on the development and political discussion in Afghanistan (see box 1).

Box 1 Human security, rule of law and water: three Afghanistan Human Development Reports Continued

Supported by the United Nations Development Programme in over 165 countries, NHDRs reflect an effort to place human development at the forefront of national political agendas. These reports are policy analysis tools that focus on highlighting the national priorities of countries, helping strengthen national capacities, engaging civil society partners, identifying inequities and measuring improvements in well-being.

(continued on next page)

Box 1 Human security, rule of law and water: three Afghanistan Human Development Reports Continued

Since 2006, the Centre for Policy and Human Development at Kabul University has carried out research and analysis, published reports and undertaken advocacy on behalf of the NHDR process in Afghanistan. This 2010 Afghanistan NHDR, the third, builds on the conceptual and analytical foundation established by the first two NHDRs.

The 2004 Afghanistan NHDR, *Security with a Human Face: Challenges and Responsibilities*, examined the ways in which decades of fear and want had undermined human development.[3] The report contributed significantly to a critical expansion in the application of the human development concept to Afghanistan. The authors argued that human security should be the focus of post-2001 reconstruction and state-building efforts. An end to insecurity should not be sought solely through short-term military solutions. Security is not simply the end of war (an issue that is equally relevant and controversial in Afghanistan in 2010). Security is also the ability of people to pursue their livelihoods in peace, to gain access to health services and to be free of ethnic or religious persecution.

The 2007 Afghanistan NHDR, *Bridging Modernity and Tradition: Rule of Law and the Search for Justice*, addressed the needs and the obstacles in the effort to establish the rule of law in the country through formal and informal systems of justice.[4] The report highlighted that an effective and just judicial system is the first line of defense against the many social ills that threaten any democracy. Bridging modern and traditional institutions of justice is the key to a successful political transition in Afghanistan. The report spurred a wide-ranging national and international debate by concentrating on the steps necessary to establish the rule of law in a post-conflict setting.

This 2010 Afghanistan NHDR examines how water can become a medium for encouraging social and political cooperation and how cooperation can, in turn, reduce the threat of insecurity in Afghanistan. (Because of the security issue, there is a direct link between the 2004 report and the 2010 report.) The 2010 NHDR analyses the country's water-related infrastructure, the access of the population to water and ways to reduce inequities by strengthening the capacity of the public sector, establishing dispute resolution mechanisms and improving access to justice.

Taken together, the themes of the three NHDRs—human security, the rule of law and water for human development—are important in advancing the political dialogue in Afghanistan.

Sources: UNDP (2004); CPHD (2007).

Assessing Human Development in Afghanistan

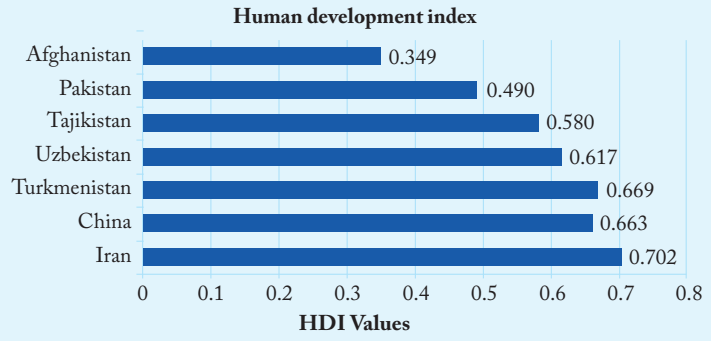
An overview of the HDI

Our analysis of human development in Afghanistan begins with a look at the HDI, which represents the best available measure for comparing human development across countries. Aiming to capture the range of choices and life chances in a society, the index is calculated using three components: life expectancy at birth, adult literacy and gross enrolment rates in education, and per capita gross domestic product. Deprivation in any of these areas—health, education and economic standards of living—means that other capabilities are also compromised. (See the reader's guide.)

According to internationally comparable HDI data for 2010, Afghanistan ranks 155th among the 169 United Nations member states on which sufficient and reliable data existed. This illustrates the challenges in seeking to advance the well-being of Afghans.[5] Figure 1 highlights the dire situation of human development in Afghanistan. Without exception, the country's neighbours score higher on the HDI.

Human development is by no means limited to the three dimensions captured by the HDI. The HDI does not explicitly cover other important dimensions such as political

Figure 1 **Regionally, Afghanistan ranks lowest on the Human Development Index**



Source: UNDP Global HDR (2010).

freedom, participation in the life of the community and personal security. In 2009, the Centre for Policy and Human Development conducted a survey of children working on the streets of Kabul.[6] The survey revealed that, although most of the children were attending school, they were experiencing poor living conditions and faced a high level of personal insecurity, thereby highlighting the shortcomings of the HDI as an infallible measure. Thousands of these children roam the streets. Focusing a human development lens on the condition of Kabul's street children offers an opportunity to examine broader trends in development within the country (box 2).

Health: a troubling picture despite signs of progress

Encouraging advances have been made in health service access and in the reduction of the under-5 and maternal mortality rates in Afghanistan over the last decade. Nonetheless, most health indicators show that Afghanistan is still at the bottom in relative international terms.

Many Afghans in rural areas are now enjoying access for the first time to health clinics where they receive basic care through maternal and newborn health, immunization and disability services that have been introduced through the Basic Package of Health Services. Today, 65 percent of Afghans live within a two-hour walk of a health facility.[7] The reduction in the under-5 and the maternal mortality rates can be attributed to the basic service package. In addition, as part of the package, the government has deployed mobile health clinics to extend services to include nomadic populations such as the Kuchis. However, while 79 percent of urban populations are within a one-hour walk of a public health facility, the corresponding

Box 2 **Kabul's Street Children: a Portrait of Human Development in Kabul City**

The street children of Kabul represent the increasingly impoverished face of urban life in Afghanistan. A city with an estimated population of over 4 million, Kabul is home to more than 60,000 street children. An entrenched feature of the overpopulated and polluted streets, these children work from dawn to dusk as roadside vendors, labourers, garbage collectors, or beggars and toil under conditions that violate international standards for any age or group.

The survey revealed that the average age of street children is 12, while the majority of the children are pre-adolescent. Over 63 percent are enrolled in school: they lead double lives in the classroom and on the streets, a situation not captured by the HDI. Most work an average of 7.5 hours per day, and education outcomes tend to be meagre. Yet, the resolve of the children to remain in school is strong: 94 percent prefer attending classes to working despite the hardships and long hours.

Nearly 60 percent of the children interviewed stated that they had been sent into the streets to work by their parents because of chronic underemployment and poverty among the families. Although most of the children do not keep accurate records of their earnings, the average income has been estimated at slightly more than $2 (AFN 117) per day. This represents a significant contribution to the family budget: the average monthly income of $51 (AFN 2,524) of a street child contributes nearly half of the average family income, $110 (AFN 545), per month.

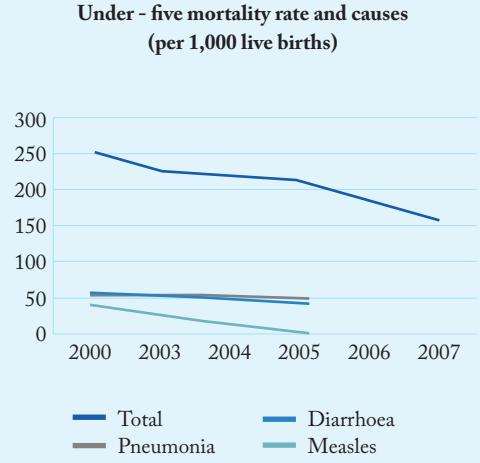
In addition to being exposed to workplace hazards and pollution, Kabul's street children experience psychological stress and physical harm. Among these children, 53 percent reported beatings, verbal assaults and threats, and they are often forced to keep moving to avoid trouble. At work, one in ten of the children interviewed had witnessed at least one car bombing or suicide attack. These hazards affect psychological well-being and can lead to long-term trauma and ill health.

Source: Safia Rahim (2009).

share is only 37 percent among Kuchis and 54 percent among rural populations.[8]

The high infant and under-5 mortality rates are two of the major contributors to the low average life expectancy in Afghanistan, an indicator used in the HDI. Yet, there has been progress. The under-5 mortality rate decreased from 257 per 1,000 live births in 2000 to 161 in 2007–2008 (figure 2).[9] From 2000 to 2006, full immunization coverage increased from 27 to 37 percent.[10] More than half of all children 12 to 23 months old (56 percent) have been immunized against measles.[11] However, this rate is still among the lowest in the world.

Figure 2 **Despite a decade of progress, child mortality is still among the highest in the world**



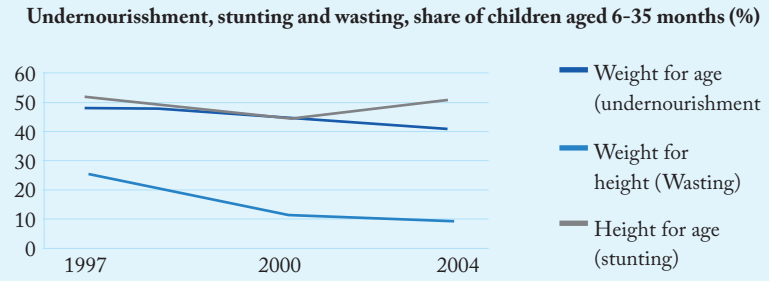
Note: The figure relies on a median scenario.
Sources: UNICEF. Best Estimates (2005), MRRD and CSO (2009).

Every day, 600 children under the age of 5 die owing to a variety of causes, including 23 percent who die because of problems related to diarrhoea. Among children aged 6–35 months in 2004, 54 percent were stunted, and over 67 percent were underweight (figure 3). [12] Among children under 5, 7 percent suffered from wasting, the process by which muscle and fat tissue waste away.[13]

The maternal mortality rate is another indicator of the ability to lead a long and healthy life. Health services targeting pregnant women are improving (figure 4). The number of women delivering with the assistance of skilled birth attendants increased threefold between 2003 and 2006, from 6 to 19 percent. In 2008/09 the Ministry of Health reported that professional birth attendants assisted in 31 percent of deliveries, a 5 percent increase over the 2007/08 estimates.[14] Estimates of women receiving skilled antenatal care reveal consistent improvement as well.

Every day, 600 children under the age of 5 die owing to a variety of causes, including 23 percent who die because of problems related to diarrhoea

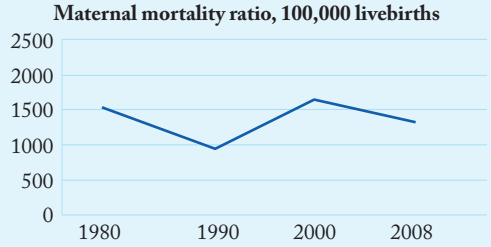
Figure 3 **More than 50 percent of children (ages 6-35) were reported under- nourished in 2004**



Note: moderate and severe cases.
Source: UNICEF, Best Estimates, (2005).

Despite these achievements, Afghanistan has the second highest maternal mortality rate in the world, at 1,600 deaths per 100,000 live births.[15] Furthermore, the rate is extremely uneven across population groups. Thus, it is particularly high among pastoralist nomads. Only 17 percent of Kuchi women report the use of skilled antenatal care services, compared with 71 percent among urban women and 30 percent among rural women. Only 8 percent of Kuchi women are assisted by skilled birth attendants during delivery, compared with 69 percent of women in urban areas and 15 percent among women in rural areas.[16]

Figure 4 **The maternal mortality ratio (MMR) in Afghanistan is the second highest in the world**



Source: Hogan, et al (2010).

Since 2001, primary and secondary enrolment rates—a critical HDI indicator—have expanded considerably, and more children than ever are attending school

The low life expectancy of 43.9 years for men and 43.8 years for women captures the fragile state of health of many Afghans.[17]

Education: progress amid inequality

In the human development perspective, education fulfils three critical roles: an instrumental role by fostering the capacity of people to participate in decision-making at the household, community and national levels; an empowerment role by enabling individuals to become direct agents in their own lives; and a redistributive role by helping disadvantaged, marginalized and excluded groups to organize politically to influence decision-making and make the case for the equitable redistribution of resources.[18]

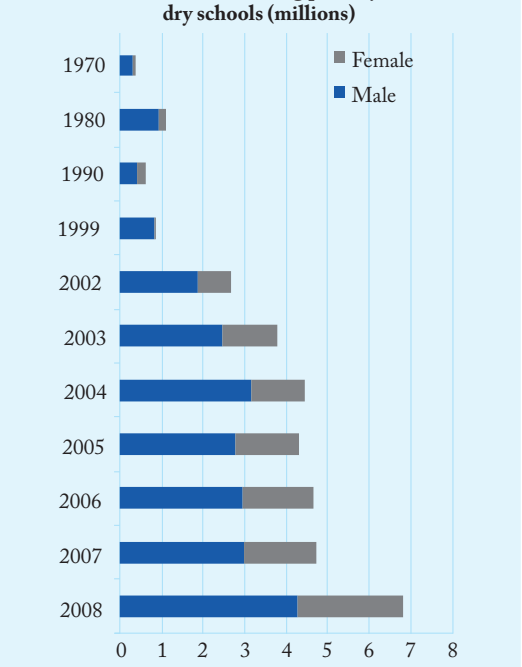
An analysis of educational opportunities in Afghanistan indicates that, since 2001, primary and secondary enrolment rates—a critical HDI indicator—have expanded considerably, and more children than ever are attending school. In 2007, 61 percent of school-aged children (4.7 million) children were enrolled across the country. The number increased to a total of 6.8 million students at all levels of the educational system in 2008 (figure 5).[19] Moreover, a remarkable surge in literacy has occurred among children aged 12–16: 37 percent of girls and 62 percent of boys can now read and write.[20]

Despite these achievements, not all Afghan children of school age enjoy equal access to education. Inequitable educational access means inequitable opportunities to engage in full and productive lives with ample space for social and economic advancement.

Female enrolment rates still trail male enrolment rates. In 2008, girls accounted for only 37.4 percent of all students.[21] Geographically disaggregated data reveal considerable discrepancies in educational participation across provinces. Kabul boasts the highest enrolment rate, at 75 percent, while Uruzgan Province is last, at less than 5 percent (figure 6).[22]

Kuchi and disabled children continue to be underrepresented in education. The average school enrolment rate among nomad children is only 6.6 percent for boys and 1.8 percent for girls.[23] In 2005, only 22.4 percent of the 196,000 disabled school-aged children were enrolled. Moreover, the drop-out rate for these children was 75 percent in primary and secondary school, mainly because the education system does not have the capacity to handle children with disabilities.[24]

Figure 5 **Since 2001 educational opportunities for school-aged students have increased**



Source: Giustozzi (2009).

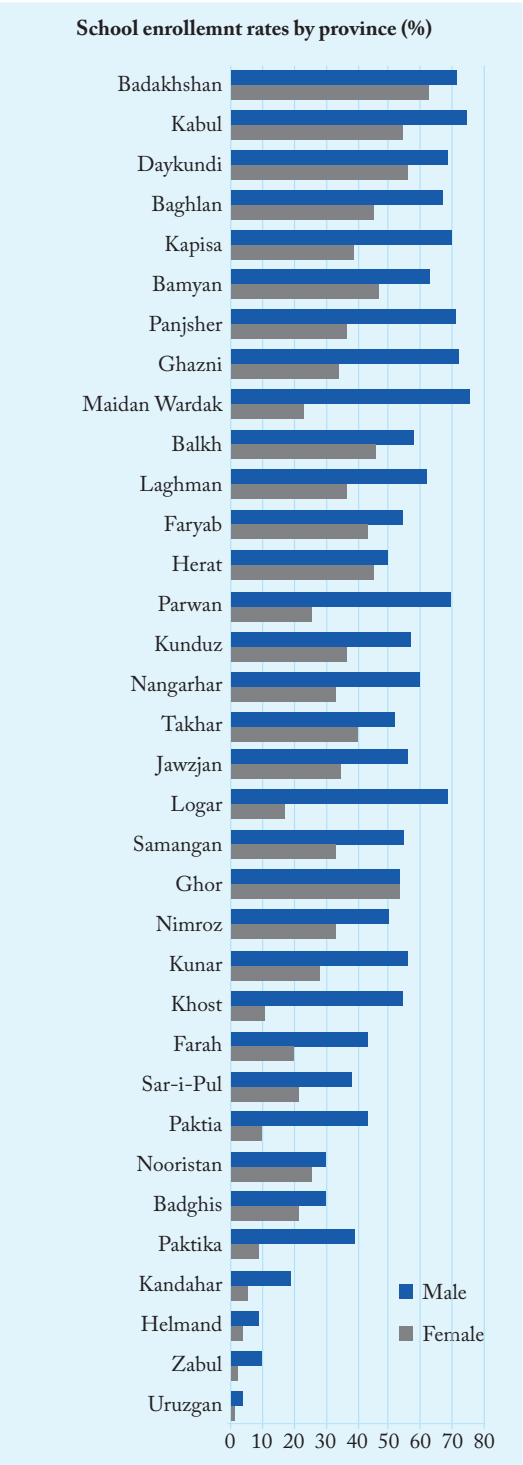
Insecurity, social issues, the geographical coverage of schools, inadequate facilities, lack of separate schools for girls, the demand for domestic work, and poor educational quality are some of the causes of the inequitable educational opportunities and the high numbers of drop-outs. Enrolment rates are lowest in the southern provinces owing primarily to the ongoing insurgency. A lack of school facilities for girls continues to be a major problem. Of the 415 educational districts surveyed, 29 percent have no designated schools

for girls.[25] Distance, lack of transport, poor water provision and poor sanitation often prevent girls from attending school even in areas in which separate facilities are available. Poor enrolment is also caused by the lack of female teachers, particularly in rural areas. In 2005, only 28.1 percent of teachers were women.[26]

Children who are disadvantaged because of gender, physical disability, lifestyle, or geographical location will likely eventually face long-term challenges in finding work and accessing services. They will also be far less likely to participate in the political process or in the community or, more generally, to become agents of their own lives.

Kuchi and disabled children continue to be underrepresented in education

Figure 6 **Unequal educational opportunities by province and gender**

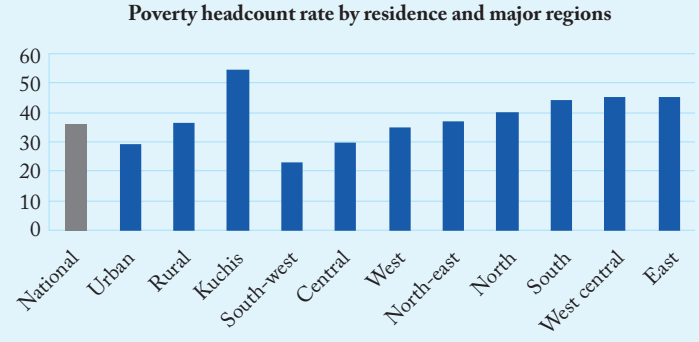


Source: Calculated based on MRRD and CSO (2009).

The Scope and Nature of Poverty in Afghanistan

The National Risk and Vulnerability Assessment defines poverty according to the monthly cost of a minimum basket of necessities for basic subsistence, including food, water, clothing and shelter.[27] This translates into a poverty line of AFN 1,255 ($25.10) per person per month. According to the assessment, 36 percent of the population cannot meet these basic subsistence requirements. By this tally, an estimated 9 million Afghans are living below the poverty line. The assessment also finds that household expenditure among these people is, on average, 22 percent below the AFN 1,255 poverty threshold. Figure 7 shows that urban households are as poor as rural households. The regional differences are, meanwhile, much more

Figure 7 **Thirty-six percent of Afghan households cannot meet their basic subsistence needs**



Source: MRRD and CSO (2009).

An extremely high level of deprivation associated with living standards, particularly access to clean water and improved sanitation, is the main driver of poverty

acute: the poverty incidence ranges from 23 percent in the south-west to 45 percent in the eastern region.

Other approaches to gauging poverty rely less on income-based measures and more on multidimensional indicators. They focus on evaluations of the quality of life through assessments of health, educational attainment and living standards to reach an aggregate view. The human poverty index, for example, is used to rank developing countries in terms of poverty. The 2009 global HDR ranks 135 United Nations member states according to this index.[28] According to the ranking, Afghanistan has the dubious distinction of being the most impoverished country in the world.

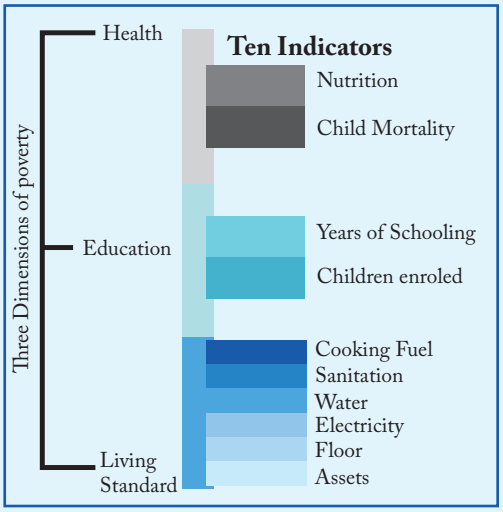
In July 2010, a new measure of poverty, the multidimensional poverty index (MPI), was introduced. The measure was developed through the Oxford Poverty and Human Development Initiative, with the assistance of the United Nations Development Programme (box 3).[29]

At an overall MPI of 0.51, Afghanistan ranks 96th among 105 developing countries (figure 8). Almost 84 percent of Afghan households are multidimensionally poor according to this measure. Thus, an assessment based on multiple indicators of deprivation in health, education and standard of living (84 present) produces a poverty rate that is much higher than the rate calculated on the basis of income alone (36 percent) as in the approach adopted in the National Risk and Vulnerability Assessment (see elsewhere above).

A closer look at the 10 indicators used in calculating the MPI offers a more detailed profile of the dimensions of poverty in Afghanistan. An extremely high level of deprivation associated with living standards, particularly access to clean water and improved sanitation, is the main driver of poverty. With the exception of assets, the level of deprivation linked to the living standards indicators is above 70 percent; the level of deprivation linked with sanitation is close to 100 percent. These results are far worse than the

Box 3 The Multi-Dimensional Poverty Index (MPI), a new index for measuring poverty

The MPI is calculated on the basis of 10 weighted indicators corresponding to three dimensions of the HDI: education, health and standard of living. The MPI thereby measures multiple and interconnected dimensions of deprivation as experienced by households. The three dimensions are given equal weight (see the figure). Two education indicators and two health indicators each account for 16.7 percent of the measure, while the six indicators of the standard of living—sanitation, access to safe water, access to cooking fuel, electricity, floor area, and assets—are weighted 5.5 percent each. A household is considered multidimensionally poor if the weighted indicators show total deprivation at 30 percent.



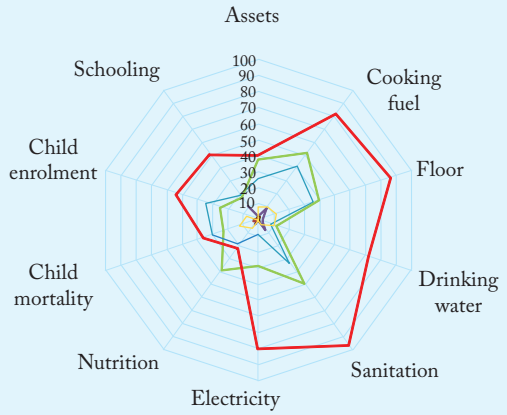
Who is considered MPI poor? A household is considered poor if, for example, it has at least one member who is undernourished and no member who has had at least five years of education. Likewise, a household that has experienced a child death and is deprived according to at least three indicators of the standard of living is considered poor. A household that is deprived with respect to three living standard indicators and also has one or more school-aged children who are not enrolled falls into the same category.

Source: Alkire and Santo (2010).

corresponding results in neighbouring countries (figure 9). While close to 80 percent of Afghan households are considered poor in the dimension of drinking water, less than 15 percent of households in neighbouring Pakistan are at a similar level of deprivation.

Figure 9 **In almost all MPI indicators, Afghan households are poorer and more deprived when compared to neighbouring countries.**

Percentage of households considered deprived in each of the 10 categories. Comparison for 7 regional countries



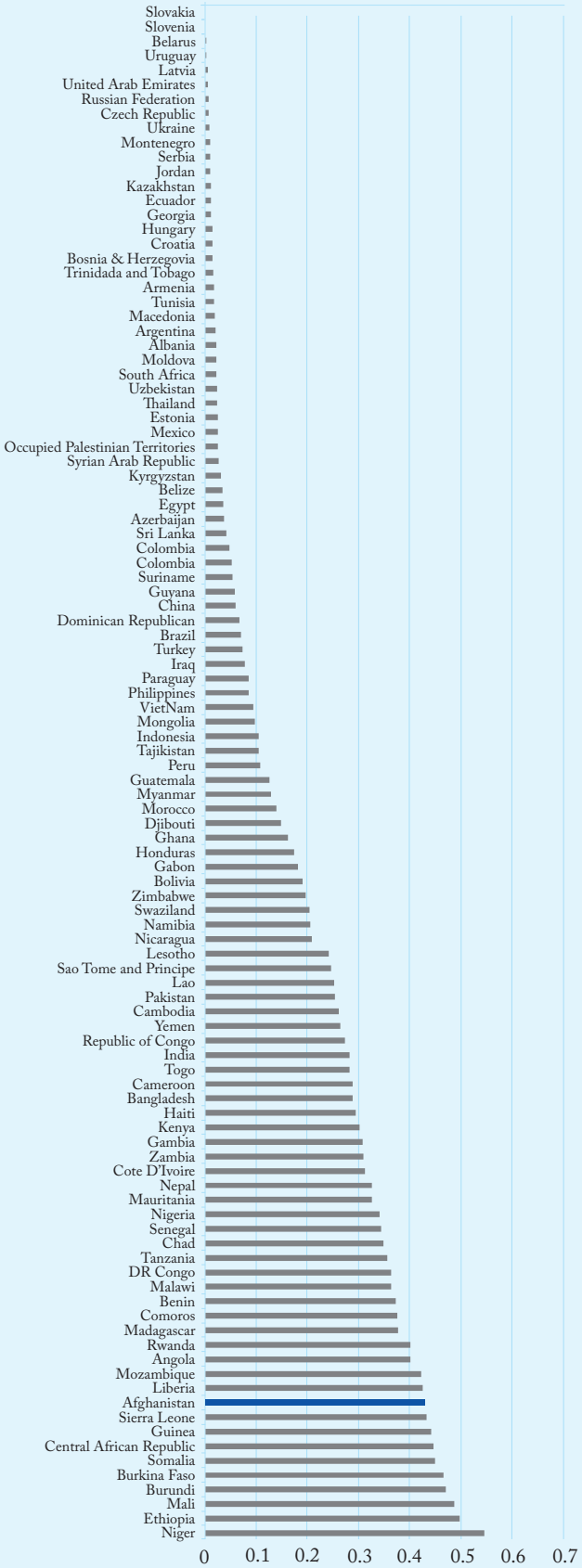
Note: H is percentage of multidimentional poor households.
Sources: Calculations for Afghanistan are based on MRRD and CSO (2009) data. Other country data are based on UNDP measures (2010).

In the educational dimension of poverty, the results show that more than 50 percent of households in Afghanistan are deprived in terms of schooling and enrolment. A comparison across this dimension with households in countries in the same region provides insight into the challenges that lie ahead.

In the health dimension, the levels of poverty captured by the child mortality indicator are high: almost 40 percent of Afghan households are considered poor by this measure. The gap with countries such as India and Pakistan is, however, narrower than it is in other indicators. According to the nutrition indicator, the level of poverty is lower in Afghanistan than in India.

Figure 8 **Mutlidimensional Poverty Index: Afghanistan ranks 96 out of 105 developing countries.**

Multidimensional Index (MPI) - Classification of 105 developing countries

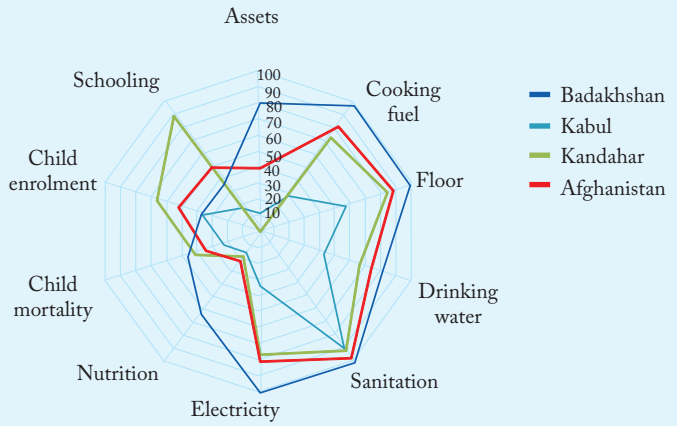


Sources: Calculations for Afghanistan are based on MRRD and CSO (2009) data. Other countries' data are based on UNDP measures (2010).

Incidence of multidimensional poverty is much lower in urban areas compared with rural areas

The poverty and deprivation profile at the national level hides differences across provinces (See the reader's guide for a complete provincial poverty profile). A comparison among Badakhshan (in the north-east), Kabul (east) and Kandahar (south-west) illustrates how stark these differences can be (figure 10).

Figure 10 Poverty profiles are highly variable between provinces.



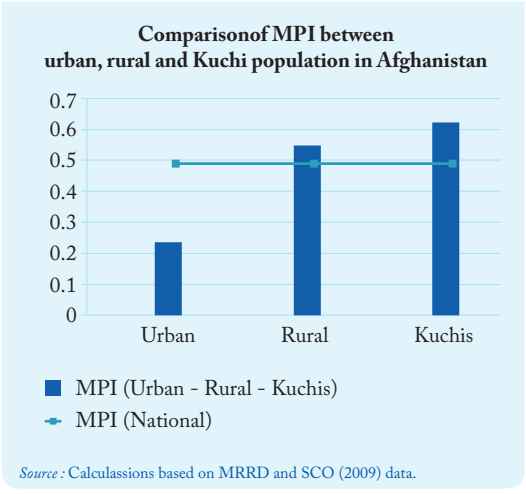
Source: Based on MRRD and CSO (2009) data.

The differences in the nature of poverty in the three provinces are acute. The level of deprivation according to indicators of sanitation coverage is high across the provinces. However, the indicators of living standards for Kabul Province are significantly better than the national average. The greater access to assets and to electricity in the capital city tends to lower the level of poverty in the province. In contrast, the highest levels of deprivation in standards of living occur in the remote province of Badakhshan, where more than 80 percent of households are poor according to all six of the relevant indicators. The health indicators for Badakhshan are also worrisome: members of more than 60 percent of the households are malnourished; this is almost three times the national average. Yet, in education, Badakhshan performs much better than the national average. The share of households considered poor and deprived in school enrolment and educational attainment is lower than or close to the corresponding share in Kabul. Meanwhile, Kandahar Province performs relatively better than Badakhshan according to the living standards indicators, but the share of households deprived in education is almost two times higher.[30]

Once the accuracy of the MPI data is enhanced, the MPI could be used as a tool in the design of interventions aimed at reducing poverty by targeting the areas of the most acute deprivation in each province according to each of the 10 indicators.

The MPI has revealed an important urban-rural divide in Afghanistan (figure 11). Though the National Risk and Vulnerability Assessment found that, from an income perspective, the rural-urban poverty gap is relatively small, the MPI shows that the incidence of multidimensional poverty is much lower in urban areas compared with rural areas.[31] In addition, while the national MPI is 0.49, the MPI is 0.62 among the Kuchis, the nomadic pastoralists.

Figure 11 In almost all MPI indicators, Afghan households are poorer and more deprived when compared to neighbouring countries

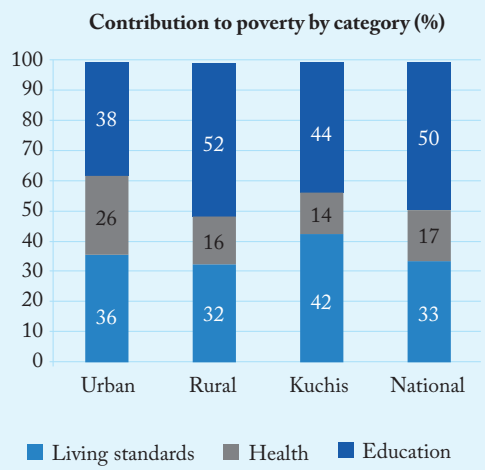


Source : Calculassions based on MRRD and SCO (2009) data.

The various segments of the population experience different types of poverty (figure 12). Poor living standards and lack of access to education constitute the primary factors behind the high levels of poverty and deprivation among the Kuchis. Among

rural Afghans, low standards of living are the main contributor to multidimensional poverty. In urban areas, the contributions of poor health, education and living standards to overall poverty are more balanced.

Figure 12 **Deprivation in living standards is the main contributor to multi-dimensional poverty in rural reas**



Source: Calculation based on MRRD and CSO (2009) data.

According to the Afghanistan Pilot Participatory Poverty Assessment, which follows the human development approach, the poor themselves perceive poverty in terms of inadequate housing, limited income opportunities and lack of land or livestock. The poor also define poverty in terms of the inability to provide adequate food for the household.[32] The poor frequently associate poverty with deprivation in other areas of life, including security, political power and access to essential services, principally education and health.

"We don't have a clinic here, but, if you are lucky enough to be able to drive the 30 kilometres to the nearest hospital, you will find doctors who are not professionals, who don't pay attention to you, and who tell you to buy your own medicine," said a woman who participated in the assessment.

The poor themselves perceive poverty in terms of inadequate housing, limited income opportunities and lack of land or livestock

Gender Inequality: A Major Impediment to Human Development

The poor also define poverty in terms of helplessness to improve one's well-being. Poor women and girls, in particular, refer to poverty in terms of the inability to participate actively ("to be visible") in everyday life.

Despite progress in advancing women's rights and improving the access to education among girls, gender discrimination is pervasive in Afghanistan. According to the 2009 global HDR, the country ranks 154th (with an index of 0.331) in measurements of the gender-related development index, which is second-lowest after Niger (index of 0.308).[33]

The most visible progress has occurred in the constitutional rights, political participation and representation of women. Indeed, Afghanistan ranks among the world's top 20 countries in terms of the number of women representatives in parliament, at 27 percent, higher than any other Muslim country and much higher than the average of 16.4 percent in the region.[34] Afghanistan's Constitution allocates a minimum of two seats per province to women in the lower house, the Wolesi Jirga, guaranteeing women 68 of the 249 seats. The Afghan election law also contains a provision stipulating that at least a quarter of the seats in provincial councils must be reserved for women. However, this has not translated into an expansion in the recognition of gender rights, which is still limited.[35]

The extent of gender discrimination in Afghanistan impedes human development by constraining the contribution of women. Despite substantial investments in the provision of basic health services, indicators of the health of women and children are still alarming, while access to education remains unequal across the gender divide. The adult literacy rate is nearly three times lower among women (11 percent) than among men (32 percent), and the overall literacy rate among all women is 18 percent, compared with 36 percent among men. Girls are especially disadvantaged.[36] Though governmental and donor efforts to increase enrolments have been intense, girls still represent only 37.4 percent of all students. Geographically disaggregated data reveal considerable discrepancies in female educational participation across provinces.

The roles of men and women are more closely intertwined in rural areas, particularly in farming activities and handicrafts such as carpet weaving. In handicrafts, the average income of women is only 41 percent of the average income of men; the corresponding share is 53 percent in weaving and gathering firewood.[37] Women play a key role in the cultivation of opium poppy and are often responsible for planting, weeding, thinning, lancing, collecting, field clearing and processing. Women also manage food supplies. However, in most households, men continue to manage finances, and the income earned from agricultural produce is largely retained by the men. The effects of this intrahousehold distribution on family well-being are negative.

The Asia Foundation conducted a nationwide public opinion survey in Afghanistan in 2008.[38] According to the survey, literacy, forced marriage, domestic violence and poverty are among the major problems facing Afghan women (box 4).

Box 4 Perceptions concerning the participation and role of women: A survey of Afghan public opinion

In 2008, the Asia Foundation conducted a survey of 6,593 Afghan citizens aged 18 and above in all 34 provinces. The aim was to capture perceptions of the reconstruction effort, security, and governance issues, including the status of women. Respondents discussed major impediments to development, as follows:

Status of women: Illiteracy (28 percent of responses); lack of recognized rights among women, including the fact that many women cannot leave their homes; forced marriage and dowry (23 percent); lack of job opportunities (11 percent); general health care, including pregnancy-related health care (7 percent); domestic violence (6 percent) and poverty (6 percent).

Education: The vast majority of respondents were in favour of equal educational opportunities for women (92 percent of women and 85 percent of men; 96 percent of urban residents and 86 percent of rural residents). The share of respondents strongly in favour of equal opportunities increased with education level: from 54 percent among those who had never attended school to 68 percent among respondents who have reached grade 10 or above.

Health issues: Only a small share of the respondents (7 percent) mentioned the lack of health care facilities among the major problems facing women; a majority of women (53 percent) said that clinics and hospitals were available locally. Lack of quality health care, including maternity care, was considered a bigger problem in rural areas (14 percent) than in urban areas (9 percent).

Decision-making: Among respondents, 58 percent (women: 63 percent; men: 52 percent; urban areas: 62 percent; rural areas: 56 percent) said that women should freely decide how to vote, while 22 percent thought that women should take advice from men, and 18 percent believed that women should make their own decisions, but in consultation with men.

Political leadership: Views varied on whether political leaders should be mainly men (51 percent of men and 20 percent of women agreed with this) and whether men and women should share leadership roles equally (62 percent of women and 40 percent of men); 57 percent were not opposed to a woman representing them in Parliament, while 40 percent were opposed.

Source: The Asia Foundation (2008).

Linking Human Development and Water Security: Analytical Framework

Since its inception, the human development perspective has included a focus on environmental sustainability. Yet, the global HDRs did not feature the environment as a core theme until the 2006 and 2007/2008 reports examined, respectively, water and climate change as development issues.[39] Thus, the concept of water security proposed in this report—by bringing together human security and those dimensions of human development most affected by access to water and sanitation—has been set before a rich background of related ideas on human development.

The World Water Development Report series and the global Human Development Report 2006 have established that water is a core feature of human life and livelihood.[40] It is used for drinking, washing, growing crops, generating clean energy and industrial development, and it has a central role in religion, society and the environment. The global 2006 Human Development Report links water to human development and states that the crisis of water is among the greatest challenges of the early 21st century. The report argues as follows:

In broad terms water security is about ensuring that every person has reliable access to enough safe water at an affordable price to lead a healthy, dignified and productive life, while maintaining the ecological systems that provide water and also depend on water. When these conditions are not met, or when access to water is disrupted, people face acute human security risks transmitted through poor health and the disruption of livelihoods.[41]

The importance of water is emphasized in the three essential capabilities captured by the HDI. Thus, water is essential to a long and healthy life. Access to clean water ensures that children are healthy enough to attend school and are able to concentrate at school. Proximity to a reliable, improved source of clean water means that children will not be deprived of an education because they have to travel long distances to collect water. Water is necessary for a decent standard of living; this is especially the case in Afghanistan, where agriculture depends on reliable supplies of water.

The concept of water security reflected in this report builds on the notion of human security. Human security is more inclusive than physical security alone: it encompasses all essential aspects of human life, including the concept of human development. Human security is centred on the security of the individual. One may analyse human security according to seven main features, as follows:[42]

- *Economic security:* assured basic income, usually through steady employment and productive activity that are remunerated adequately and fairly or through publicly financed safety nets
- *Food security:* assured food sources, including sufficient access to assets and work and sufficient income to grow or buy food or to take advantage of public food distribution systems
- *Health security:* freedom from infections and disease and sufficient and sustainable access to safe water, clean air and health care
- *Environmental security:* adequate access to water and sufficient arable land and protection from water pollution and natural disasters
- *Personal security:* protection from torture, war, ethnic tension, violent crime, drug trafficking, violence and abuse, particularly abuse of children and women
- *Community security:* stable family relations, ability to use traditional languages and enjoy traditional culture, and freedom from ethnic discrimination, strife,

or genocide and ethnic cleansing
- *Political security:* protection from government repression, systematic human rights violations, or the effects of militarization

If security is lacking in any of these domains, overall security is compromised. Water has a direct and indirect role in all seven areas (see table 1).

Table 1 **Water for life and livelihoods plays a critical role in all domains of human security in Afghanistan**

Domains of human security	Water for life	Water for livelihoods
Economic Security	The costs associated with treating diseases owing to poor access to clean water and hygienic sanitation represents a heavy burden on poor households. Poor health caused by unsafe water reduces the productivity of Afghans.	Lack of access to water for irrigation leads to reduced for-profit crop production, loss of employment opportunities, livestock depletion and reduced land value. An adequate supply of water for industrial use and energy production supports economic development—including the creation of jobs.
Food Security	Unsafe water and poor sanitation causes high rates of diarrhoea, which in turn leads to insufficient caloric intake and malnutrition.	Insufficient water for irrigation—particularly during drought—leads to reduced crop production for home consumption. This threatens food security.
Health Security	Unsafe water and poor sanitation facilities lead to disease and epidemics of cholera, dysentery, diarrhoea etc. Dirty water and poor sanitation accounts for high yearly child mortality rates.	Access to irrigation facilitates diversified food production. Poorly drained irrigated areas can be breading ground for mosquitoes.
Environmental Security	Inadequate sanitation and waste management leads to the contamination of ground water. This can lead to outbreaks of disease.	Recurrent drought diminishes the size of grazing land, which in turn causes the loss of pastoralist livelihoods. In some cases, competition for increasingly scarce land can trigger conflict.
Personal Security	Restrictions on access to safe water supplies may result in disputes and violent attacks, which undermine personal security. Unsafe drinking water and poor sanitation can cause psychological distress when household members die—i.e. the death of family members under the age of five years.	Where water is scarce, competition between groups may turn violent, thus undermining personal security. An inability to secure food during severe water shortages places heavy mental stress on vulnerable households when they have to sell off their productive assets in order to survive. Drought leads many young men to migrate from villages to cities.
Community Security	A lack of clean water can lead families and individuals to migrate to other parts of the country or to other countries. Water scarcity affects the most vulnerable members of society the most and undermines the security of the community.	Inadequate water for agriculture increases competition between community members and is most likely to arise at the local level. Inequitable water sharing practices often leads to increased tension and reduced community cohesion. Insufficient water supplies puts added pressure on local water management institutions.
Political	Failing to supply all households with enough water to meet basic needs is a direct violation of human rights. Insufficient political will is a key driver of lack of access to water and sanitation—particularly in those regions where water is available.	Failing to ensure a sufficient supply and equitable distribution of water for irrigation may trigger disputes between communities and thereby fuel ethnic and political tensions.

Source: Adapted from Barakat (2010).

The Water Crisis in Afghanistan

Three in four Afghans—16.8 million women, men and children—lack access to protected drinking water sources.[43] Every hour, six children die because they have consumed unsafe water or because they have been exposed to poor sanitation practices (see chapter 3).[44]

Agriculture accounts for 37 percent of gross national income and remains the mainstay of most individuals, families and communities.[45] Despite the importance of agriculture, the irrigation infrastructure performs poorly. While around 3 million hectares were irrigated in the 1970s, only an average of 1.8 million hectares are irrigated each year now.[46] Furthermore, while farmers located in the upstream reaches of rivers and canals enjoy almost unlimited access to water, thousands of farmers toiling in downstream fields are often deprived of their water rights and, each year, are obliged to leave their fields fallow, missing out on a critical human development opportunity (see chapter 4).

Recurring drought and flooding propel thousands of households into coping and survival strategies that often deprive them of their most productive assets, such as livestock or land, thus sinking them deeper into poverty (see chapter 2).

The water crisis is affecting the most vulnerable: woman-headed households, the children involved in fetching water, impoverished farmers living in downstream canal areas, poor households in unplanned urban areas and refugee camps, and Kuchis and other pastoralist groups (box 5). While people have little control over specific natural shocks and the geographical constraints inherent in the environment, this report argues that it is the action or inaction of people that renders populations vulnerable to water crises.

The importance of simple solutions to serious needs, such as a glass of clean water or the availability of a clean, functioning toilet, may be too easily dismissed as minor in a country caught up in violent clashes and a spreading insurgency. Nonetheless, the failure to provide secure access to water threatens Afghanistan's own aspirations as set out in the country's National Development Strategy and Millennium Development Goal commitments. Moreover, ignoring basic needs represents a violation of human rights.

Afghanistan has sufficient water to meet its needs, at least at the national level. More than 2,775 cubic metres of water are currently available per person per year. This is far above the minimum threshold of 1,700 cubic metres required to satisfy all domestic, agricultural, environmental, industrial and energy needs (see chapter 2). Why, then, is there a water crisis?

Most Afghans lack access to domestic water because they are poor; they benefit from only the crudest infrastructure and are unable to mobilize effective institutions. Inequitable relationships of power, weakened institutions, lack of capacity, and inadequate and unreliable infrastructure determine who is entitled to tap into irrigation systems.

Box 5 What water crisis?

Several principal manifestations define the nature of the water crisis in Afghanistan.

- Approximately 16.8 million Afghans drink unsafe water.
- An estimated 23 million people enjoy only inadequate access to improved toilets and waste disposal facilities.
- Increasing population growth rates mean more competition for less water per capita.
- Drought and flooding are still causing early deaths, injury, the destruction of property, food shortages and lost earnings.
- The danger of national and international disputes over water resources is growing.
- Environmental degradation is exacerbating water scarcity.

Power and entitlement ultimately determine the human, social and economic costs of water insecurity. They also determine who suffers the most in terms of life, livelihoods and well-being.

Sources: WWAP (2003, 2006), UNDP (2006), WHO and UNICEF (2010).

Thus, in most of the country, inadequate access to water has its roots in poor management and poor governance (see chapter 5). At the same time, the water crisis is still partially a consequence of 30 years of war. Indeed, decades of turmoil have led to weakened social capital, the collapse of governmental institutions and the exodus of trained Afghans from the country. The effects reverberate from generation to generation, delaying the effort to improve water systems.

Most national and international stakeholders continue to focus on corruption and security. Though such a focus is justified, opinion polls reveal that women and men who take part in village councils consistently rank drinking water and irrigation as top community priorities.[47] Their voices only reinforce the importance of expanding water connectivity and rehabilitating irrigation systems so that water may reach the most vulnerable.

2

Managing water resources, scarcity and climate shocks

"There is enough water in the pot, but we are wandering around with thirsty lips."
— *Local proverb*

"This river is the river of life. It contains within itself the powers of destruction and prosperity alike. The river looks at the talent and ability of all sides and then apportions them their due share."
"What the river needs is solid, mature work and concrete dams reigning it in. If our actions were firm and our dams were concrete, our irrigation streams would not dry up and our fields would not be swept away."
—*Gul Pacha Ulfat, Afghan writer and poet*

CHAPTER 2

Managing water resources, scarcity and climate shocks

Authors: Vincent Thomas, Professor Naim Eqrar

Sufficient and reliable access to clean water is essential to meeting basic needs and ensuring food security. Parts of Afghanistan are physically water scarce, but most people who lack secure access to water are deprived because of inadequate infrastructure and poor management rather than insufficient resource. While Afghanistan is taking measures to mitigate the effects of scarcity and climate shocks, the interests of riparian countries must be considered. The participation of water users in decision-making on shared resources and an emphasis on capacity-building are among the key requirements for steady progress towards human development through sustainable water management.

If people lack sufficient water for domestic uses, food, energy production and environmental conservation, they are deprived of the human development potential this critical resource represents.

Securing access to water for all and providing protection against water-related shocks are among the key human development challenges facing Afghanistan.

How much water does Afghanistan have? Is it a water-scarce country that offers little potential for human development, or is the problem inadequate access and poor distribution?

A few river basins and sub-river basins are facing shortages in water. This is partly because of the geographical and temporal—that is, seasonal—distribution of the resource coupled with a lack of storage capacity. Nonetheless, overall, Afghanistan currently has sufficient water to meet domestic, agricultural, industrial and environmental needs. Yet, this sufficiency has not yet been translated into a steady and reliable supply of water for millions of poor Afghans. Indeed, secure access to safe drinking water for all is only a distant goal, and irrigation is also performing below potential.

Taping into the potential through the effective development and management of the water supply therefore represents a tremendous opportunity to improve health, provide food security, encourage industry, create jobs and reduce overall vulnerability in Afghanistan. However, while water management must be enhanced to eliminate deficiencies in the delivery of available water resources, effective management also means maintaining the ability to meet future needs. As the population increases and the non-agricultural demand for water expands, the difficulties in meeting needs swells. The window of opportunity to take the necessary measures to develop water resources efficiently and sustainably is closing in Afghanistan.

While the country must begin to tackle the water scarcity challenge, it also cannot ignore the regional dimensions of effective water management. Because the majority of the rivers flowing across Afghanistan are shared with countries downstream, planners

Ensuring water security also involves protecting populations against the vulnerabilities associated with climate shocks and uncertain water flows

of major water development projects must take into consideration the consequences for neighbouring countries.

Ensuring water security also involves protecting populations against the vulnerabilities associated with climate shocks and uncertain water flows. Withstanding famine during prolonged periods of drought is often associated with significant human development costs. Drought and floods disrupt livelihoods and can force impoverished families to dispose of land, livestock and other productive assets so the families are able to obtain food. Women and children are typically the most affected because drought and floods have a great impact on access to health care and education. Guaranteeing a reliable and predictable supply of water and offering protection against water-related shocks are an immense challenge. This is particularly so in Afghanistan, which is an extremely poor country.

The severity and the effects of climate change are uncertain, but, unless appropriate steps are taken, the human development impacts of scarcity and water-related shocks will worsen and will affect the poorest households the most.

To overcome these challenges, governments, donors and stakeholders must seek to manage the increasing scarcity of water, protect against the vulnerability and uncertainty associated with climate shocks and uncertain water flows, and safeguard and improve water quality. This involves finding the proper balance between the development of supply and the regulation of demand and guaranteeing equitable access for domestic, industrial, agricultural and energy uses, while minimizing negative environmental effects. Indeed, in most parts of Afghanistan, the problem of water scarcity has arisen not because of a lack of water, but because of mismanagement.

Rethinking Water Scarcity in Afghanistan

Despite the frequent assumption to the contrary, Afghanistan is, according to nationwide indicators, a water-rich country. In most river basins, sufficient water is available to meet current requirements. However, there are a number of constraints that impede the realization of the potential. Moreover, population growth is projected to be a key driver of future scarcity.

Defining water scarcity: a complex task

If individuals are unable to obtain sufficient water to satisfy their drinking, washing, or livelihood needs and if the water they use is not clean and provided in an affordable manner, then these individuals are considered water insecure. If a large share of the population in a single region is water insecure for a significant period, then that region is considered water scarce.[1]

Though these definitions appear simple, it is often difficult to determine clearly whether a country is water scarce. This is because the determination must also take into account the delicate balance among availability, demand and management capacity. Nonetheless, measuring water availability and determining scarcity are vital to the identification of priorities in development policy interventions.

Whether an area is water scarce depends on the following:

- The definition and identification of demand and individual needs and the extent to which environmental sustainability (that is, the maintenance of ecosystems) is taken into account.
- The share of water that is available or that can be made available to satisfy the needs
- The seasonal and geographical scope of the variations in water availability that are

evaluated in determining water abundance or water scarcity.

It is often difficult to determine whether scarcity arises because of a shortage in the resource (a supply problem) or because of the way the resource is used (a demand and management problem).[2] In fact, water scarcity is often a consequence of the latter. Many self-declared water-scarce countries possess sufficient water to meet domestic, industrial, agricultural and environmental needs, but poor management and planning mean that gaining access to the water is difficult.

Various indicators are used to assess water scarcity. These vary from the straightforward Falkenmark water stress indicator and the water resources vulnerability index to the more comprehensive, but also more complex and less intuitive water poverty index.[3] To assess the availability of water in river basins and nationwide, this report relies on the Falkenmark indicator and the water resources vulnerability index.

According to the Falkenmark indicator, 1,700 cubic metres of water are required per capita per year to satisfy the water demand of a given population for domestic, food production, industrial, energy and environmental uses. The indicator provides a measure of the extent to which the resource is available relative to the required demand (see table 1).

Is Afghanistan a water-scarce country?

The abundance of water hides the significant spatial variations in water availability

The distribution of water scarcity across river basins: Afghanistan's annual renewable surface water resources are estimated at 57 billion cubic metres. They are distributed and managed within five river basins that are defined as independent hydrological units (figure 1).

Experts are increasingly recognizing river basins and sub-river basins as the most appropriate units for the analysis and management of scarcity. Draft regulations for river basin management in Afghanistan now reference five river basins and 34 sub-river basins (table 2). The surface water distribution and scarcity levels across the five basins are discussed below.

Figure 2 illustrates that Afghanistan cannot be labelled water scarce because the country is more than 60 percent above the water stress threshold. However, the national picture conceals the considerable differences across river basins. For example, the Panj-Amu and, to a lesser extent, the Kabul river basins both possess largely sufficient water resources. The Harirod-Murghab and Helmand river basins also hover above the scarcity threshold, but skim close to the 1,700 cubic metres per capita per year water stress threshold. The Northern river basin, meanwhile, is dangerously close to the absolute scarcity threshold.

"We see all this water abundance in our rivers, but most of it is flowing out of the country, and we can't even access it for our basic needs!"

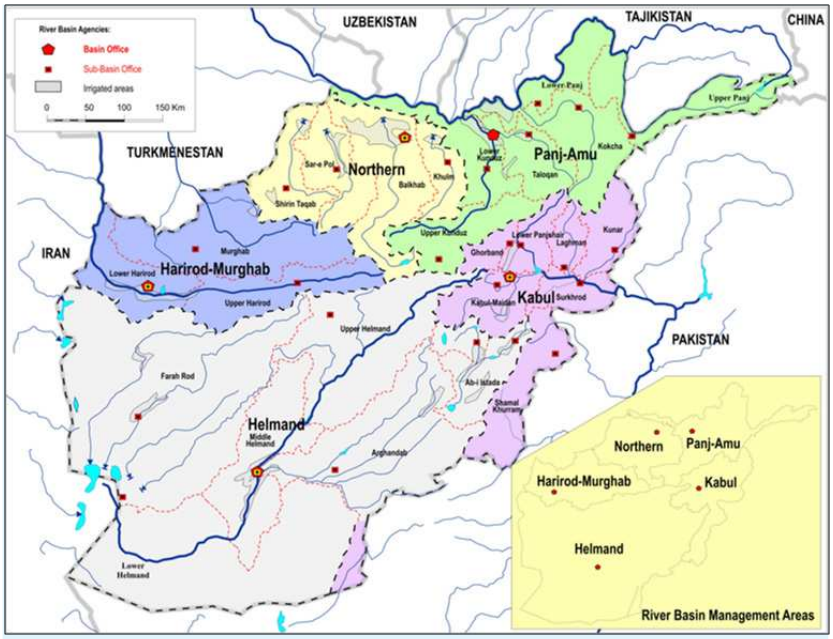
A villager in Badakhshan Province

Table 1 **Definition of the Falkenmark water scarcity indicator**

Falkenmark water stress indicator	500 m^3/capita/year	1,000 m^3/capita/year	1,700 m^3/capita/year	
	Absolute water scarcity	Water scarcity	Water stress	No water stress

Source: Adapted from Rijsberman (2005).

Figure 1 **The five river basins and 34 sub-basins of Afghanistan**



Source : Ministry of Energy and Water.

Table 2 **The river basins of Afghanistan**

The definition of a river basin: "The area that contributes hydrologically (including both surface and groundwater) to a first order stream. This is in turn defined by its outlet to the ocean or to closed lake or inland sea." Afghanistan is divided into five river basins.

River basins	Annual discharge (billion cubic metres)
Panj Amu	22.00
Northern	1.88
Helmand	9.30
Harirod Murghab	3.06
Kabul	20.76

Source: Favre and Kamal (2004), Government of Afghanistan (2008).

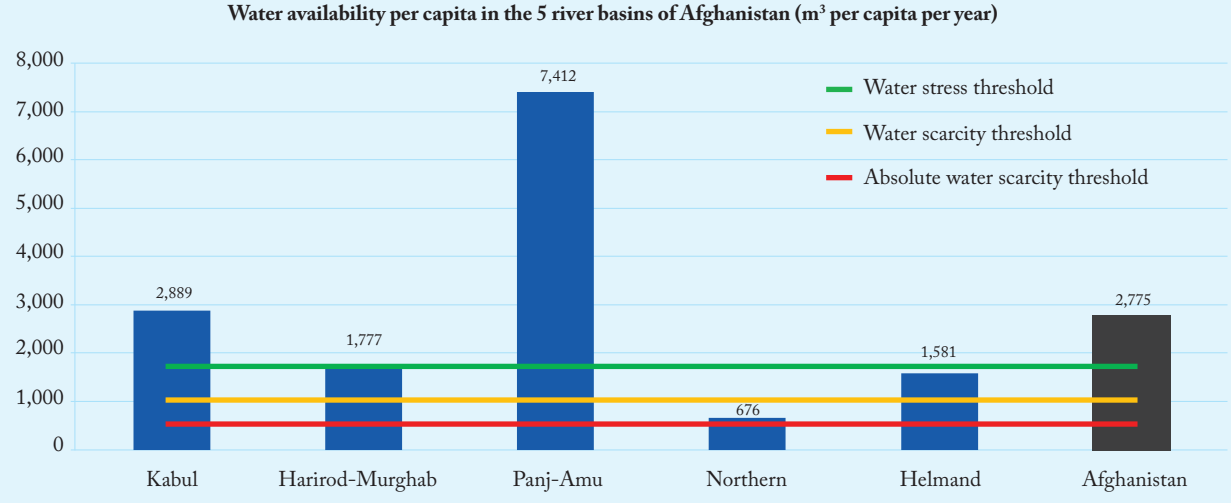
A proportion of the available water must be shared with neighbouring countries. Thus, availability per capita is actually lower than indicated by the estimates in figure 2. Currently, only the Helmand river basin is the subject of a treaty, with Iran. The treaty stipulates that an average of 26 cubic metres per second, or 8.8 percent of the 9.3 billion cubic metres flowing yearly into the basin, must be made available to Iran. This means that only 1,442 cubic metres per capita per year are available for consumption in Afghanistan.

The spatial variability constraint: Geographical (or spatial) variability means that water is not always available where it is needed, that is, where irrigable land and urban centres are located. In Afghanistan, the distribution of land, water resources and population settlements across river basins is clearly in imbalance (figure 3). Basins that contain the greatest amounts of water, such as the Panj-Amu or the Kabul river basins, are not necessarily associated with the highest shares of irrigable land or population. Meanwhile, river basins such as the Helmand or the Northern that are associated with high shares of the available irrigable land do not benefit from proportionate shares of water.

The imbalance in the distribution of resources also occurs within individual river basins. For example, in the Kabul river basin, 70 percent of the water flow comes from the Kunar River.[4] This river is located in the lower reaches of the river basin, close to the border with Pakistan, in an area where the potential for exploitation for irrigation is limited. As a result, most of the water leaves the country without being used farther upstream, where 88 percent of the land and 92 percent of the population in the Kabul river basin are located. The availability of water has sunk below the scarcity threshold of 1,000 cubic metres per capita per year in the upstream sub-river basins, where the population of the capital city is already depleting the groundwater for domestic uses (figure 4).

The findings in other river basins are similar. In the Panj-Amu river basin, which contains 7,412 cubic metres of water per capita per year (more than four times the water stress threshold), the lower Kunduz sub-river basin, which irrigates the grain basket of Af-

Figure 2 **Afghanistan is not water scarce, but the geographical distribution of water is significantly uneven**



Sources: Adapted from Government of Afghanistan (2008), Favre and Kamal (2004).

ghanistan, contains around 1,700 cubic metres per capita per year.[5] Although the latter amount is above the scarcity threshold, water is not as abundant as the overall picture of the river basin might indicate.

In the Harirod-Murghab river basin, 44 percent of the flow comes from the Bala Murghab sub-river basin, which contains only 17 percent of the irrigated land. The lower and upper Harirod sub-river basin, which includes 77 percent of the irrigated land and 66 percent of the population in the main river basin, receives only 52 percent of the water resources. The amount of water in this critical sub-river basin is still above the scarcity threshold, at an estimated 1,422 cubic metres per capita per year, but, nonetheless, the sub-river basin has 20 percent less water than the average in the entire river basin.

Afghanistan has sufficient water to satisfy all the needs of the population, but the resource is unevenly distributed within and across the country's five river basins.

An accurate hydrological map of the 34 sub-river basins would assist planners in understanding which hydrological areas of the country are water abundant and which are water scarce. However, a mapping project would require new, comprehensive data on water in the sub-river basins.

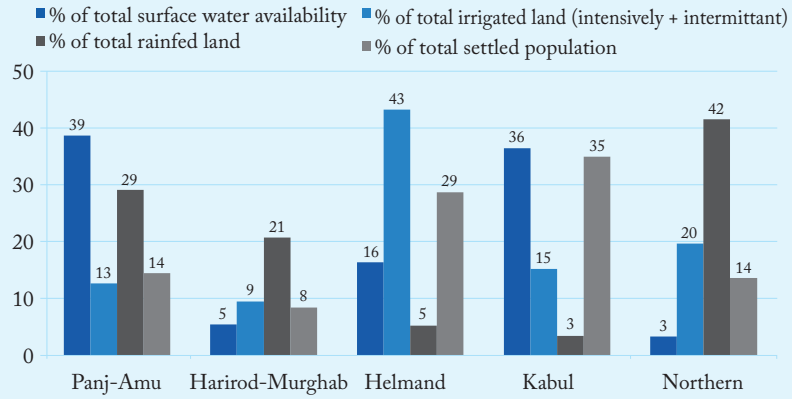
How much scope is there for the development of supply?

The water resources vulnerability index provides another perspective on water stress because it can be used to determine whether the development of water acquisition and supply is possible. It indicates the effectiveness of the exploitation of the water resources in a river basin. In this subsection, the index is examined in terms of surface water.

Figure 5 indicates that the Northern river basin is entirely exploited. This suggests that ecological requirements are not being respected. This may jeopardize environmental sustainability. Other river basins show low to medium exploitation, which indicates that the country's renewable water resources are far from being used to their full potential even if one takes into consideration the need to allow neighbouring countries to obtain some of the water.

Figure 3 **Afghanistan: a mismatch between agricultural land and the availability of water resources**

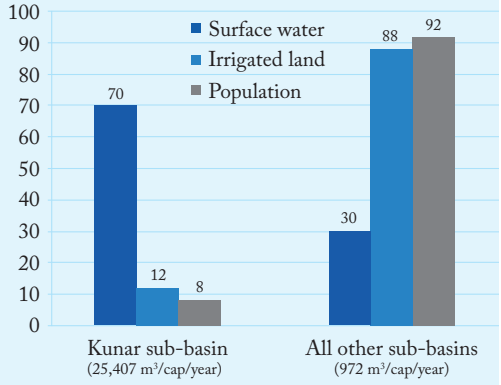
Distribution of surface water availability, irrigated land, rainfed land and settled population in the 5 river basins of Afghanistan (% of total)



Sources: Adapted from Government of Afghanistan (2008), Favre and Kamal (2004).

Figure 4 **Most of the water-abundant Kabul river basin consists of areas within the water scarcity threshold**

Distribution of water resource, irrigated land and population in the Kabul river basin (% of total)



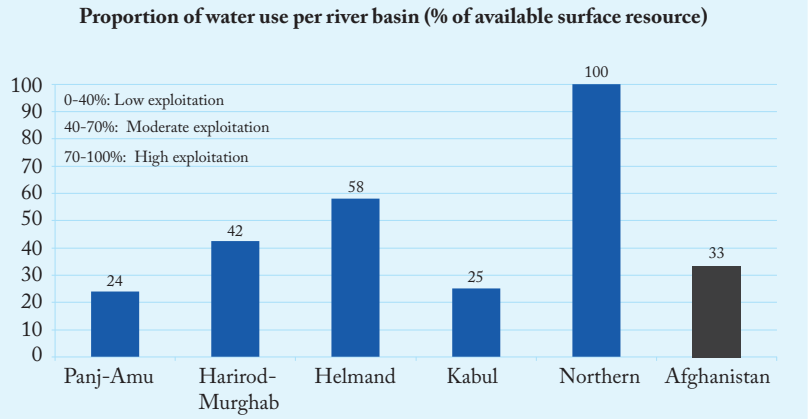
Source: Adapted from Favre and Kamal (2004).

The International Water Management Institute has introduced indicators of scarcity based on the ratio between water use and water availability. According to these indicators, countries in which less than 25 percent of the available river water is used for human con-

Afghanistan uses only 33 percent of its surface water resouces

sumption, but in which the populations suffer from malnutrition, are labelled economically water scarce. The governments of these countries would need to invest significantly in water infrastructure to ensure that resources are readily available. Countries in which more than 60 percent of river flows are allocated to agriculture, industry, or domestic uses are labelled approaching physical water scarcity. Countries in which more than 75 percent of river flows are so allocated are labelled physically water scarce.

Figure 5 The level of water stress varies widely across river basins



Source: Estimates based on data of Government of Afghanistan (2008).

Overall, Afghanistan fits most closely in the economically water scarce category. However, an examination of the five river basins shows that this category would only strictly apply to the Panj-Amu and Kabul river basins, although, in the case of the latter, the uneven distribution of resources within the basin would limit the potential of the basin. The Northern river basin, meanwhile, is clearly physically water scarce, while the Helmand river basin approaches this status.

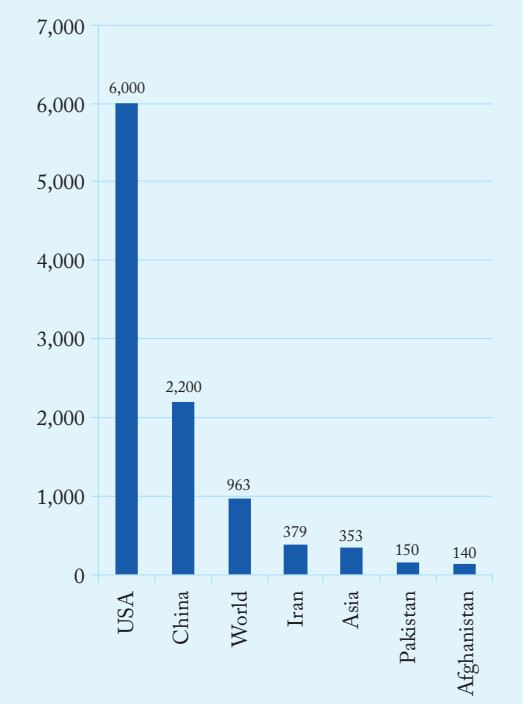
Though the definition of economic water scarcity is somewhat arbitrary, the index helps highlight how much water is available for human development.

Seasonal variations and the lack of storage capacity

Water is not a static resource, and its availability varies according to year and season. Surface water is occasionally abundant or overabundant, creating flood hazards, and, at other times, insufficient to meet demand. For example, the Kunduz River receives almost 60 percent of its annual runoff within only three months of peak snow-melt. The absence of proper storage facilities may pose a serious problem because the excess water cannot be stored to meet subsequent demand during periods when availability becomes limited.

Unfortunately, Afghanistan has the lowest storage capacity in the region and one of the lowest storage capacities in the world. It is estimated at 140 cubic metres per capita based on original infrastructure designs (figure 6). Yet, during 25 years of conflict, infrastructure has been poorly maintained, and, combined with a high siltation rate partly due to land degradation along the upper catchments, this has affected storage capacity, which has now probably fallen well below 100 cubic metres per capita.[6] This means that the country faces great technical obstacles in any effort to tap into potentially available water resources.

Figure 6 The water storage capacity of Afghanistan is among the lowest in the world



Sources: World Bank (2005), UNESCAP (2006).

In the absence of storage, the amount of water available in Afghanistan falls short of the value indicated in figure 2. Thus, the country must develop water storage capacity to make the most effective use of its internal resources. This must be planned in cooperation with other riparian countries and local communities and with a view to sustain the environment. Technical capacity will also have to be enhanced in water resource planning and infrastructure operation.

Scarcity, population growth and economic development

The constraints of geographical distribution, seasonal variation, lack of storage capacity and the necessity of sharing with neighbours do not entirely explain why the access to protected water sources is so limited and why irrigation is performing far below potential. Indeed, the demand for water for domestic uses stands at only around 20 cubic metres per capita per year, which is less than the total surface water availability by a factor of almost 140.[7] It appears that Afghans who lack access to domestic water and sanitation facilities are not affected by water scarcity in the physical sense, but suffer because water service delivery is poor or because of the issue of affordability.[8]

The way forward will therefore involve not only investment in supply infrastructure, but also the establishment of appropriate governance and collective management practices in river basins with a view to sharing water with neighbouring countries. The situation is urgent: the issue of water scarcity is bound to become more acute in the near future.

Development and economic activity as critical drivers of water scarcity

An estimated 80 percent of the water scarcity in the world can be explained by factors related to population growth and problems associated with economic development, while the remaining 20 percent can be explained by climate change (see section on climate change).[9] Indeed, as a country's population increases, so does the demand for water for food production, industry, energy and domestic uses. Even if Afghanistan's population growth rate slows, the decrease in the availability of water per capita would raise concerns about human development (see box 1).

It is imperative that the government undertake efforts to reduce demand (especially with respect to irrigation) and ensure that the management and distribution of resources are adequate, efficient and equitable. This will help lessen the threat of a population-driven scarcity scenario.

By 2025, Afghanistan's water availability per capita per year will have declined by approximately 36 percent relative to 2004. By 2040, it will have fallen by almost 50 percent

Box 1 Population-driven water scarcity

At an estimated 2.6 percent, the population growth rate in Afghanistan is currently the highest in the region. This will have a significant impact on the amount of water available for Afghan households. Even if the rate were to slow to less than 1 percent within four decades, a scenario anticipated by the US Census Bureau, projections point to a parched future, as follows:

In 2025:

- The Helmand river basin could fall below the scarcity threshold of 1,000 cubic metres per capita per year.
- The Northern river basin could fall below the absolute scarcity threshold of 500 cubic metres per capita per year.
- Countrywide, the availability of water per capita per year could decline to only slightly above the water stress threshold of 1,700 cubic metres per capita per year, a reduction of approximately 36 percent relative to 2004.

In 2040:

- Water availability could fall below 1,500 cubic metres per capita per year. The country may not have enough water to remain self-sufficient in cereal crops. More pessimistic predictions find the country dipping below this threshold by 2030.[10]
- The amount of available water per capita will drop by almost 50 percent relative to 2004.

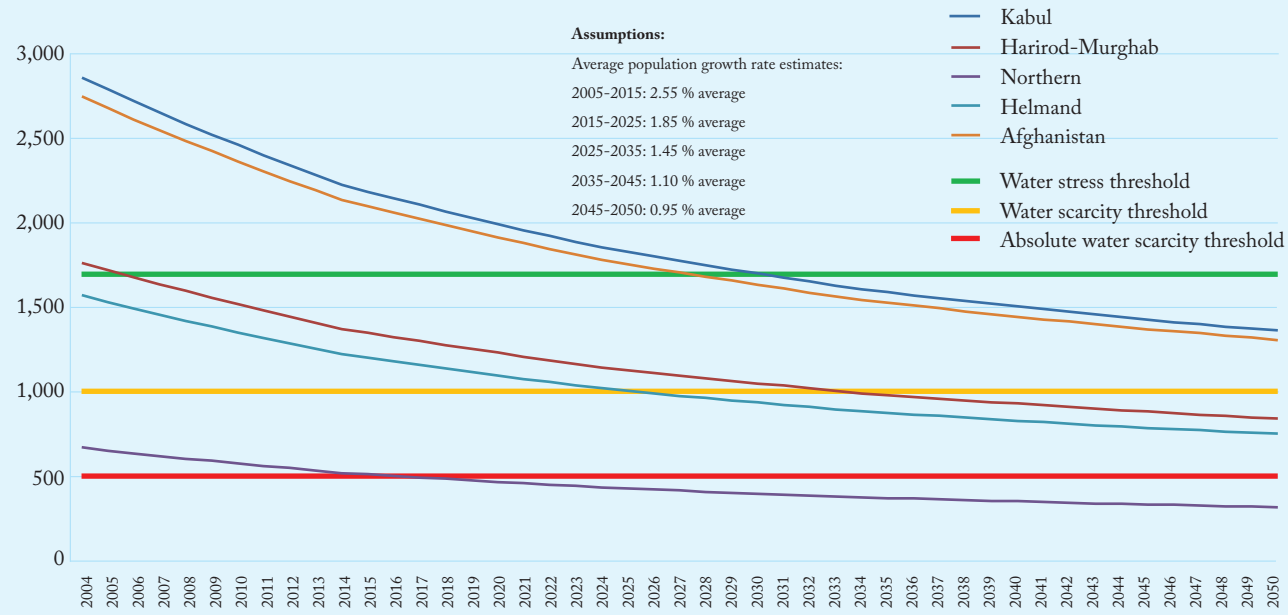
(continued on next page)

Box 1 Population-driven water scarcity

- The amount of available water in the Harirod river basin will decrease to slightly below the scarcity threshold of 1,000 cubic metres per capita per year, while the water supply in the Helmand river basin will decline to more than 15 percent below this threshold.
- At an estimated 355 cubic metres per capita per year, water availability in the Northern basin will fall to approximately 30 percent below the absolute scarcity threshold.
- The Kabul river basin is problematic because of the geographical distribution of the water resource (see figure 4 elsewhere above). Despite an overall positive outlook for availability per capita per year in decades to come, 87 percent of the basin area, accounting for 88 percent of the land and 92 percent of the population, will decline below absolute water scarcity by 2042.

By 2040, the availability of water per capita could decline by 50 percent relative to 2004

Projected water availability per capita in 4 river basins (m^3 per capita per year)



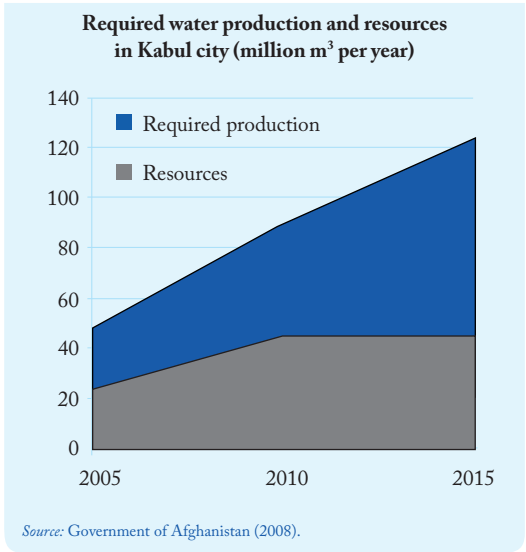
Note: Calculations of the baseline scenario assume 57 billion cubic metres of surface water availability. The Panj-Amu river basin is not shown because the related Falkenmark indicators are likely to remain high during coming decades. The estimates of the population growth rate are derived using the cohort-component method. The estimates in the census bureau database for various years (2005, 2015, 2025 and so on) have been averaged to arrive at the estimates for the various periods (2005–2015, 2015–2025 and so on). This approach has limitations, and the projections remain hypothetical, though they are best estimates.
Sources: Baseline population data: Favre and Kamal (2004); population growth estimates: International Data Base, US Census Bureau, http://www.census.gov/ipc/www/idb/country.php (accessed 26 April 2010).

Though the projections presented here are indicative and based on debatable assumptions, population growth will certainly be a major factor behind water insecurity and, thereby, food security and overall well-being. In fact, population pressure would represent an even more critical issue if current growth rates—an estimated 2.6 percent per year—are maintained over the next four decades. If this is the case, the country will fall below the water stress threshold by 2024 and below the water scarcity threshold by 2045. In 2050, the Helmand, Harirod-Murghab and Northern river basins would decline to 10, 24 and 58 percent, respectively, below the absolute scarcity threshold.

Urbanization is also critical in terms of water demand. This is because of the high concentration of people and the different lifestyles and aspirations of city dwellers. Among the consequences of the migration to cities is overloaded urban water supply and sanitation infrastructure (see chapter 3). For example, the sub-basins on which Kabul depends offer only limited surface water, and shallow groundwater is currently the most important source of drinking water, accounting for 85 percent of the total supply.[11] Several studies show that Kabul is already overexploiting the groundwater resource.[12] The Water Sector Strategy

reflects a more optimistic view.[13] Based on consumption of only 40 litres per capita per day, it estimates that supplies will be sufficient to meet demand until 2012 (figure 7). In any case, because of population growth, estimated at 3.8 percent in 2009, well above the country average, the need to develop alternative supplies of water for Kabul remains an urgent priority.[14] Indeed, projections indicate that six times more water will be required by 2050 owing largely to the effect of population growth and, to a lesser extent, climate change.[15]

Figure 7 **Kabul: demand for water will exceed supply beginning in 2012**



Source: Government of Afghanistan (2008).

The unregulated construction of deep tube-wells can cause groundwater levels to drop and lead to the drying-up of shallow wells nearby. One study shows that, over the last decade, the drilling of thousands of wells throughout the city has been associated with a drop of several metres in the water-table. Neighbourhoods are reporting water shortages as a result.[16]

Deterioration in the infrastructure for the delivery of water supply and sanitation also leads to a progressive decline in urban living conditions because of water shortages, pollution and unsanitary water, all of which are potential factors in an urban water and health crisis. This obliges city dwellers, particularly the poor, to pay private water vendors inflated prices for an increasingly scarce, but vital resource and could generate greater tension, especially during periods of drought.

In the master plan for the Kabul Metropolitan Area, among the candidate sites for the development of urban water supply infrastructure are the following:

- The exploitation of groundwater from the upper Logar and Panjshir fan aquifers.
- Surface water storage: four possible dam locations are being proposed, including the Gulbahar and Salang dams along the Salang and Panjshir rivers and the Shatoot dam on the Maidan River, one of five top priorities of the Ministry of Energy and Water; the related feasibility studies are under way.[17]

As urbanization continues apace, industries and municipalities will also ramp up their demand for water, which will result in increased competition with the agricultural sector. So far, more than 95 percent of Afghanistan's water resources are being used for agriculture. However, international trends suggest that non-agricultural uses may be expected to require a growing proportion of water resources. In South Asia, the share of non-agricultural users among all users is projected to rise from 5 to 25 percent by 2050.[18]

Afghanistan will undoubtedly experience such a trend. A recent two-year Kabul river basin water survey found that even the exploitation of deep underground water sources may not be sufficient to provide for all human and farming needs during coming decades.[19]

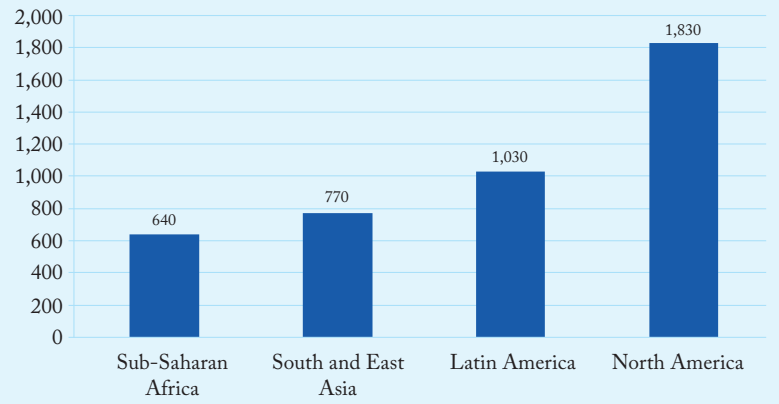
If the security and economic situation in Afghanistan stabilizes, the demand for water will inevitably soar as living standards improve and the population expands. If this were to happen, the Afghan diet will likely improve, and preferences will probably shift towards more water-intensive foodstuffs such as meat or rice. This could represent a serious obstacle to the sustainability of the water supply. For example, the production of a kilogram of wheat requires between 1,350

Although water is a renewable resource, it is only renewable within limits. As population increases, freshwater demand increases, and supplies per person inevitably decline

It will be increasingly difficult to feed the population if the decline in water availability per capita continues

and 1,500 litres of water, and the production of a kilogram of potatoes requires around 500 litres of water. Meanwhile, the production of a kilogram of sheep meat requires more than 6,000 litres of water, while the production of a kilogram of beef requires a minimum of 16,000 litres. The production of a kilogram of rice requires between 3,000 and 4,500 litres of water. Overall, while a typical South and East Asian diet would require around 770 cubic metres of water per capita per year, European and North American diets require more than twice this amount (figure 8).

Figure 8 **Local diet has an impact on the demand for water**



Source: Adapted from Gleick (2000).

What are the human development implications of increased scarcity?

The prospect of water scarcity in Afghanistan raises serious human development concerns. First, in coming years, it will be increasingly difficult to feed the population if the decline in water availability per capita continues. One outcome may be that growing quantities of commercial foodstuffs will have to be imported, and these imports will be subject to fluctuating market prices. Because the Afghan economy has been weakened, the country will be vulnerable to food price increases; witness the situation in 2008 (see chapter 4).

Second, assuming that the security situation improves, urbanization will expand, refugees will continue to return and the industrial and municipal demand for water will gather momentum. As water availability per capita declines, competition among agricultural, industrial and domestic uses will inevitably rise, as has already been witnessed elsewhere in developed and developing countries alike.

How and by whom water resources are allocated has a tremendous impact on the equitability of human development. A decline in the availability of water per capita means that water governance must improve markedly to ensure fair allocation across all users and sectors.

The most vulnerable should not systematically lose out in this process. Failing to anticipate the consequences of the mounting pressure on resources will most certainly lead to an all too familiar situation. Households that are heavily dependent on agriculture, but that do not have secured water rights, economic power and political influence will be the first to lose out.

In a scenario of business as usual, the Kuchis (nomadic pastoralists) will face greater challenges in securing water for their livestock. Small farmers living at the tail reaches of irrigation canal systems or close to urban centres such as Balkh, Herat, Kunduz, and other major cities could face difficulties in achieving recognition of their water rights relative to wealthier, more well situated farmers and in the face of growing municipal and industrial demand.

The landless, whose connections with influential landowners are already tenuous, may be unable to obtain work as farm labourers, which means they would have to find other types of employment. This is a serious concern in a country in which unemployment is pervasive and few alternative or sustainable livelihood opportunities exist.

As surface water becomes scarce, more farmers will begin to extract groundwater. In the absence of strong governance, including the enforcement of regulations, it is likely that farmers will deplete resources. Those who cannot afford to extract groundwater in a context of surface water shortages will see

their yields reduced or will become increasingly reliant on rainwater, which will render them more vulnerable to drought.

In the scarcity equation, the environment is often the biggest loser. The deterioration of the Hamoun wetlands in the Sistan depression between Afghanistan and Iran in the early 2000s not only disrupted the livelihoods of communities located there, but was also a reminder that extreme scarcity, combined with poor management, can lead to environmental, economic and social disaster (box 2).

Groundwater resources: preventing over exploitation and safeguarding quality

Early signs of depletion

Groundwater is the primary source of drinking water for millions of Afghans. Traditionally, this resource has also been used to support local agriculture. An estimated 16 to 22 percent of the total irrigated area in the country is supplied by groundwater sources, including springs, wells and *karezes* (box 3).[20]

Currently, a lack of comprehensive databases and extensive monitoring systems means that it is difficult to know what constitutes a safe water-extraction rate, that is, whether groundwater is being used sustainably. While a 1996 study estimated the available ground-

Box 2 The Hamoun wetlands: when scarcity and poor management intersect

For the past 5,000 years, the Hamoun wetlands have been a major source of food and shelter for the people of Central Asia. Located on the border of Afghanistan and Iran and fed by the Helmand River, the 2,000-square-kilometre wetlands once formed an oasis at the epicentre of a vast arid plain.

The Hamoun was once one of the few sources of fresh water for hundreds of kilometres and home to numerous species of plants and animals that populated its reed-clogged shallows. Nearly 140 species of fish darted among the waters of Hamoun. The area was a major stopover for many types of migrating birds, such as flamingos, ducks and pelicans. Fox, otter, deer and leopards all foraged along the wetland banks.

Until recently, human inhabitants lived mostly in harmony with the region's teeming wildlife. The wetlands were the centre of a unique culture. Most families were almost entirely dependent on hunting, fishing and farming. Ranchers tended more than a million domesticated animals (cattle, goats and sheep) that wandered throughout the region, while farmers cultivated a wide range of fruits and vegetables, including wheat, barley, millet, cotton, sugar cane, grapes and melons.

The 20th Century witnessed a major surge in population, alongside the rapid expansion of irrigation systems throughout the wetlands. Unregulated development, coupled with a prolonged drought during the late 1990s and early 2000s, was too great a shock.

As the Hamoun wetlands withered into lifeless salt flats and decaying reed stands, the wildlife, towns, fisheries and fields disappeared, leaving nothing behind, except a dried wasteland. The local fish and bird populations all but disappeared. Most of the crops shriveled in dustbowl conditions, and hundreds of thousands of livestock were lost. As many as 100 towns were eventually submerged by windblown sands, and all the fisheries were forced to close. As with the Aral Sea disaster, many who had lived in the Hamoun for generations either moved away or lost everything.

Source: Adapted from UNEP (2006).

Box 3 Karezes: ecologically sustainable, but highly vulnerable traditional groundwater use systems

A kareze is a man-made groundwater extraction structure used to irrigate fields and provide water for livestock and other uses. Most are constructed within the alluvial fans located in the foothills of Afghanistan's valleys and were likely first developed in the Middle East some 3,000 years ago. Considerable numbers are still in use in China, North Africa and Western Asia.

To construct a kareze, a farmer first digs a mother well at the upper part of the valley. Next, he excavates a horizontal channel and, every 20 to 30 metres, digs vertical access shafts for the removal of rubble and for ventilation and lighting (see the figure).

Reportedly, there are 9,370 karezes in Afghanistan. Most are located in the south and western parts of the country (see the figure). The largest number, 2,112, are located in Ghazni Province. Most karezes (82 percent) are community managed; only 18 percent are privately owned. Some karezes reach a length of more than 20 kilometres. The area of agricultural land that can be irrigated by a kareze varies from 10 to 200 hectares; the average is 50 hectares.

Among the many advantages of the kareze system is ecological sustainability. Karezes naturally maintain groundwater balance and are not detrimental to underground reservoirs. Modern pumps are not as sustainable because they allow for the withdrawal of water on demand, regardless of whether the water can be replenished.

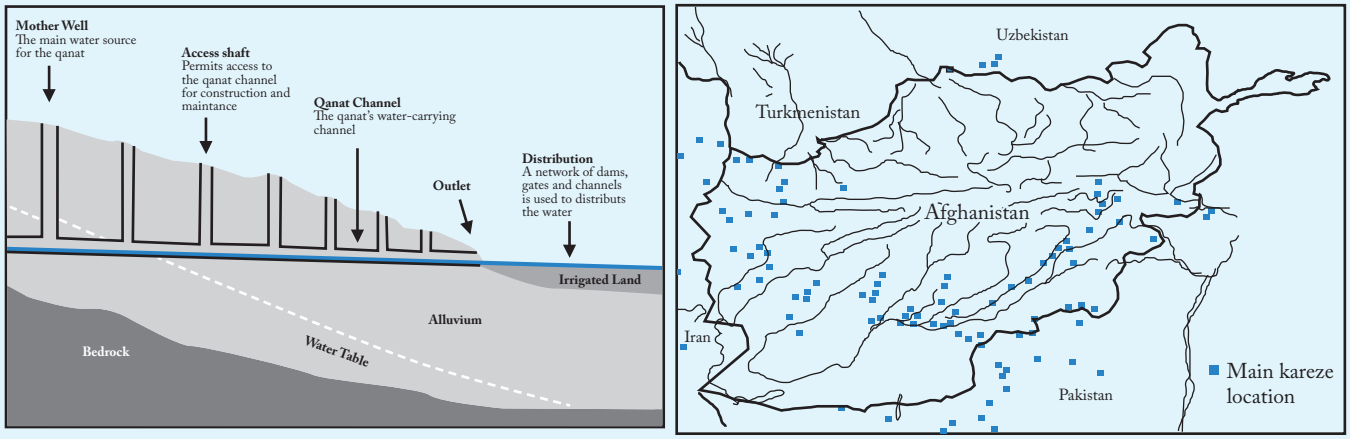
Karezes require significant maintenance, however, and, through lack of maintenance, some have become dysfunctional. Moreover, the widespread introduction of tube-wells has led to groundwater depletion, causing many karezes to dry up.

(continued on next page)

Box 3 Karezes: ecologically sustainable, but highly vulnerable traditional groundwater use systems

Advantages	Disadvantages
There is no need for mechanical devices to extract water.	Cleaning work is extremely laborious, difficult and risky.
Karezes are a sustainable system of groundwater extraction because they never overexploit the aquifers.	The technology cannot provide sufficient water for large-scale agriculture.
They are closely linked to the local community and its ability to plan and manage resources.	It is somewhat difficult to control the flow and prevent water wastage. However, surplus water can be stored in water pools and wetlands and used when needed.
Community institutions manage both the maintenance of the karezes and water sharing. The system has the benefit of in-built equity.	The system is highly vulnerable to the drilling of deep wells within the same catchment area.

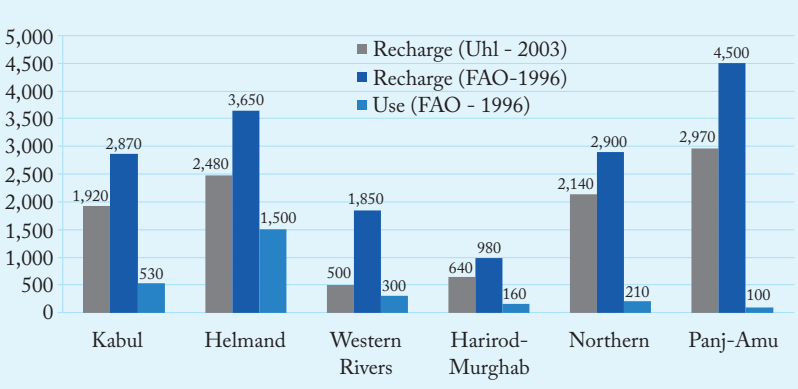
Left: Lateral profile of a kareze. Right: Most karezes are located in southern and eastern Afghanistan



Sources: Favre and Kamal (2004), Shobair (2007), Hussain et al. (2008).

water at approximately 18 billion cubic metres throughout the country, more recent research in river basins has produced much lower estimates, at 10.6 billion cubic metres aggregate.[21] Nonetheless, relatively recent studies provide an overview of the resources available in river basins (figures 9 and 10).

Figure 9 Differences across estimates of groundwater recharge and irrigation water use in aquifers



Source: Based on Uhl (2003).

As with surface water, the availability of groundwater appears to vary greatly depending on geographical factors. Basins such as those fed by the Northern and Panj-Amu river systems offer a high potential for supplementary irrigation and more reliable access to domestic water. However, in the Kabul, eastern Helmand and Western river basins, water resources have started to decline or offer only limited potential.[22] In fact, water is being extracted more rapidly than the rate of recharge, especially in the case of unconsolidated aquifers from which shallow wells, karezes and springs are all extracting groundwater (figure 10).[23]

The extended period of drought that lasted from 1998 to 2002, coupled with a dry year in 2004, affected the availability of groundwater. Nonetheless, drought is not the only reason why karezes and wells are drying up. More recently, Afghans have begun relying on deep drilling to extract wa-

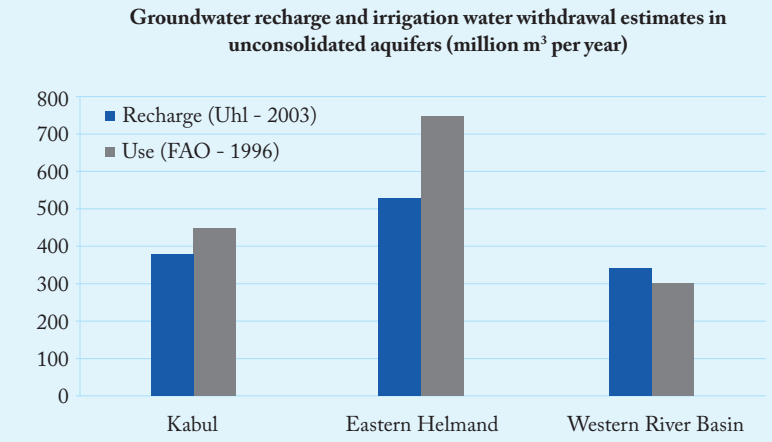
ter for irrigation. This phenomenon is being reported in the Ghazni, Kabul, Logar and Tarnak river valleys.[24] Farmers, sometimes with the support of well-meaning non-governmental organizations, have drilled hundreds of new high-yield motor-driven wells and boreholes. The private sector has also constructed considerable numbers, despite the fact that local drilling companies are not sufficiently equipped with the technical skills necessary to ensure quality and develop sustainable groundwater resources.[25] As a result, the water-table is dropping, and this development is associated with the drying-up of surrounding shallow wells and karezes. Figure 11 shows the cumulative impact of several years of drought and the uncontrolled expansion of deep tube-wells.

Over exploitation is also a concern because it widens inequalities. Lying at the core of sustainability is the notion that resources are managed so that we may use resources today without eroding the assets we pass along to future generations. The core challenge of water governance is to balance water use and demand so as to maintain environmental integrity.

In Afghanistan, the Water Law requires a permit for deep well drilling. This should help limit uncontrolled development. In 2007, the Supreme Council for Water Affairs and Management adopted a comprehensive groundwater management policy. Although the council recognizes groundwater as a strategic resource, its ability to implement and enforce this mandate remains limited.

As water-tables fall, the energy required to pump water typically rises, along with the associated costs of digging or deepening wells. While wealthier farmers can dig deeper and pump more, the burden on poorer farmers becomes insurmountable, which allows the former to develop groundwater market monopolies.[26] In addition, as water-tables sink, environmental degradation becomes a serious issue because uncontrolled drilling often leads to the contamination of aquifers.

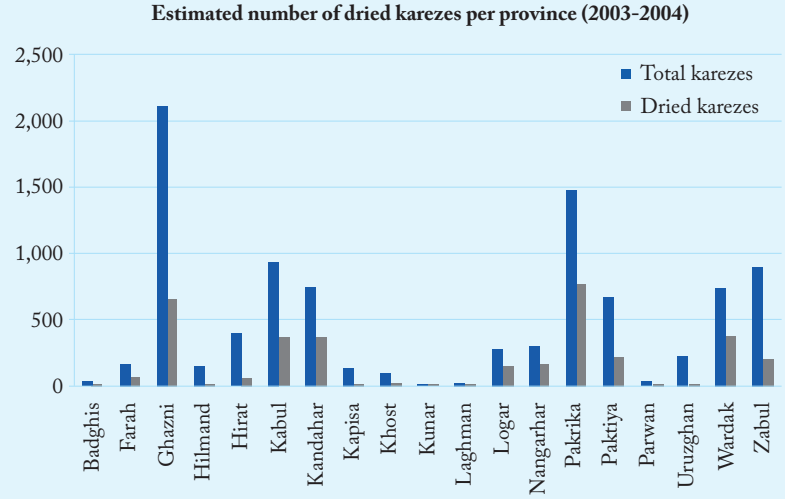
Figure 10 **Some aquifers are already depleted**



Source: Uhl (2003).

Samples taken from water sources in Badghis, Ghazni, Herat, Wardak, Zabul and, especially, Kandahar show that prolonged irrigation with groundwater can also cause soil salinization if drainage is inadequate.[27] In neighbouring Pakistan, long-term groundwater depletion has gone hand-in-hand with soil salinity, which now affects 36 percent of groundwater resources. By reducing productivity, salinization compromises rural livelihoods.[28] However, in Afghanistan, irrigation with groundwater is still relatively limited. Most farmers rely

Figure 11 **Many karezes have dried up because of drought and the uncontrolled expansion of tube-wells**



Source: Data of S. S. Shobair, Food and Agriculture Organization of the United Nations, 2007.

Quantity should not be seen as the only benchmark in measuring water scarcity. Quality also has an impact on the availability of water

on surface water. This is likely to change as demand increases and pressure on surface water mounts. The drying-up of sustainable traditional groundwater extraction methods such as karezes should be considered an early and alarming sign of bad practice.

The issue of water quality

Quantity should not be seen as the only benchmark in measuring water scarcity. Quality also has an impact on the availability of water. If poor water quality poses unacceptable risks to health, agriculture and the viability of soil, the water becomes *de facto* unavailable for consumption.

Local indicative studies raise serious concerns regarding groundwater quality in many parts of the country, but particularly in the capital city. Historical analysis suggests that, over the last 50 years, the quality of water in the Kabul basin has significantly deteriorated because of an increase in concentrations of salt (electrical conductivity), nitrate and sulfates and an increase in contamination by faecal bacteria.[29]

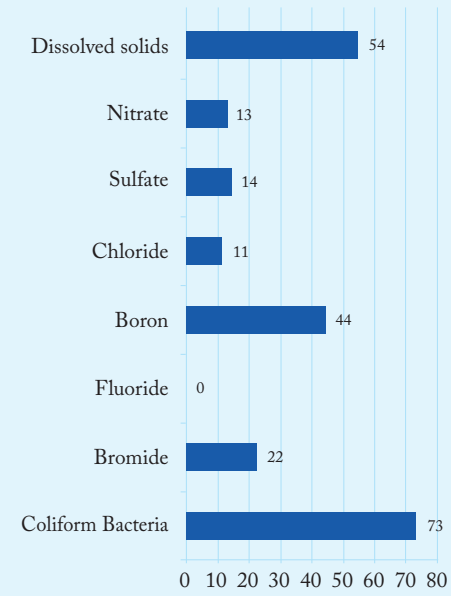
This is borne out by a number of surveys conducted in 2004 that show that 22 percent of sampled points in the Kabul basin present a level of E. coli higher than the United States Environmental Protection Agency and World Health Organization limits (figure 12). High levels have also been discovered, though not quite as bad, in other monitored wells in 16 provinces. These are being blamed for outbreaks of intestinal disease. Nitrate levels exceed the limits in more than 10 percent of the wells studied, and contamination is being blamed for outbreaks of intestinal diseases that are particularly harmful to children.

Other studies undertaken in 2005 confirm the findings. The studies found that 42 percent of the wells sampled were contaminated with unacceptable levels of nitrate (figure 13). Similarly, the high sulfate content found in 13 percent of the samples can lead to fluid loss and can exacerbate symptoms of intestinal disease in children (see chapter 3 for more details on the impact of poor water quality on health).

Whether in rural or peri-urban areas, agriculture can also be at risk. Although farmers usually irrigate with surface water, high levels of dissolved solids, electric conductivity and boron, especially in the Kabul basin, mean that water is not suitable for farming, including for the cultivation of vegetables. This places a particularly heavy burden on marginalized families, particularly woman-headed households, that rely on small gardens for home consumption and for the market. High boron content causes liver, stomach and kidney problems (see chapter 3). Thus, if water quality is taken into account, the potential for groundwater use is much more limited than quantitative estimates might suggest.

Considerable effort needs to be taken to map the quality of groundwater resources comprehensively and continuously. Accu-

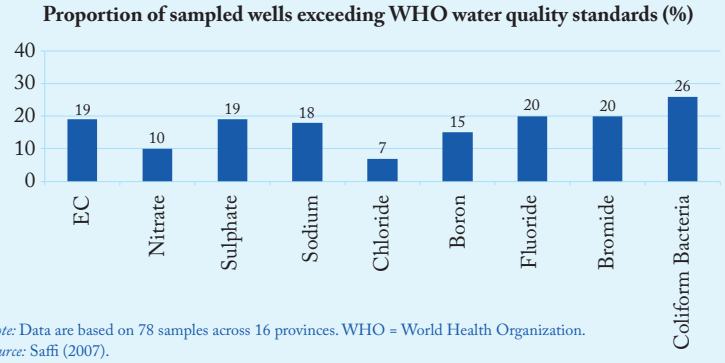
Figure 12 **A large numbers of wells in the Kabul river basin are contaminated**



Note: Data are based on a sample of 108 wells tested between July and November 2004. USEPA = United States Environmental Protection Agency.
Source: Based on Broshears et al. (2005).

rate information can have a tremendous impact on the design of surface and groundwater development projects. Currently, Afghanistan lacks the capacity to assess properly and monitor regularly the quality and surface variations of groundwater resources because of a shortage of laboratory facilities, testing equipment and trained personnel. All three are important in mitigating the risks of poor drinking water and ensuring the productive use of irrigation water.

Figure 13 **A large share of wells in 16 provinces are contaminated**



Note: Data are based on 78 samples across 16 provinces. WHO = World Health Organization.
Source: Saffi (2007).

Water Resources Management: The Transboundary Challenge

Afghanistan shares most of its rivers with neighbouring countries. Managing this interdependency is a great challenge, but one that could provide water security and yield other benefits for human development. The country's reconstruction requires water resources to be developed, including through large-scale infrastructural projects. Afghanistan's capacity to deal with transboundary water management will be critical in this effort.

Transboundary disputes occur, but cooperation is the norm

As water becomes scarce relative to demand, the transboundary competition for the water in shared rivers will likely grow. In the absence of institutional mechanisms designed to respond to these challenges, this could lead to conflict. Yet, the historical record shows that countries are more likely to cooperate in settling disputes. Over the last 50 years, only 37 serious disputes have arisen worldwide; approximately 200 treaties have been negotiated and signed during this period.[30] Wrangles over water rights should therefore not necessarily be seen as a prelude to violence. Political will, backed by strong institutional mechanisms, has been the key to reaching mutually beneficial agreements.

General principles in transboundary water sharing

In recent decades, there has been an effort to adopt international conventions on water sharing, but no single principle has been accepted worldwide. Institutions, laws and norms are usually less well defined in transboundary water governance than in the governance of domestic water resources. In the current debate over transboundary water sharing, governments are relying on sometimes contradictory international practices and conventions. Examples of customary international water laws and conventions are outlined in box 4.

According to territorial sovereignty, an international customary principle, a state should be free to use the water resources in its jurisdiction without regard to any consequences beyond its borders as long as there is no intervening legislation. However, in arguing against this principle, downstream states

Box 4 International public law related to the non-navigational use of shared water resources

International conventions

- The Convention on the Protection and Use of Transboundary Watercourses and International Lakes obliges parties to prevent, control and reduce water pollution. The convention was adopted in Helsinki in 1992 by the United Nations Economic Commission for Europe and entered into force in 1996.
- The Convention on the Law of the Non-navigational Uses of International Watercourses represents a foundation for a broad agreement among states on the general principles relating to equitable and reasonable resource use, ecosystem protection, management obligations, information sharing, conflict resolution, the protection of water resources during armed conflict and the duty not to cause significant harm. The convention was adopted by the United Nations General Assembly in 1997 and is not yet in force.

International custom

Customary international water law provides a set of rules that reflects the following principles:

- According to the principle of restricted territorial sovereignty, a state should be free to use the water resources in its jurisdiction.
- According to the principle of prior appropriation, established past use of water creates a right to similar future use.
- According to the principle of the prohibition of substantial injury in the territory of a co-basin state, a state is responsible for any disruptions in water supply or water quality that could affect another state sharing the water. Should damage occur, the state responsible for the damage is obligated to pay compensation to the injured state.

Judicial decisions

One of the most important judicial decisions on the non-navigational uses of international watercourses reflects the principle of restricted territorial sovereignty. This principle is increasingly being recognized in the use of shared watercourses as are the other principles mentioned above.

Sources: Based on WWAP (2003), UNDP (2006).

sometimes cite the principle of prior appropriation, according to which established past use creates a right to future use.[31] In practice, most governments accept that absolutist approaches to water rights are unlikely to guide sustainable and mutually beneficial policies.

In a declaration that complements the Helsinki Rules on the Uses of the Waters of International Rivers, which were adopted in 1966, the 1997 United Nations Convention on the Law of the Non-navigational Uses of International Watercourses attempts to address these shortcomings by outlining the principles on which riparian states could share water. These are the principles of equitable and reasonable utilization, no significant harm, and prior notification of works.

International watercourse governance mechanisms appear to seek to take into account the effect that water use has on other countries, the availability of alternative water sources, the size of the population affected, the social and economic needs related to watercourses, and the conservation, protection and development of watercourses.[32]

The application of these principles is hampered by difficulties mainly because of a lack of practical guidance on the resolution of competing claims. Furthermore, the conventions fail to provide practical enforcement mechanisms. Yet, they still outline principles that remain central to human development and could provide the guidelines necessary to plan for future initiatives involving Afghanistan and riparian countries.

The context of transboundary water sharing by Afghanistan

The vast majority of rivers in Afghanistan are fed by precipitation and the seasonal melting of snow and glaciers located within the country's borders. Nonetheless, with the exception of the Northern river basin, the main rivers are shared

with neighbouring countries. This makes transboundary issues difficult to ignore.

Table 3 summarizes existing treaties with riparian countries that share various river basins, as well as recent initiatives to promote dialogue and cooperation. Among the four river basins shared with neighbouring countries, only one, the Helmand, is the subject of a formal treaty.

The Kabul river basin has become problematic. Recent attempts to explore the possibility of a bilateral treaty with Pakistan has yielded little progress even as pressure mounts to develop a reliable supply of clean water for the capital city (see table 3). Because this will likely require the construction of reservoirs, it is important that Afghanistan and Pakistan search for a cooperative solution.

Growing demand and other key challenges

While Afghanistan only uses an estimated 33 percent of the water flowing within its borders, Iran and Pakistan are currently experiencing significant water stress. Each already exploits

Table 3 **Treaties and recent initiatives in the transboundary river basins of Afghanistan**

River Basin	Riparian countries	Area of the country in basin (%)	Treaties with Afghanistan	Recent Initiatives
Aral Sea[a]	Kazkhstan	34.46	June 1958: Protocol between the USSR and Afghanistan concerning the joint execution of works for the integrated utilization of the water resources in the frontier section of the Panj-Amu	None
	Uzbekistan	31.07		
	Tajikistan	11.02		
	Kyrgyzstan	9.07		
	Afghanistan	8.52		
	Turkmenistan	5.68		
	China	0.15		
	Pakistan	0.01		
Helmand	Afghanistan	44.3	March 1973: A transboundary water allocation treaty was signed by Afghanistan and Iran and approved by the parliaments of both countries. The treaty allocates a discharge of 22 cubic metres per second of Helmand River water to Iran and permits Iran to use an additional 4 cubic metres per second as a good will gesture. Other clauses stipulate a variation on this for dry periods and wet periods. Afghanistan is obliged to avoid polluting the water to such an extent that it becomes unsuitable for agriculture.	Afghanistan and Iran have recently established a common Helmand River Commissioners Delegation aimed at facilitating cooperation with respect to flood control on the Helmand River. Since 2003, constructive efforts have been made by Afghanistan and Iran for the rehabilitation of Hamoun Lake, in collaboration with the United Nations Environment Programme and the Global Environmental Facility.
	Iran	38.2		
	Pakistan	17.4		
Indus	Pakistan	52.48	None	2003: A nine-member technical committee, led by Pakistan, initiated the drafting of a water sharing treaty with Afghanistan. The attempt failed due to a lack of data. 2006: The World Bank offered to mediate a new bilateral treaty. This offer did not lead to renewed dialogue.
	India	33.51		
	China	6.69		
	Afghanistan	6.33		
	Chinese control (claimed by India)	0.84		
	Indian control (claimed by China)	0.14		
	Nepal	0.00		
Harirod / Murghab	Afghanistan	44.31 / 59.79	None	Iran has indicated readiness to cooperate on a trilateral basis with Afghanistan and Turkmenistan. A cooperation framework has yet to be developed. Iran and Turkmenistan built the Dostluk dam on the Harirod River without consulting with Afghanistan.
	Turkmenistan	17.41 / 40.21		
	Iran	38.27 / 0		

a. Includes the Panj-Amu and Northern river basins.
Sources: Based on UNDP (2006); Favre and Kamal (2004); King et al. (2010).

Afghanistan requires storage and infrastructural capacity and other support to alleviate the country's water scarcity problems and offset climate shocks

more than 75 percent of their water resources.[33] The amount of water available per capita in these countries is also lower than the corresponding amount in Afghanistan: in Iran, less than 1,400 cubic metres per capita per year and, in Pakistan, below 1,200 cubic metres per capita per year.[34] In Pakistan, high population growth is exacerbating this critical situation. The water scarcity in neighbouring countries is indirectly affecting Afghanistan because the water flowing into these countries originates or flows through Afghanistan first.

Transboundary environmental issues are also a major concern. Rivers fed by or originating in Afghanistan feed both the Sistan wetlands (straddling Afghanistan and Iran) and the Aral Sea.

Afghanistan requires storage and infrastructural capacity and other support to alleviate the country's water scarcity problems and offset climate shocks. New dams will also be necessary if the living standards of Afghans are to improve and if the country is to possess a sustainable source of energy. The current energy infrastructure falls far short of current and future needs.[35] The government is attempting to grapple with the crisis by investing in medium- to large-scale water storage infrastructure. It has identified at least 31 major infrastructural projects, including the construction of 15 storage dams at an estimated total of almost $10 billion.[36] These projects would provide for multiple uses: water for domestic use, irrigation, power, flood control, industry, recreation, groundwater recharge and environmental enhancement. In most cases, however, the new infrastructure will require agreements with neighbouring countries and possibly the donor community to determine the best ways to manage shared resources.

Strengthening engagement with regional partners and institutions

One of the most relevant lessons learned from water management in the 20th Century is the importance of institutions that can facilitate effective transboundary water management and engage disputing countries in preventive hydro-diplomacy.[37] Experience around the world has shown that, in the absence of viable institutions, shifts in water use and water availability can generate conflict. If water development projects are undertaken without regional cooperation, tensions may increase among nations and lead to regional instability. Although open warfare is unusual in such situations, tensions can smolder for years, triggering delays that Afghanistan can ill afford, especially considering looming shortages and recurrent floods and drought.[38]

For many years, Afghanistan has not been part of any platform directly involved with transboundary issues, and its interests have not been recognized.[39] Over the past few years, some progress has been made. Thus, for example, a protocol was signed with Tajikistan, Afghanistan joined the Abu Dhabi Group for Himalayan Water and a dialogue has been ongoing with Iran over the Helmand River. Yet, these steps are limited. Meanwhile, it is the responsibility of the government to engage actively with regional powers, and, to be able to negotiate confidently towards beneficial outcomes, the government will need to overcome a certain number of additional challenges, including gaps in information and expertise.

The information and expertise gap

Afghanistan's disinclination to engage in a regional dialogue about water can be attributed, in part, to the limited available hydrometeorological data, including the data that were lost or not collected during 30 years of war.[40] Reliable data are necessary for the development and implementation of water sharing agreements. Although the Ministry of Energy and Water is planning to establish 174 hydrometric stations, of which 100 are already functional, it will take time before new data can be analysed properly.[41]

In addition, Afghanistan lacks qualified staff. Hydrological expertise, a strong knowledge of international law, and an ability to negotiate in international forums are among the

skills necessary to engage confidently in transboundary water management discussions.

Under these circumstances, Afghan officials are justifiably concerned that they are disadvantaged in international discussions, including regional water cooperation negotiations.

Asymmetric power relations

Because of a lack of institutional capacity, the government cannot negotiate water agreements on an equal footing with neighbouring countries. Although Afghanistan occupies a superior negotiating position because it is the most upstream country, Iran and Pakistan benefit from stronger central governments and greater diplomatic influence.

Lessons learned during previous negotiations suggest that power inequities, in addition to differences in technical expertise, represent a disincentive to engage in discussions on the management of transboundary water resources. In discussions between India and Pakistan, for example, asymmetry has been cited as a key reason why the Indus Waters Treaty was delayed for so long.[42] The positive, active and continuous involvement of a third party, namely, the World Bank, played a key role in encouraging progress in the discussions.

In summary, Afghanistan has the legitimacy to develop water management infrastructure, but must overcome numerous constraints. The government needs to continue participating in dialogue to reach mutually beneficial agreements. It must also take responsibility for initiating dialogue with other riparian countries. At the same time, the international community should be ready to offer technical and financial support to assist Afghanistan to engage as an equally empowered partner.

Risks and Uncertainties: The Threat of Drought and Floods

Beyond scarcity, Afghanistan also faces risks and uncertainties because of recurring floods and drought. As a consequence, Afghans regularly suffer from food shortages, displacement, out-migration, land degradation and conflict. The country's vulnerability to drought derives from a combination of local factors not all of which are climatic. Prolonged and recurrent periods of drought have severe impacts due to the significant infrastructural and socio-economic vulnerability to climate shocks. Land degradation, coupled with the expansion in the number of human settlements located in risk areas, has increased the economic and environmental effects of floods.

Drought

What is a drought?

"Drought is a natural but temporary imbalance of water availability, consisting of a persistent lower-than-average precipitation, of uncertain frequency, duration and severity, of unpredictable or difficult to predict occurrence, resulting in diminished water resources availability, and reduced carrying capacity of the ecosystems."[43]

Drought is not restricted to arid and semi-arid or water-scarce areas; it may occur in all climates and can evolve slowly and exert an impact spanning up to several years.[44] Droughts are usually classified as meteorological, hydrological, agricultural, or socio-economic (box 5).

The frequency of meteorological drought

Meteorological drought, which occurs in all arid and semi-arid areas of the world, is frequent in Afghanistan, as follows:

- Localized drought occurs every three to five years.
- Countrywide drought occurs every 20 to 30 years.[45]

An analysis of oral history and past rainfall

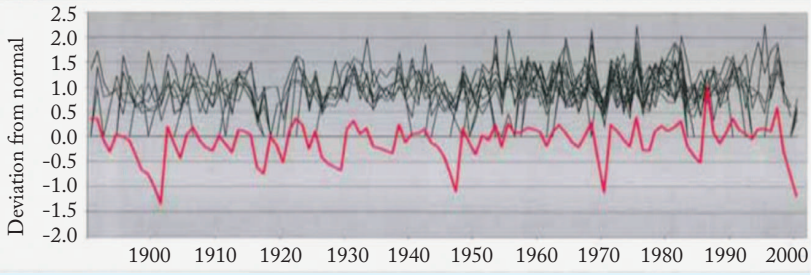
Box 5 The four types of drought

- A meteorological drought is usually associated with the degree of dryness (relative to a normal or average amount) and the duration of the dry period (usually a prolonged period of precipitation that is below average).
- A hydrological drought occurs if rivers or water reserves in lakes, reservoirs and aquifers fall below an established statistical average, usually following upon a meteorological drought. However, a hydrological drought may also occur during times of average precipitation if the demand for water is high and increased use has lowered water reserves.
- An agricultural drought is determined by the amount of moisture in the soil. Normally, an agricultural drought occurs during dry, hot periods of low precipitation, but it may also take place during periods of average precipitation if soil conditions require extra water.
- A socio-economic drought is brought about by a combination of meteorological, agricultural and hydrological drought. Socio-economic drought occurs if the water demand exceeds the water supply as a result of weather-related shortfalls in supply.

data in Afghanistan and neighbouring Central and Western Asian countries reveals that the region has experienced four severe regionwide periods of drought during the past century: in 1898–1905, 1944–1945, 1970–1972 and 1997–2004 (figure 14).[46] This confirms that extreme drought occurs every 30 to 40 years.

Above average rainfalls in 2003, 2005, 2007, 2009 and 2010 helped shore up the declining average (for example, in the early years of this decade) and bring it closer to normal, despite the years 2006 and particularly 2008, when average rainfall was below long-term averages. The 1998–2002 and 2008 droughts were considered the most severe in Afghanistan's climatic history and were reminiscent of the severe drought in 1898–1905 or the "Persian famine" of 1872 which was particularly severe in Herat and Afghan Turkistan.[47]

Figure 14 Afghanistan and the region experienced four severe droughts during the last century



Note: The black lines indicate long-term rainfall data from various regional stations. The red line indicates cumulative above- and below-normal totals.
Source: MRRD (2004).

The human development costs of drought

While the severity of a drought may be quantified in terms of the loss in crop production, the impact on people's lives is reflected in livelihood strategies and risk management arrangements. Drought has been shaping livelihoods towards diversification for centuries. Yet, despite the resourcefulness of people, the human development effects of drought are recurring and significant.

> "The drought is worse than the 30-year war. At least you could escape the war, but there is no way to escape the drought."
>
> A resident in Wardak Province

Declines in crop production and increases in prices and in food insecurity: In 2008, lack of rain, compounded by below normal snowpack, caused wheat production to decline by 40 to 55 percent countrywide (figure 15).[48] If it is evaluated against data on 2007, which is considered a normal year, the impact of drought was felt more strongly in rainfed areas (an 85 percent reduction) than irrigated areas (a 16 percent reduction). This means that households without access to irrigation, which are usually the poorest and most vulnerable, were the most severely affected.

The effect of the 2008 drought on crop production is illustrated in figure 16, which shows the results of a normalized difference vegetation index analysis comparing biomass production in August 2007 and August 2008.[49] The sharp decrease in the index values throughout the region, which is usually referred to as the grain basket of Afghanistan, provides a global picture of the impact.

This crisis was greatly aggravated by disruptions in the regional grain trade in the form of export bans and illegal taxation, increased conflict on major trade routes along the Pakistan border and a significant rise in global food prices.[50] The decline in the availability of wheat triggered a 200 percent jump in the retail price in most markets.[51] During the same period,

the price of livestock fell by 40 to 70 percent because of a combination of high wheat prices and a lack of grazing land.[52] An estimated 4.5 million people required food aid.[53]

> "In all my life, I have never seen anything as bad as this. We should have harvested over a ton of wheat, but we've only managed to get a 10th of that this year."
>
> 80-year-old Sayed Shah of Saighan Valley, Bamyan Province, 18 October 2008

Source: Report of BBC News.

Because of the 1998–2002 drought, rainfed wheat production fell by 40 percent in 2001 compared with 2000, which was already characterized by extremely low output. A local study undertaken in Helmand and Kandahar following the 2001 drought period estimated that wheat production had dropped by 40 percent relative to an average year and that orchard production had dipped 50 to 75 percent. Similarly, the dry year in 2004 caused wheat production to plummet by 47 percent overall, including a 68 percent decrease in rainfed production and a 38 percent decline in irrigated production.[54]

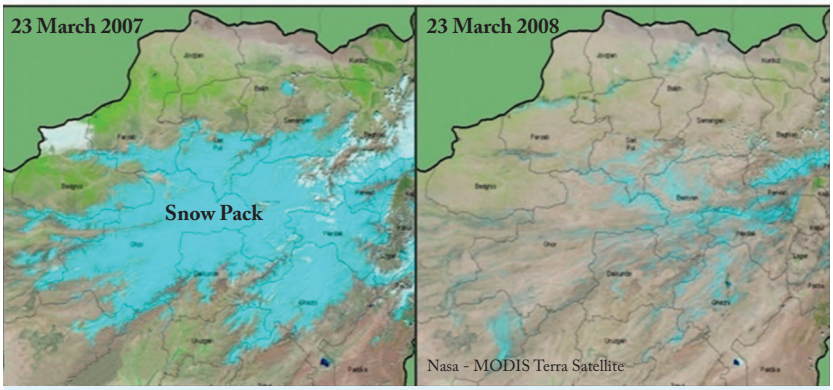
A 2004 analysis undertaken at the provincial level showed that 37 percent of the population was food insecure.[55] This represented a 17 percent increase with respect to 2007, which is considered a normal year. The populations of the southern provinces of Kandahar and Nimroz were also considered food insecure, at 70 and 92 percent, respectively. Levels of food insecurity vary across regions depending on the availability of water and specific geographical conditions, thereby creating a mosaic of relatively productive valleys interspersed with deeply drought-affected areas.[56]

Risk management: from coping to survival strategies: Livelihoods depend on assets and disposable resources. Resources and assets may be tangible or non-tangible, material or non-material. They are usually grouped into five types of capital: natural, physical, human, financial, or social. For example, land and livestock are essential assets that contribute to the physical capital of a household. Good health and the ability to work are examples of human capital. Social networks and family and kinship support constitute the social capital of a household.

Household responses to drought may be divided into two categories: coping strategies and survival strategies (figure 17). This distinction is primarily based on whether these strategies deplete productive household assets and capital. Early responses to scarcity are known as coping strategies, that is, reducing expenditures, but not to the point where household capital is eroded. Over time, however,

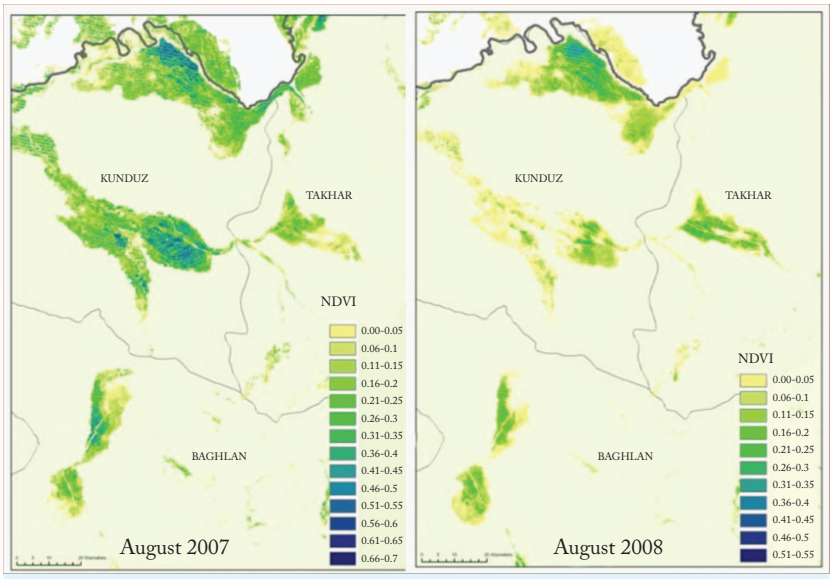
Figure 15 **Shrinking snow pack during the 2008 drought**

Center Afghanistan: winter snow pack comparison



Source: USDA (2008).

Figure 16 **The global impact of the 2008 drought on crop production in the grain basket of Afghanistan**



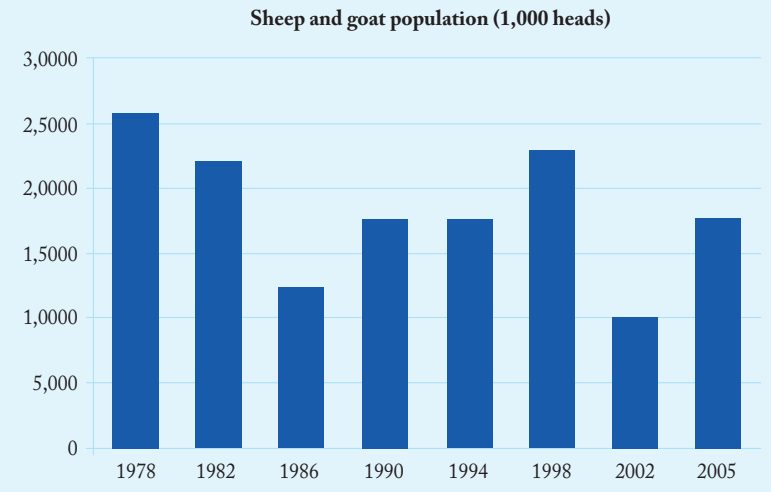
Source: Beekma and Fiddes (2010).

Figure 17 Typical household coping and survival strategies

Coping (non-erosive of capital)	Survival (erosive of capital)	
Reduce quality and size of meals	Sell remaining carpets / kilims	(Financial)
Seasonal migration of labour for labour	Borrow from merchants (high interest)	(Financial)
Sell first carpets / kilims	Children diverted from school for fuel collection	(Human)
Consumption of grain reserves	Reduce number of meals	(Human)
Seeking Food Aid programs	Reduce breast feeding	(Human)
Increase carpet / kilim weaving hours	Children sent as servants to rich households	(Human)
Younger family labour migrate for work	Increase fuel collection	(Human)
Reduce farm labour	Marry daughter early	(Human/ Social)
Reduce household expenditure	Sale of house beams(Physical)	(Physical)
Increase trading	Sale of oxen	(Physical)
Borrow from relatives (low interest)	Sale of land	(Physical)
Sale of portion of sheep flock	Sale of domestic utensils	(Physical)
Reduce size of carpet woven (increase cash turnover)	Consume seed stock	(Physical)
	Sell firewood stock	(Physical)
	Begging	(Social)
	Migrate from village	(Social)
	Accumulate debts	(Financial/ Social)

Source: Adapted from Pain (2001).

Figure 18 Sheep and goat populations were severely depleted during the 1998–2002 drought



Source: Data of the Central Statistics Organization, 2005.

households that begin to dispose of more significant assets, such as land or oxen, engage in survival strategies, that is, strategies that erode household capital.

Figure 17 shows that survival strategies may deplete a range of household assets. After families have depleted financial assets (which appear to be used first) and physical assets, they begin depleting social and human assets. Children are pulled out of school and put to work. Some are sent out as servants; daughters may be given in early marriage.

In practice, coping and survival strategies are applied along a continuum. The shifts from coping to survival strategies depend on a variety of opportunities and constraints. Poorer households tend to adopt survival strategies sooner. For this reason, these households recover more slowly from episodes of drought; this increases their vulnerability and weakens their capacity to escape poverty.

Livestock depletion and the threat to the livelihoods of pastoralists: Drought has a significant effect on livestock. During the 1998–2002 drought, the number of livestock fell to less than half (figure 18). Among Afghan households, 68 percent own some livestock.

During the 2001 drought in Kandahar, 76 percent of the goats and sheep had to be slaughtered, otherwise died, or had to be sold at almost 40 percent below the normal price because of the loss in weight among the animals and the decline in demand (table 4).

The impact of drought is not distributed evenly across households. While richer farmers can cope by buying more costly fodder, poorer farmers must sell off livestock or, in the absence of food, water, money, or buyers, let the livestock starve (box 6). The loss of livestock is critical because it leaves families without transportation, much-needed dairy products and the

Table 4 A large share of livestock are lost during drought, Kandahar, 2001

Households interviewed	Livestock which died or were slaughtered (%)	Livestock sold (%)	Decrease in livestock selling price during drought (%)
170	45 %	31 %	38%

Note: The table refers to goats and sheep.
Source: MRRD (2004).

ability to plough fields. Families are also often forced to choose between oxen, which are necessary for ploughing during subsequent seasons, or donkeys, which provide transportation in more remote areas.

The nomadic Kuchis rely on a livestock-based economy for their livelihoods. They were hit particularly hard by the 1998–2002 drought and the dry year of 2004 because they could not water their animals. In the provinces that were most affected, Kuchis lost 50 to 70 percent of their livestock.[57] The loss was exacerbated by increased competition from local communities for access to pastureland. A growing insurgency also threatened traditional migration, and many Kuchis, particularly in the drought-stricken south, were displaced to emergency camps. Although this was a tragic development, these families were finally able to obtain potable water and receive basic health care.[58]

Water insecurity, displacement and migration: Afghan households have relied on migration as a central livelihood strategy for decades. The migration has occurred either within the country or across borders, depending on the risks and opportunities, but also on social networks and the availability of work.

Of the households surveyed for the National Risk and Vulnerability Assessment, in 2007–2008, 7 percent reported that family members had migrated internally to find work, while another 6 percent reported that family members had left the country, and 14 percent reported that family members were working as seasonal labour migrants.[59] Drought increases the likelihood that family members will migrate at least temporarily.

Most of the migrants are young men. For example, during the 2008 drought, in Sar-e Pol Province (north Afghanistan), twice a week, on market day, 10 to 20 young men would depart for Iran for work. Those who make such trips must often work for at least six months to pay off the cost of the migration—the fee to migrant smugglers is typically AFN 30,000 to AFN 40,000 ($60 to $80) or the equivalent of a teacher's salary for 10 to 13 months—and begin sending money back to their families. Unable to manage the border crossing, some migrants return home and are forced to sell off land or livestock. For many, migration has led to even more dramatic consequences (box 7).

Box 6 Drought and the unavoidable curse of livestock depletion

"We lost our cattle and bought food for our family. We couldn't keep and raise the cattle during that time because we couldn't feed them. Their fodder cost too much, and we could not graze them in deserts or mountains because the pastureland had dried up as well."

Interviewee, Samangan Province, talking about the 2008 drought

"I have lost 300 sheep. I could not feed them, and, because everyone was suffering from the drought, no one wanted to buy my sheep. I had to let them starve to death."

Abdul Wahid, Faryab Province, talking about the 2008 drought

"Two years ago, I had 400 sheep and was saving money. Last year, I sold half of my sheep to buy food for my family and fodder for my remaining livestock (200 sheep). This year, most of the livestock have died, and no one is buying the survivors."

A (formerly wealthy) interviewee, Panjwei District, Kandahar, talking about the 2002 drought

Sources: Centre for Policy and Human Development focus group discussion, 2009; Lautze et al. (2002).

"If the drought continues, we will all become migrants. There were 600 families in the village, but now only 400 are left."

Mohammad Alim, Faryab Province

Source: CPAU (2010).

A survey conducted in 12 provinces in the southern and western parts of the country in June and July 2004 found that there had been significant declines in the water-table and that this was having a severe impact on karezes (figure 19). The households immediately affected were poorer ones that could not afford to deepen the shallow wells.

Additional surveys undertaken in 14 provinces found that almost 17,300 households were displaced from July to September 2004 as a direct result of drought. The underlying causes of the displacement were the following:

Box 7 There are risks associated with migration

"I once owned 13 jeribs of rainfed and irrigated land. During the last drought, I couldn't cultivate my land because water was so scarce. After facing food shortages, my two sons decided to migrate to Iran with some other villagers to work and then send remittances home so we could buy food; one of my sons was 21, and the other was 25. I paid AFN 30,000 for each of them to the smuggler and told him that my sons would pay the remaining AFN 10,000 once they reached Iran.

For three months, my sons did not call home. My wife and I were worried, not knowing if they were alright. One day, one of the boys from the same group who had migrated to Iran was caught by the Iranian police and sent back to Afghanistan. When he returned to the village, I went to his house to ask about my sons. As I entered his house, the boy ran towards me, hugged me and shouted, 'Kaka Jan, Aslam and Khaliq Jan were killed at the border!' I lost my senses and fell down. Later on, I was taken to my home with the help of villagers.

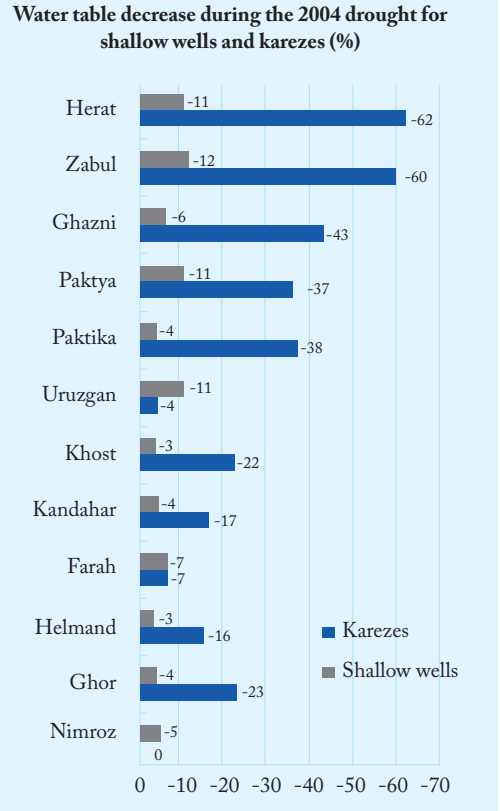
My brother and I found my sons' remains after four months. I am one of the unfortunate fathers who lost two of his young sons to get food. If I could have found work in my village, why would I have sent my sons to other countries for work? I ate from the produce of my land for my whole life, but, with this drought, I lost my sons. Many unfortunate households have lost family members, but still people go to Iran for work because, if we do not go, we would die from hunger here."

A farmer in Jowzjan Province, talking about the 2008 drought

Note: 1 jerib = 2,000 square metres.
Source: Centre for Policy and Human Development, interview, May 2009.

- Lack of drinking water: 50 percent
- Lack of irrigation: 37 percent; most displaced families had been in downstream areas
- Food shortages: 13 percent

Figure 19 Water-tables decreased severely during the 1998–2002 drought and the 2004 dry year



Source: Adapted from MRRD (2004).

In Kandahar, an assessment of the devastating 2001 drought revealed that more than 35 percent of respondents had chosen to migrate with their livestock or stay with relatives living in relatively less badly affected irrigated areas until the situation improved.

Indebtedness and crippling shame: Afghan households take out loans as a survival strategy, but only after selling household and productive assets. Credit is available only at informal institutions based on kinship or community ties.

During the 1998–2002 drought, a large majority of households accumulated significant debt. A study commissioned by the United States Agency for International Development found that, from March 1999 to March 2002, the proportion of households facing extreme debt sharply increased (figure 20). Towards the end of the 2002 drought, 60 percent of the households surveyed were classified as extremely debt insecure.[60] This is a serious matter: in Afghanistan, debt is not only an indicator of a depletion in assets; it is also a source of acute shame, particularly if families are forced to request credit from those outside the close kinship circle (box 8).

Land access and water rights: Drought not only impoverishes families, but also increases

the pressure on local institutions to regulate access to the common resources on which millions of livelihoods depend. For example, recurring drought accelerates the trend to convert pasture into rainfed farmland, leaving the poorest households with more limited access to the pastures that traditionally sustain them. The Kuchis, in particular, face more and greater difficulties to use the land and obtain the water to sustain their pastoral economy (box 9). Kuchi women and men maintain that access to clean water is their main priority.[61]

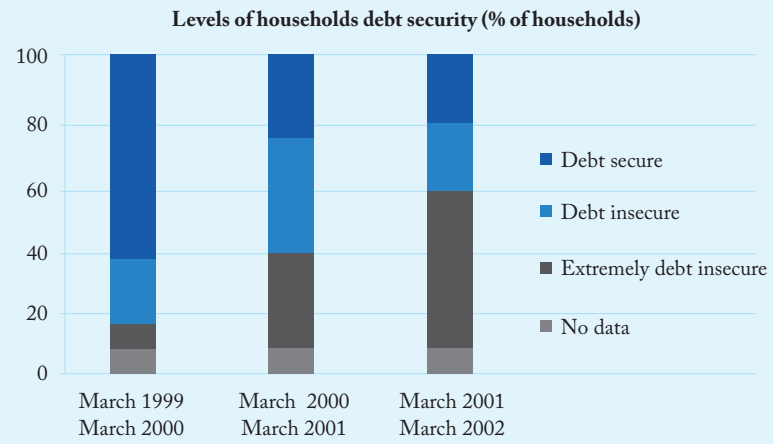
In irrigated areas, water scarcity caused by hydrological drought intensifies the tensions between upstream and downstream villagers along canals and rivers, sometimes reinforcing existing hostility along ethnic or political lines. It is also a destabilizing factor among already weakened local institutions in charge of water distribution and the enforcement of water rights. In such a context, the poorest farmers at the tail reaches of canals are the first to lose access to water (see chapter 4).

Health, nutrition and education: If households become food insecure, the parents are more likely to put their children to work. Many children become the main breadwinners if adults are confined at home because of disability, debt, the insecure situation in parts of the country, or, in the case of women, restrictions on movement associated with traditional practices. As a result, many children drop out of school at least temporarily. As water becomes increasingly scarce, children and women, but also adult men, must spend more time and energy fetching water, which can affect health.

Less water means fewer baths, less personal and household hygiene and a general rise in water-related health problems and water-borne diseases (box 10). If food becomes scarce, parents are usually the first to skip meals, which jeopardizes their health as they shoulder their household labour and economic responsibilities. [62]

Drought increases the divide between rich and poor: The extent to which affected populations can draw on social resources is a critical factor in explaining why some households are more resilient than others and why some communities do not experience famine during even the worst years of drought. However, certain informal risk management practices such as sharecropping and credit-based instruments have historically served as exploitative mechanisms, perpetuating and intensifying inequality. [63] Indebtedness benefits informal moneylenders and large landowners. If they have been unable to pay off their debts, the poorest households often wind up losing houses, orchards and land (including

Figure 20 **The proportion of indebted households sharply increased during the 1998-2002 drought**



Note: The figure indicates the level of household debt insecurity.
Source : Lautze et al. (2002).

Box 8 **The stigma of indebtedness**

"I am still in debt, and this bothers me a lot, especially when I see my relatives."

A woman in Andarah District, Farah Province, talking about the 1998–2002 drought

"I have more debt than hairs on my head. Anyone I see, I think that is someone to whom I owe money. I can't face anyone anymore."

A soldier in Kandahar Province, talking about the 1998–2002 drought

"Most of the fathers in the neighbourhood are in debt and are too ashamed to go to the stores; so, they force us to go and borrow. This makes us embarrassed in front of our friends. Being in debt has caused a lot of problem for families; it is destroying them."

A boy in Kabul Province, talking about the 1998–2002 drought

Source: Lautze et al. (2002).

Box 9 Kuchis and the loss of entitlement

The Khomari Khel and the Kutub Khel are two Kuchi communities. During the winter months, both communities inhabit traditional lowland campsites in the valleys of eastern Afghanistan. The campsites lie in close proximity to farming communities. With the onset of spring, some households herd livestock to the high pastures of the eastern central highlands, while others establish camps on the outskirts of Kabul to work as labourers or trade in the markets. During the summer months, shepherd households bring livestock down from the high pastures to reunite with the community members working in the cities. At the end of summer, both the Khomari Khel and Kutub Khel return to their winter lowland camps having completed another season of mixed labour, trading and livestock herding. This mixed economy was especially evident after the 1998–2002 drought.

Two years of monitoring have revealed that the two Kuchi communities face severe challenges in gaining access to natural resources at each end of the migratory cycle. The challenges are threatening the pastoral lifestyle of these communities and their capacity to recover from drought, as follows:

- The first threat revolves around their access to customary grazing land, whether in their winter or summer camps. Drought and pressure on land because of population growth are leading to the conversion of pasture into arable land. This prevents the Kuchis from grazing their livestock on their traditional high pastures and is forcing them to participate in the wage-based labour economy.
- The second threat revolves around access to water in key locations along the migratory routes of Kuchi communities. For example, in their summer camp near Kabul, the Khomari Khel have traditionally relied on spring water. However, growing competition for water has led neighbouring settled farmers to make use of springs to supply adjacent irrigated land. Throughout 2006 and 2007, several arguments and scuffles broke out between the Kuchis and villagers at a spring located near the summer camp. Responsible for fetching water, Kuchi women bore the brunt of aggressive behaviour, and many feared for their personal security.

At the Kuchi winter campsites, powerful commanders ploughed up pastureland to cultivate wheat and sank tube-wells to irrigate the new fields. Combined with the heavy extraction of groundwater, drought lowered the water-table to such an extent that nearby springs dried up the following year. As a consequence, the Kuchis have been forced to collect water for domestic consumption from a handpump close to the main road. This means that Kuchi women have to travel much farther to fetch water, which brings them into direct contact with men from the surrounding villages.

Source: Adapted from Roe (2010).

Box 10 Drought takes a high toll on nutrition, health and education

"My dad always excused himself from the house at lunch or dinner time to leave his food for us. There were many days when children only received one meal, while parents did not eat at all."

Girl in Kunduz Province, talking about the 1998–2002 drought

"My father keeps telling me to stop going to school and to get work to raise money."

Boy in Saedebad District, Wardak Province, talking about the 1998–2002 drought

"The availability of water is poor here. We have no public bathhouses. Some of the wells that were built by non-governmental organizations have become salty or have dried up altogether. During the summer, we have a lot of health problems. . . . All the kids suffer from diarrhoea during the summer."

Man in Kabul Province, talking about the 1998–2002 drought

"In the whole area, there was only one spring, and we had to stay in line for more than a half-day. We could not wash our clothes often. On those days that we could not get water, we went to our neighbours and borrowed a cup of water to avoid dying from thirst. My father got sick while carrying water over such great distances, and he is now too ill to get water."

16 year-old girl in the camp at Maslakh, Herat Province, talking about the 1998–2002 drought

Source: Lautze et al. (2002).

the associated water rights) (box 11). In the absence of functional public institutions such as banks, families risk being exploited by unscrupulous neighbours or moneylenders.[64]

Generally, periods of drought widen the divide between those people who manage to retain or even increase their wealth and others who fall more deeply into poverty. While more well off households are usually in a better position to deepen their wells and continue to irrigate crops, buy costly fodder to keep feeding their livestock, or use their grain stock to avoid the consequences of the increase in market prices, the poor lose their most productive assets, such as land, incur mounting debt, and send their only sons to Iran to work.

Furthermore, as poor households are forced to sell off donkeys or other modes of transport, they may no longer be able to reach food aid distribution points. For example, during the distribution of relief in Faryab Province in 2001, only a small number of more well off villagers who still owned donkeys could make the 10-hour journey to collect supplies. The donkeys were not shared with other community members and remained in the hands of the wealthier households.[65]

Vulnerable groups also tend to become additionally marginalized because of debt and the loss of assets. Internally displaced persons and the Kuchis, two of the most marginalized groups in Afghanistan, are usually charged higher interest rates relative to settled populations not only because lenders fear default, but also because of open discrimination.[66]

The unacceptable human costs of drought-related water insecurity: As a result of household insecurity, certain survival mechanisms may carry unacceptable social costs for human development. Families that have no other choice but to give daughters away in marriage at an early age is one example. Women are also particularly affected by the inability to feed their children. The lack of adequate food means that mothers may experience difficulties in breastfeeding their infants.[67] Members of woman-headed households, usually the poorest of the poor, are often forced to beg (box 12).

Men are also psychologically affected by long-term drought because they shoulder the primary responsibility for providing food and other basic necessities. In particular, young adults are expected to provide for their families. During extended periods of drought, the constant worry of finding water and a viable source of income has led to a sense of hopelessness among villagers living in more arid provinces. In a case study in Faryab and Wardak provinces, respondents spoke of young men joining the Afghan National Army or the Taliban to fulfil family responsibilities.[68]

> "The drought forces the people to take part in the war either on one side or the other."
>
> A farmer in Wardak Province, 2010

Source: CPAU (2010).

Box 11 Credit, debt and exploitative mechanisms

> "We did face problems during periods of drought in obtaining credit and repaying it. We borrowed wheat and other commodities on a credit basis from traders in Baharak and lenders in Feyzabad, and, mostly, there were delays [in repayment] as we did not produce enough wheat and crops to repay on time. There was an enormous interest charged, two to three times [the principal amount], to put you in a position to mortgage your land and then become (the lender's) sharecropper. There are about 10 to 15 people from neighbouring villages who were small landowners in the 15–20 years before [the beginning of the period of instability], but, during periods of drought and instability, they lost their land through mortgaging."
>
> Interviewee in Baharak Valley, Badakhshan Province, talking about the 2008 drought

Source: Pain (2008).

Why is Afghanistan so sensitive to drought?

Drought sensitivity can be gauged in various ways (box 13). Yet, whatever measure is used, the results invariably point to Afghanistan as a country that is extremely sensitive to drought.

According to the socio-economic drought vulnerability index, Afghanistan is one of the most drought-sensitive countries in the world because of its significant dependence

Afghanistan is one of the most drought-sensitive countries in the world according to most indicators

on agriculture and the importance of agricultural sector jobs, the primary means of livelihood for the Afghan population. Among all households, 55 percent are engaged in farming, and 68 percent own livestock. Agriculture represents 37 percent of the country's gross domestic product.[69] Thus, if there is a drought, the entire economy is affected (figure 21). However, the past few years have seen the reliance on agriculture decline from the estimated 50 percent in 2002; this corresponds to a shift towards a more service-oriented economy.[70] If confirmed, such a trend would help reduce Afghanistan's overall vulnerability to drought.

The infrastructural development of a country also determines, to a large extent, the level of drought preparedness. Indeed, the level of infrastructural development is inversely related to the risk of water insecurity.[71]

The availability of improved water sources and the accessibility of rural areas to transport by road are two indicators that may be used to determine a country's ability to cope with drought.[72] According to the infrastructure vulnerability index, Afghanistan would rank last in the world because of the low share of the population that enjoys access to improved water sources (27 percent) and the generally poor level of access of rural areas to water.[73]

Box 12 The human development costs of drought are higher for women and children

"The mothers of our children are suffering mentally from the lack of water and money. They do not have enough food for their children. They do not have enough food to give their children enough milk. It is very difficult for a mother to see her children starve."

A farmer in Faryab Province

"Four years ago, after the long drought (1998–2002, 2004), we had lost everything, and we had sold everything that could be sold, but we still had nothing to eat. Some people in our village came to our home and asked for our daughter to marry their son. My daughter was 12 years old, and she got engaged because we had no other choice. The next year she got married and we received AFN 85,000 ($1,700) from the boy's family. We kept that money for our food expenses. It lasted 12 months.

"During the last drought [2008], we could not cultivate anything on the five jeribs of land we had taken to sharecrop. We had not recovered from the previous drought and had no choice but to marry off our second daughter, who was also 12 years old. When the groom's family took her to their home, she ran to me and asked, 'Why do they want to take me away from you? I do not want to go with them, and I want to live with you.'

"I started crying and took her in my arms and told her, 'This old man (the girl's father-in-law) is your uncle, and he wants to make you his daughter. He will take you to his home and will bring you back to us after a few days.' When she reached her future husband's house, she fell unconscious and had to be taken to a doctor. I went to the clinic. When she saw me there, she said that she wanted to come back to our home. I brought some medicine for her and brought her back to my home. But, after a week, I sent her to her new husband's home, where I stayed with her for a day.

"Who would marry off their 12-year-old daughters if it wasn't because of hunger and poverty? Now, my son is in Pakistan, and he sends us some money so we can eat and survive. When my daughters come to our home, they still say that they want to come back. But I must tell them that this was their destiny. We were poor at the time, and we had nothing to eat."

A mother in Sar-e Pol Province

"This year, I cultivated wheat on my six jeribs of land, but the harvest was poor because of the drought, and the wheat was unsuitable for human consumption due to pests. So, I kept the wheat for my livestock. One day, a widow came to my house and asked my wife if she could have the wheat. My wife asked her, 'What would you do with it? We have stored it for our livestock.' She replied that she didn't have anything else at home to feed her children. I asked my wife to give her some proper wheat flour so she could bake some bread.

"A few weeks later I came to know that this widow had sent her only son, a 14-year-old, to Iran for work because she didn't have anything left to feed him and his sisters."

A farmer in Faryab Province, talking about the 2008 drought

Note: 1 jerib = 2,000 square metres.
Sources: Centre for Policy and Human Development interview, May 2009; CPAU (2010).

Box 13 Useful indicators to assess drought sensitivity

Different indicators are used to evaluate the drought sensitivity of a country. Three indicators are discussed in this chapter, as follows:

- The infrastructure vulnerability index is used to gauge the extent to which a country can adapt to drought. Two commonly used measures to determine drought adaptability are the World Bank's rural access index and the share of a population with access to improved water sources.
- The socio-economic drought vulnerability index measures the vulnerability of countries to socio-economic drought. It is formulated on the notion that greater contributions of the non-agricultural sectors to gross domestic product, a lower share of agriculture in employment and greater crop diversity collectively lower a country's chances of developing socio-economic drought if meteorological drought occurs.
- The storage–drought duration index indicates the share of the average annual duration of drought that the water storage capacity of a country is able to offset based on average monthly surface water consumption.

Source: Adapted from Eriyagama et al. (2009).

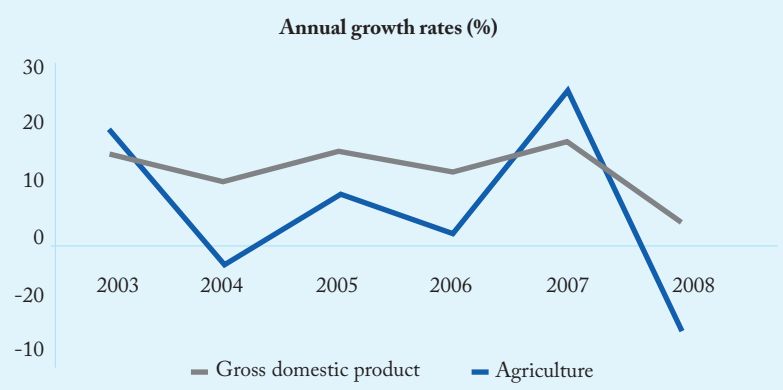
Thus, a 2004 post-drought assessment of 34 villages in Helmand and Kandahar provinces concluded that the assistance being provided by local and international non-governmental organizations and others was not reaching the majority of the people living in remote areas, but was being provided only along the main roads.

Water storage capacity is also necessary for drought preparedness because it allows excess water from floods and the spring thaw to be stored and used later during periods of higher demand or drought. The storage–drought duration index assigns an index value of 1 to a country's storage capacity if it is satisfactory in terms of the average consumption of surface water and the mean annual duration of drought. The index of Afghanistan is estimated at between 0.1 and 0.25, ranking the country among the bottom 10 countries in the world. This outcome highlights the country's lack of storage capacity, which, if developed, could help mitigate the impact of prolonged drought.[74] Many Central and South Asian countries show similar deficits, and, like Afghanistan, many of these countries also score low on this index although they face no apparent hydrological barriers to increasing storage capacity (that is, water availability is not a constraint).[75]

Other indicators may be included for a more refined assessment of Afghanistan's sensitivity to drought. The biophysical vulnerability index, which has been applied to India at the behest of individual Indian states, consists of three sub-indicators: the depth of soil cover index, the groundwater scarcity index and the soil degradation severity index.[76] Although a lack of data means that this last index cannot be applied to Afghanistan, it is clear that soil degradation is a major problem and clearly contributes to the severity of drought and floods (see elsewhere below).

Moreover, even if most river basins hold potential groundwater resources, current infrastructure, such as shallow wells or traditional technologies such as karezes, cannot be relied on if water levels drop because of drought and the proliferation of deep-drilling technologies (such as high-yield motor-driven wells that dry up neighbouring shallow

Figure 21 During a dry year or drought, as in 2004 or 2008, agricultural production tends to drop, and the economy is affected



Source: Adapted from MRRD and CSO (2009).

wells and karezes). Lack of proper planning and control in the exploitation of groundwater thus renders the poorest segments of the population more vulnerable because these people still depend on traditional technologies to access water for domestic purposes.

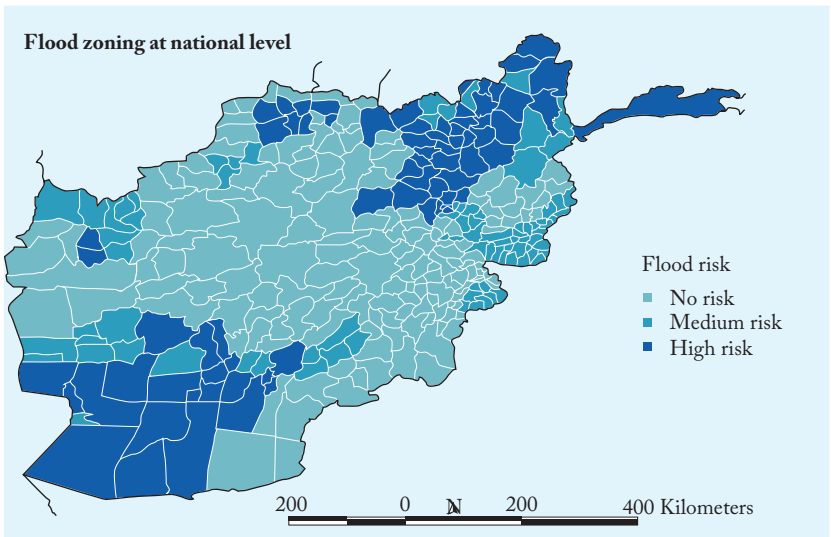
Floods

Risk areas and seasonality

Risk areas: According to the Disaster Management Information System the mountainous north-eastern region of the country is at particular risk (figure 22). This is partly because of the higher spring precipitation levels, which can induce flash floods, and the greater snow accumulation at higher altitudes.[77]

Yet, according to the Afghanistan Information Management Services, the southern part of the country is also prone to flooding.[78] During the past 19 years, eight serious events have been recorded, leading to the displacement of at least 240,200 people.[79] The north is also considered a high-risk area partly because the Amu Darya is eroding the land along its banks in the provinces of Balkh and Jawzjan, a situation that the National Bank Protection Programme is attempting to rectify (box 14).

Figure 22 **The north-east is considered the most flood-sensitive area of the country**



Sources: Data of the Afghanistan Information Management Service, http://www.aims.org.af/ (accessed 12 May 2010).

Seasonality: Flash floods generally occur from February to June. The Kabul river basin is a notable exception because it is influenced by the monsoon and often suffers from flash floods in August and September. In the area not influenced by the monsoon, heavier rain and snowfall during the early part of the year are reflected in high-intensity flash floods.[80] River floods occur during the snow-melt period, primarily in June and July.

Vulnerability and forecasting limitations

The impact of floods on livelihoods: The lack of the data necessary to estimate the impact of floods in Afghanistan remains a serious issue. However, partial and localized evaluations conducted in recent years are starting to provide a better sense of the devastation. In 2009, 13 provinces that were susceptible to flooding in the north, north-eastern and western regions were regularly monitored. The results are detailed in table 5.

Spring floods affected at least 202,076 people in the 13 northern, north-eastern and western provinces surveyed. This represents approximately 2 percent of the total population settled in these areas. Families saw their houses destroyed, lost their spring crops (usually wheat), lost productive assets such as livestock, or had to contend with the destruction of local canals (box 15). As in the case of drought, the destruction of productive assets increases vulnerability because it deprives households of the means to recover from shocks.

In the north, close to 12 percent of the 9,734 affected households surveyed had each lost at least one family member as a result of floods. As of 17 May 2010, an additional 11,000 houses had been destroyed, more than 50,000 jeribs of crops lost, and 11,680 livestock killed.

Floods can severely damage water supply and irrigation infrastructure, representing an important setback in the development of a community. In Badakhshan Province,

Box 14 Amu Darya flood erosion and destruction in northern Afghanistan

The Amu River is the largest river flowing along Afghanistan's borders. Every year, it swells and changes course during the spring and summer seasons, washing away settlements, traditional irrigation systems and irrigated agricultural land. In 2004, it destroyed 24,000 hectares of farmland along its banks in Balkh, Jawzjan, Kunduz and Takhar provinces.

Jawzjan Province, located in the Northern basin of Afghanistan, is the most badly affected province. The population living there depends mainly on farming and livestock, while the Amu River provides 57 percent of the total irrigation water. In 2005, the river washed away more than 5,000 hectares of farmland and pasture. In 2009, 4,883 families in six districts were affected. In 2010, the Afghanistan National Disaster Management Authority reported 1,800 to 2,500 flood-affected families in 14 villages in Feyzabad District.

Although the Asian Development Bank is implementing the Pyanj River Basin Flood Management Project to help both Afghanistan and Tajikistan more effectively manage flood threats, donors and the government must still invest in infrastructure to stabilize embankments throughout the country. The government allocated $2 million to build temporary embankments on the most vulnerable points of the river, utilizing old military vehicles covered in sandbags. Villagers living in Kaldar and Shortepa districts (in Balkh Province) tried to strengthen the banks with more than 3,000 gabion boxes, sandbags and 5,000 wooden beams. They also attempted to redirect the flow of the water, but this was not sufficient to stop the Amu River from destroying more than 150 houses and the most valuable irrigated land.

Fortunately, the Afghanistan Government has now earmarked $185 million for a national bank protection programme, which was fast-tracked following the recent Kabul conference.

Sources: Based on FEWS NET (2008), UNOCHA (2010).

Table 5 Destructive effects of 2009 spring floods in 13 provinces of the northern, north-eastern and western regions.

Regions	People Killed	People Injured or displaced	Houses destroyed or damaged	District affected	Households affected	% of Region opulation affected	Farmland destroyed (jeribs)	Canals damages (m)	Livestock loss
North	1,130	3,908	5,744	21	9,734	2.0	NA	NA	NA
North-East	39	16	9,075	46	16,398	3.4	102,626	9,811	35,368
West	10	1	2,736	14	2,736	0.6	NA	NA	NA
Total	1,179	3,925	17,555	81	28,868	2.0	102,626	9,811	35,368

Note: 1 jerib = 2,000 square metres. na = not available.
Source: Based on UNOCHA (2009).

for example, the 2009 spring floods damaged six water supply networks and 83 wells, while, in Baghlan Province, at least 420 canal hydraulic structures were destroyed. This contributed to the inefficient and inequitable distribution of water for irrigation (see chapter 4).

The rate of flood-related deaths in Afghanistan is among the highest in the world (figure 23), and, between 1980 and 2000, the country experienced the highest number of flood-related deaths.[81] As in the case of drought, the lack of infrastructure, poor disaster preparedness, which is partly caused by a lack of data, and poor socio-economic conditions render Afghanistan more vulnerable than most countries.

It is the combination of all of these elements that explains why the average number of flood-related fatalities in Afghanistan is close to 20 times greater than the corresponding number of fatalities in

Box 15 A life of pride and independence swept away

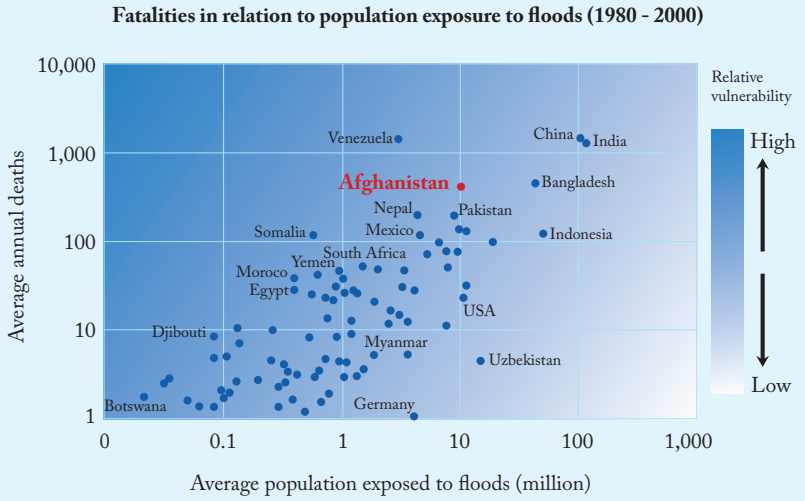
"Because the flow of water increased rapidly, we had no choice but to leave the house and move to a safer place. However, in a matter of few hours, nothing was left; our house and land had been swept away by the flood.

Before the flood, we had 50 jeribs of irrigated land; now, we are working on someone else's land to survive."

Abdullah, a farmer in Balkh Province

Note: 1 jerib = 2,000 square metres.

Figure 23 **Afghanistan is among the most vulnerable countries with regards to floods**



Source: Adapted from UNEP/ GRID Geneva as quoted in ICIMOD presentation – Kabul – (May 2008).

the United States, where the likelihood of flooding is about the same as in Afghanistan (figure 23).

Forecasting limitations: Although the available databases are helpful in measuring the vulnerability of Afghanistan to floods, the data are not reliable. The lack of consistency across databases raises questions about the ability to estimate impact and assess trends accurately in the occurrence and intensity of floods (box 16). The relative absence of precise, systematic monitoring means that attempts to predict, prevent and respond to floods are also deficient.

National statistics that could confirm the extent of infrastructural damage and loss following a flood are not always available. It

Box 16 **A word of caution about flood databases**

Flood databases are rather unreliable in the case of Afghanistan. Indeed, differences in local assessments and the estimates put forward through these databases appear to be considerable (see the table). For example, in 2009, the Dartmouth Flood Observatory Database recorded only two persons killed and 1,200 displaced throughout Afghanistan. Meanwhile, a series of detailed local evaluations undertaken by the United Nations Humanitarian Air Service reported 1,179 people killed, 3,815 persons displaced and 28,868 households impacted by spring floods in 13 of the country's 34 provinces that same year.

Global databases appear to underestimate the impact of floods, possibly because they focus only on major events (see note a) or on river floods. Flash floods are often overlooked because they are more difficult to monitor via remote sensing. Rainfall intensity is not usually measured.

Databases and studies are inconsistent in measuring the occurrence, intensity and impact of floods

Souce	Period	N° of years coverage	Events	Death
Dartmouth Observatory	1991-2010	19	63	4,531
USAID-Cred	1957-2010	53	60	3,644
WFP	1956-2002	46	24	1,925
UNHAS	1976-2001	25	31	18,700

a. Dartmouth Flood Observatory Database, University of Colorado, Boulder, CO, http://floodobservatory.colorado.edu/index.html (accessed 10 May 2010). The lowest flood severity level in the Dartmouth database is labelled 'large flood events', which are defined as "significant damage to structures or agriculture; fatalities; and/or 1-2 decades-long reported interval since the last similar event".
b. USAID-CRED = United States Agency for International Development, Office of United States Foreign Disaster Assistance (OFDA) and the World Health Organization Collaborative Centre for Research on the Epidemiology of Disasters (CRED); EM-DAT: OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels, http://www.cred.be/.
c. Based on Shobair and Shankracharya (2009).
d. United Nations Humanitarian Air Service.

Trends analysis based on such databases is also questionable. In the USAID-CRED Database, which is often quoted in numerous reports and presentations about Afghanistan (see note b), the number of events from the 1950s to the 1980s is calculated at between one and three, but, after 2000, the number suddenly leapt to 41. Yet, from the 1970s onwards, individual floods would have supposedly affected fewer people, thus giving the impression that these were less devastating. Even if the definition of events is somewhat unclear, the data suggest that the number of people affected fell from 601,684 to 157,862 despite the fact that the population almost doubled, from less than 13 million in the early 1970s to more than 23 million in 2008.*

Similarly, the Dartmouth Flood Observatory Database (see note a) registered 239,800 affected persons during the 1990s, but then estimated the number at only 62,400 since 2000 (excluding 2010). It is difficult to believe that floods have diminished so much in intensity and destructive capacity over the past two decades.

* MRRD and CSO (2009).

is even more difficult to gauge the impact on the population (migration, long-term indebtedness, post-traumatic stress disorder and so on). This affects the design of priority aid programmes that focus on the long-term impacts of disasters on livelihoods. Developing, testing and adapting flood preparedness measures must therefore be emphasized, and the impact of flood disasters on Afghanistan as a whole must be viewed as an integral aspect of water resources management.

Understanding and quantifying drought and flood patterns and anticipating their impact are a matter of great importance. Monitoring risk and issuing timely warnings could greatly mitigate the effects of these types of disasters.

Planning for floods and drought should cover the period from pre- to post-disaster. A successful relief effort requires lead-time to mobilize and deploy emergency assistance, including staff and materials. Well-maintained and regularly updated contingency plans and flood and drought forecasting and warning systems and alerts must be improved and strengthened to protect populations from climate-based humanitarian disasters.

Although the Government of Afghanistan initiated these processes in 2004, a lack of high-quality data continues to hamper the timely detection of trends in drought and floods, and development has now stalled.

Factors behind the increasing number of incidents of flooding and drought

Environmental degradation and unwise land use at the sub-river basin level are among the overarching factors behind an increase in disastrous flooding in Afghanistan over the past four decades. Many of the upper catchments located in sub-river basins from which the bulk of Afghanistan's water resources derive are within some of the poorest, most physically degraded and agriculturally unproductive areas in the country.[82]

If the geological, topographical (that is, steep slopes) and climatic features of Afghanistan naturally increase the country's susceptibility to soil erosion, human activities also play a significant role in exacerbating the problem. Practices such as the cultivation of crops on steep slopes, deforestation and the unsustainable exploitation of scrubland and rangeland all play a part in the soil degradation process. While erosion decreases the capacity of soil to absorb water through rainfall, continued deforestation, combined with livestock overgrazing, as well as sustained loss of vegetation cover, intensifies the effects of flash floods. Furthermore, because of the rapid runoff and the lower level of absorption, deforestation hampers groundwater replenishment, thereby leading to the deterioration of groundwater resources. Eventually, water can no longer be absorbed. This disrupts the natural water cycle and worsens the effects of drought.

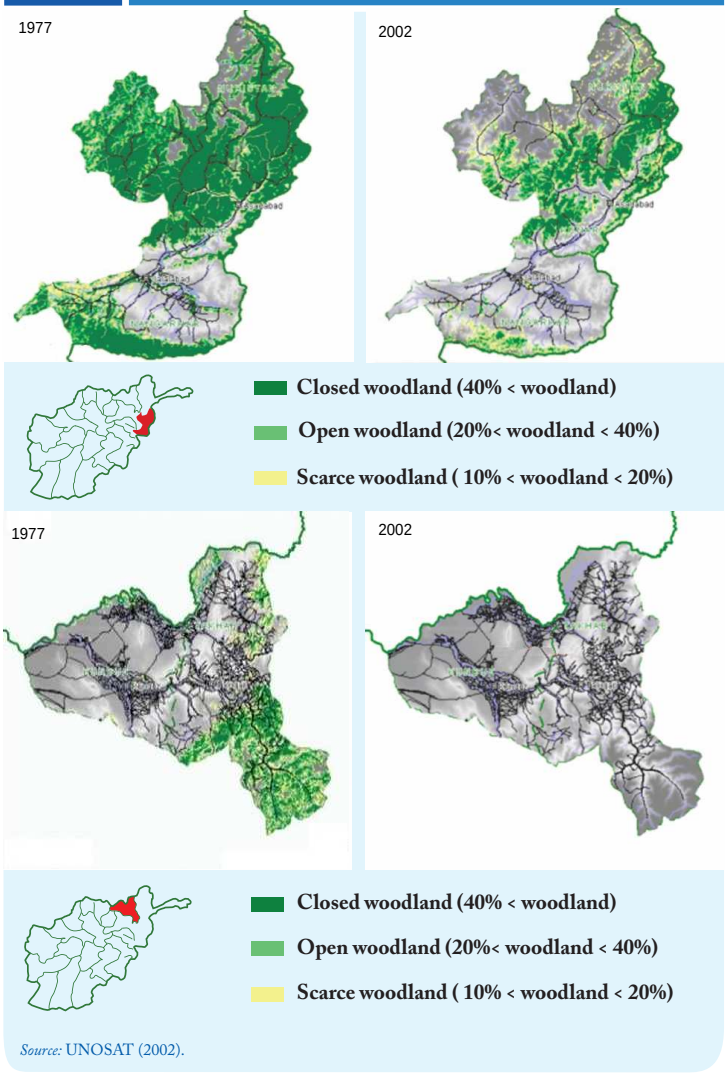
Afghanistan's rangelands currently represent roughly 60 to 75 percent of the country's territory, and they are in poor condition.[83] Overgrazing and land encroachment have led to soil erosion and forest degradation.

In the middle of the 20th Century, surveyors estimated the total forest cover in Afghanistan at 3.1 million to 3.4 million hectares. Today, woodlands occupy less than 1.0 million to 1.3 million hectares (2 percent of the total area of the county), while the north-eastern and eastern regions are prone to high-intensity floods.[84] A remote sensing analysis undertaken in Kunar and Takhar provinces in 1978 and then again in 2002 revealed that the forest cover had shrunk by more than 50 percent in the interim. If deforestation continues at the present rate, the country's woodlands will disappear in three decades.[85] Deforestation has undoubtedly contributed to the devastation caused by recent floods (figure 24).

In most cases, the causes behind land

Environmental degradation and unwise land use at the sub-river basin level are among the overarching factors behind an increase in disastrous flooding in Afghanistan over the past four decades

Figure 24 **From 1977 to 2002 forest cover there has been reduced by more than 50 per cent.**



Source: UNOSAT (2002).

degradation and desertification are social and economic; they are linked to human intervention (deforestation and the over exploitation of rangeland), population growth, and livestock overgrazing on marginal lands. The demand for timber and related trade goods in neighbouring countries, including Pakistan, has added to the diminution of forests in Afghanistan. Between 1992 and 2002, massive logging and timber smuggling (150,000–500,000 cubic metres of wood annually) stripped the eastern provinces of much forest.[86] The lack of incentives and community involvement in the management of common land has deepened the crisis.

Although meteorological drought is common in arid and semi-arid countries such as Afghanistan, well-managed rangelands and upper catchments can recover from drought when the rains return. However, continued land degradation and poor management inevitably increase the country's vulnerability to drought and floods, thereby putting millions of Afghans at risk. A growing concentration of people, infrastructure and settlements in areas vulnerable to floods, such as flood plains, riverbanks and gullies, are only adding to the strain. The 2008 Water Sector Strategy warns of this risk, but few are paying attention. [87]

Looking to the Future: Climate Change and Water Insecurity

Forecasts for the coming decades suggest that global warming is precipitating change in evaporation and rainfall patterns and a more unpredictable hydrological cycle. According to the global trend, dry areas will become drier, and wet areas wetter. Water flows, coupled with more frequent and extreme weather events such as drought and floods, will also become more unpredictable.[88] Though the intensity and impact of climate change on the river basins of Afghanistan are still uncertain, there is no doubt that the agricultural sector will be affected the most. This will exacerbate risks and vulnerabilities and threaten the livelihoods, health and security of millions of people.

The impact on agriculture and on the water requirements for food production

According to long-term predictions, by the 2090s, drier conditions will prevail throughout much of Afghanistan, ranging from −10 to −40 millilitres depending on carbon dioxide emissions. Similarly, annual temperatures are projected to increase by between 2.8°C and 5°C.[89] Both scenarios would have dire consequences for farmers relying exclusively on rainfed agriculture, who are usually already impoverished relative to farmers enjoying access to irrigated land. This would apply particularly to farmers in the northern and western river basins, where more than 60 percent of the rainfed land is located.

An increase in evapotranspiration (that is, water demand for crops) also has an impact on irrigation. An average 1.4°C increase in temperature represents an average increase in standard evapotranspiration of less than 3.5 percent, and an average increase by 5°C (that is, the high scenario for the 2090s) would represent a nearly 13 percent increase in evapotranspiration (table 6).

A similar simulation undertaken in the Emam Saheb irrigation scheme in Kunduz Province provides similar results. If there is a rise in temperature of 4.7°C in the period 2070–2099, the overall water demand for the irrigation scheme is going to be approximately 12 percent higher than the demand in the 1961–1990 baselines.[90] Thus, to produce the same amount of crops, 12 percent more water will be required.

These figures should be put in perspective. The efficiency of irrigation in Afghanistan is already as low as 25–30 percent, while 40 percent efficiency is considered reasonable (and 50 percent good). Thus, improving efficiency to a reasonable standard could lead to a 10 to 15 percent increase in water savings. The long-term impact of rising temperatures on crop water requirements could thus be offset by improving water use efficiency in irrigation.

Table 6 **Evapotranspiration will increase due to projected increase in temperature**

	2030s	2090s	
	Average	Low scenario	High scenario
Average increase in T (°C) (based on DFID, 2009)	+ 1.4 °C	+ 2.8 °C	+ 5.0 °C
Average percent increase in ETo (calculations using Cropwat) (example for Baghlan Province).	+ 3.3 percent	+ 6.6 percent	+ 12.2 percent

Note: Standard climate data of the ClimWat 2.0 Database-Baghlan station-have been used as a baseline. Temperatures have been modified based on estimations in Savage et al. (2009), and new data on evapotranspiration have been computed using CropWat software based on the assumption that other elements affecting evapotranspiration, such as wind speed, radiation, hours of sunshine and so on, remain similar to the baseline values.
Sources: For the increase in temperature (°C): Savage et al. (2009); for evapotranspiration: CropWat software simulation using the ClimWat 2.0 Database, Water Development and Management Unit and Climate Change and Bioenergy Unit, Natural Resources and Environment Department, Food and Agriculture Organization of the United Nations, http://www.fao.org/nr/water/infores_databases_climwat.html.

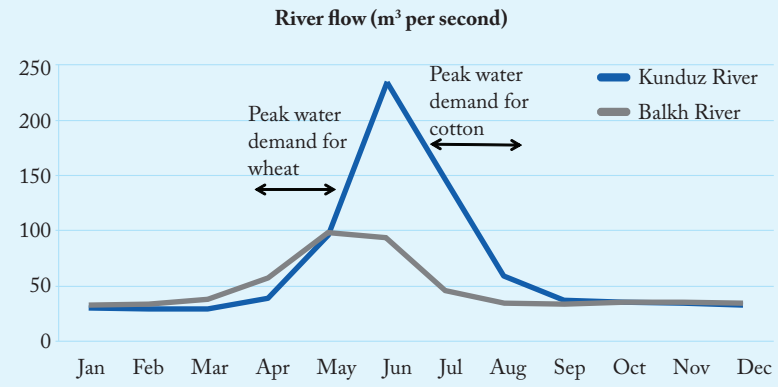
Impacts on river flows and the seasonal availability of surface water

Because of climate change, water flows will become more uncertain all over the world. In the case of Afghanistan, the consensus is that, as the climate warms, the region will experience pronounced alterations in glacier and snow-melt runoff.

An analysis charting the extent of snow cover in the water-abundant Panj-Amu river basin in 1972–2007 found that, on average, snow cover has already shrunk 10 percent.[91] How this will affect river flows and river levels has yet to be determined. However, there is a correlation between peak discharge and the extent of spring snow cover.[92] Given that snow cover has decreased over the past 35 years, it is likely that this will be reflected in a decrease in peak discharge and the availability of water during the irrigation season.

Earlier snow-melt is also a worrying development. Because river levels could start subsiding sooner (figure 25), this would leave less water available for the period of peak water demand for irrigation and could affect summer crops such

Figure 25 **Climate change means less river water will be available to meet the demand for irrigation during the peak summer season**



Sources: Adapted from Favre and Kamal (2004); Klemm (1996).

as maize, beans, melons, watermelons and rice. Combined with a lack of storage capacity and temperature increases, this would put summer crops in jeopardy. It would mean less food, particularly for women and children, and fewer employment opportunities for landless labourers. Kuchis setting camps near irrigated plains would also face greater difficulties in accessing water for livestock and might become involved in more conflicts with landed farmers.

More extreme weather patterns will increase risk and vulnerability

Because Afghanistan is already extremely vulnerable to drought and floods, the consequences of climate change on water security is a serious concern. Although experience shows that a population can adapt to the long-term effects of climate change provided these are gradual, adapting to and recovering from rapid change induced by climate shocks represent a much greater challenge.

In Afghanistan, variations in climate and water availability from one year to the next exhibit a much more significant range than the average long-term changes in temperature, evapotranspiration (the water demand for crops) and river flow regimes induced by global warming. They are also more difficult to predict, especially well in advance of a crisis.

Consequently, the gap between those people who can cope (sometimes at the expense of the most vulnerable) without eroding household capital and those people who cannot will only widen. This will inevitably lead to unacceptable human development costs, particularly for women, children, nomadic pastoralists and the landless.

Managing Scarcity, Drought and Floods in a Context of Regional Water Sharing

The management context

Afghanistan is not a water-scarce country, but it faces numerous constraints in managing its water resources, as follows:

- The relatively high availability of water at the national level can be misleading because it hides important variations within and across sub-basins. The distribution of the available water does not always correspond to the location and distribution of irrigable land and population settlements.
- Considerable intra- and inter-annual variations in the amounts of available water, coupled with low storage capacity, reduce Afghanistan's control over the available surface resources.

Because they lead to greater demand for water for food production, population growth and improvements in living standards are going to be key drivers of water scarcity

in decades to come. Urbanization is likely to increase the demand for water, which, in the case of Kabul, is already a cause of alarm.

The overall availability of groundwater throughout the country requires more investigation and research. Nonetheless, concerns over depletion caused by overextraction need to be addressed.

As with all other arid and semi-arid countries, Afghanistan is prone to floods and drought. However, significant dependence on agriculture, combined with ongoing land degradation, lack of infrastructure and inadequate storage, renders the country particularly sensitive to the impacts of drought and floods. Because of drought, vulnerable households frequently resort to survival strategies that deplete productive assets and trap the households in poverty. Environmental degradation and inappropriate land uses worsen the impact of drought and floods. Planning and measures to safeguard against water shortages will reduce the vulnerability to water-related climate shocks.

Experts project that, over the long run, climate change will result in the following:

- A progressive increase in the demand for water for crop irrigation.
- A change in the seasonality of the behaviour of rivers, including reduced snowmelt water during the warm season; this means less surface water will be available for the irrigation of summer crops.
- An increased incidence of drought and floods.

Despite projections, experts are uncertain about the magnitude of the impact of water scarcity during this century.

There are good reasons for the development of the water management infrastructure in Afghanistan, but the gap in data and expertise must be overcome before the country engages in a dialogue with riparian countries to address transboundary water management issues. The assistance of the international community would be helpful, but it is the Government of Afghanistan that is ultimately responsible for actively engaging in such a dialogue.

Dealing with water scarcity and climate shocks

Dealing with scarcity will involve developing supply and regulating demand, while finding a balance to ensure sustainable and efficient water use and equitable access across categories of users. The integrated water resources management and river basin management approach promoted in the Water Law provides an institutional context within which such goals could be established, prioritized and implemented.

The long-term sustainability of development plans to address scarcity and climate shocks will also depend on comprehensive and continuing awareness-raising and capacity-building campaigns. Tackling the sensitive issue of transboundary water management is also a priority.

Applying these recommendations would also support adaptation to climate change.

Developing supply and reducing the infrastructure deficit

Improving storage dams: The absence of large-scale water storage infrastructure has a major bearing on the capacity of Afghan households to adapt to climate shocks. Because of the extreme annual variations in surface water flows, the construction of storage infrastructure, particularly dams, would enable the country to control its resources more effectively and ensure the greater and more reliable availability of water throughout the country and throughout the year. This would minimize the effects of river floods and drought. Furthermore, given the strategic importance of perennial rivers for irrigation and energy production, investment in large storage facilities has an undeniable appeal. Unfortunately, the lack of high-quality data is hampering the efforts to draft effective operation and management plans.

Afghanistan requires evidence and expertise. Therefore, donors need to work with the government to improve the technical capacity of local water management experts.

The rehabilitation of karezes and the development of traditional and modern harvesting structures: In countries such as Afghanistan, where river flows are unreliable, drought mitigation strategies should not focus on river flows alone.[93] The development of an integrated package of strategies is needed that includes water harvesting and river flows. In addition to the construction of large-scale dams on rivers, the country must capitalize on the many traditional methods that have proven so effective for so many centuries. These include the construction of *cha* (snow harvesting pits) and water harvesting ponds and the rehabilitation of karezes, as follows:

- A recent study undertaken in Bamyan Province showed that snow harvesting through the snow fence collection method could meet 16 to 47 percent of annual village livestock water requirements.[94] This method could be vital for farmers living in more remote communities where the development of conventional supply networks is challenging.
- Kareze rehabilitation has been successful in neighbouring Iran and Pakistan (Balochistan Province). In Iran, the government has spent $48 million to rehabilitate more than 7,800 karezes over five years to supply an additional 1.4 million cubic metres of water to communities. At an average of $6,000 per kareze, a similar amount would help restore or improve 85 percent of the karezes in Afghanistan. This would also require support for more effective community-based management and the enforcement of groundwater policies to manage and maintain the kareze system. Protecting water resources against deep-well drilling is also paramount. Some analysts have proposed a minimum distance of 500 metres between karezes and high-yield wells (see elsewhere above) as a rough guideline in the absence of more accurate local estimates.[95] River basin agencies and river basin councils should undertake to protect the kareze system.
- Small-scale storage, that is, water harvesting ponds, could be developed along Kuchi migration routes to allow the Kuchis to water their livestock. These facilities could help reduce conflict between the Kuchis and settled farmers and communities.[96]
- Household rainwater harvesting should also be piloted and promoted. This technique has been successful in the relatively similar climatic conditions in the state of Rajasthan, India and should be tested in Afghanistan. For example, the estimated water yield of a 1,500 square metre rooftop receiving an effective rainfall of 250 millimetres and with a runoff coefficient of 0.8 is 300 cubic metres, which is sufficient to meet the consumption of drinking water of 41 individuals for a year at 20 litres per capita per day. [97]
- Roof water harvesting for the recharging of groundwater is another option in regions where there are suitable aquifers. This technique requires that roof water be harvested and channelled into existing tube-wells, bore wells, or, especially, designed wells. It is most well suited to urban housing complexes or institutional buildings located in drought-prone arid and semi-arid regions. In Rajasthan, the government has made the harvesting of roof water mandatory in all new buildings with a roofed area of more than 1,500 square metres. Afghan authorities could propose the same sort of regulation for all urban settings, including the cities of Kabul and Kandahar.

Large-scale dams or small-scale water harvesting?: Debate continues over the benefits and limitations of large- and small-scale infrastructure interventions (see the examples of the pros and cons in table 7). In the con-

Table 7 **Some advantages and limitations of large scale storage and small-scale harvesting methods**

Large scale storage		Small-scale harvesting	
Advantages	**Limitations**	**Advantages**	**Limitations**
• Can mitigate variability of water flows and rainfall • Can improve access to irrigation • Can secure access to drinking water • Can support renewable energy production	• Possible risks of displacements and related social unrest • Possible social and ecological damages • High siltation rate reduces • Possible damages of wetlands • Possible reduction in fish stocks • Prone to tensions with neighboring countries • Requires comprehensive and transparent management & operation plans which require reliable & long term data series currently unavailable for Afghanistan	• Localized storage (closer to people) • Not prone to tensions with neighboring countries • Can make use of indigenous practices • Low cost • Reduces intensity of floods and droughts	• Many small projects needed and thus long term investment required to achieve significant coverage and impact • Difficult to manage

Source: Based on UNOCHA (2009).

text of Afghanistan, it is not a matter of simply one or the other. Both are needed.

Irrigation infrastructure rehabilitation, including low-cost technologies: The rehabilitation of canal infrastructure is a priority if irrigation is to become more efficient. One good example of this is the World Bank–funded Emergency Irrigation Rehabilitation Project being implemented by the Ministry of Energy and Water with the support of the Food and Agriculture Organization of the United Nations.

If rehabilitation is to be successful, it is crucial that communities participate in the design and implementation phases. This could be undertaken through newly formed water user associations and irrigation associations and with the support of sub-river basin agencies and councils (see chapter 5).

Planners and policymakers should focus not only on large-scale infrastructure, but also on low-cost micro-irrigation, which is well suited to irrigation plains, as well as remote valleys. Low-cost drip systems and water extraction technologies such as treadle pumps are particularly suitable for small-scale irrigation.

Reducing irrigation water demand

While improving water supply is a priority in water-abundant river basins, decreasing the demand for irrigation water might be a greater priority in water-scarce river basins. The latter would mean reducing crop water requirements and improving the efficiency of water delivery to plots.

Promoting less water-intensive crops and cultivation methods in irrigated areas: Testing and adopting seed and crop varieties that are more tolerant to drought conditions may help the poorest households avoid resorting to survival strategies. Neighbouring countries, such as Iran and Pakistan, that share water resources with Afghanistan could provide support through technology and knowledge transfer projects. This would build trust, enhance transboundary relations and lead to mutual benefits.

In some parts of the country, particularly the Panj-Amu and, to a lesser extent, the Northern and Harirod-Murghab river basins, rice cultivation has become an issue owing to the significant irrigation water requirements (see chapter 4). Successful trials have been undertaken in recent years through the introduction of the system of rice intensification, a method of rice cultivation that requires 20 to 50 percent less water, while ensuring increased yields of 50 to 100 percent (see chapter 4). Such successful trials need to be encouraged and expanded.

Improving efficiency through more effective water management in farm fields: Substantial water savings can be achieved in on-farm water delivery. Most irrigation systems in Afghanistan are inefficient, exhibiting efficiency rates as low as 25–30 percent (40 percent efficiency is considered reasonable, and 50

percent is considered good). On-farm water management techniques such as improved furrows, land levelling, or mulching should also be tested and implemented where they are successful. These techniques need to be urgently prioritized in regions characterized by extreme scarcity (such as the Northern river basin) and limited opportunities to develop water supply.

The promotion of cropping and cultivation methods that utilize less water and improve water use efficiency should focus on water users, but also on local government agencies. In the effort to extend best practices in on-farm water management, it is critical to build the capacity of government staff, including extension officers in the departments of agriculture, irrigation and livestock.

Soil and water conservation for long-term flood and drought mitigation

While large- and small-scale storage may represent a short- or medium-term solution to water scarcity, sub-river basin and rangeland conservation and management are necessary for long-term drought and flood mitigation.

Watershed and rangeland conservation and management: In Afghanistan, the extensive degradation of the natural resource base means that soil and water conservation is a necessary component of sub-river basin management. Soil and water conservation enhances the conditions for biomass regeneration and erosion control. Both flood vulnerability and sensitivity to drought would be lessened through effective catchment conservation and water harvesting practices. However, little attention has been paid to these practices in recent years.

Efficient sub-river basin management involves soil and water conservation measures, including the following:

- Agronomic measures such as contour cultivation and mulching.
- Vegetative measures such as grass strips, hedge barriers, windbreaks and brushwood.
- Structural measures such as terraces, banks, bunds, palisades and water harvesting.
- Management measures such as changes in land use, area closure and rotational grazing.[98]

Institutional and organizational initiatives, including in rangeland management, will be necessary to foster sustainable natural resource use in upper catchments. This will require the establishment of local decision-making bodies and agreements on community rangeland management, in addition to technical and material support, accompanied by the active input and participation of members of local communities, especially herders and farmers.[99]

Implementing integrated water resources management in all river basins

Differing levels of scarcity characterize the five river basins of Afghanistan. This means that supply and demand management plans will need to be tailored. As the core concepts in water resources management in Afghanistan, the Water Law has adopted integrated water resources management and river basin management through multistakeholder platforms. These platforms promote the following concepts:

- Decision-making involves water users, not only government agencies.
- Water resources management should be carried out according to river and sub-river basin boundaries (see chapters 4 and 5).

Setting-up multistakeholder platforms and ensuring the representation of all categories of water users: River basin councils, which represent water users, need to be established immediately and become fully engaged in any water resources management projects and plans. Projects are much more likely to be sustainable if a broad spectrum of water users are involved in drafting and approving plans. The participants should include marginalized groups such as the Kuchis, who have a vested

interest in protecting their pastoralist livelihoods by avoiding unnecessary conflicts with farmers and individuals living in settled communities.

Developing river basin management plans based on water resource development priorities: Projects decided upon through multistakeholder platforms should be piloted at the river and sub-basin levels. River and sub-river basins show different profiles in terms of the availability and use of water resources. It is therefore critical to decentralize decision-making in the establishment and implementation of development plans. Whether such projects should focus more on supply or more on demand management depends on the characteristics of the river basin, including levels of scarcity, vulnerability to climate shocks, socio-economic profiles and livelihood priorities (such as rural or urban development).

Prioritization among water uses, including drought management plans: Although the populations in a number of basins, such as the Panj-Amu, may not yet be experiencing tensions revolving around water sharing, it is clear that, in the other river basins, population growth means that urban centres are increasingly competing with agricultural users. In addition to developing supply and reducing demand, the establishment of water sharing regulations is critical, particularly during periods of drought. Successful implementation may be limited, however, so long as enforcement capacity is weak.

Implementing integrated water resources management will require considerable capacity-building, including training among representatives of various categories of water users and line ministry personnel who support river basin agencies. The training should encompass, for example, integrated project planning, river basin management, water allocation procedures, monitoring and methods to ensure that participatory decision-making is an integral part of the process. Detailed and comprehensive plans for capacity development need to be drafted for each sub-basin and take into account locally specific constraints and opportunities.

Develop the capacity to implement groundwater policies

Protecting groundwater resources both quantitatively and qualitatively should be a priority in policy development. Ensuring that groundwater is effectively managed as a strategic reserve and safeguarded during periods of drought or poor availability will be critical to preserving access to domestic water.

Prioritizing sub-basin groundwater during periods of drought: The Government of Afghanistan now recognizes that groundwater is a strategic reserve and that it must act to ensure that sub-river basin agencies begin restricting development and the overexploitation of this critical resource, particularly during periods of drought. Key to supporting this hard decision will be the technical expertise provided by the international community.

Special efforts are needed to control the number of motor-driven pumps used for irrigation during periods of drought. These pumps should be deployed only if it is absolutely necessary, that is, if doing otherwise will lead to greater poverty or displacement, and only as a temporary measure. [100]

Close collaboration with local institutions such as water user and irrigation associations or community development councils will help ensure that groundwater policy is followed.

Developing expertise and skills among drilling companies: Drilling companies are being deployed to develop groundwater resources. However, these companies are insufficiently qualified to develop sustainable groundwater use and infrastructure. Particularly over the short term, donors, multilateral agencies and other international stakeholders will therefore need to provide the necessary equipment and knowledge to complete wells at an adequate technical standard.

Establishing source protection areas: The

government should establish protection areas around strategic groundwater supply installations, especially in areas that are highly vulnerable to pollution or contamination.

Promoting groundwater education: In a country with limited enforcement capacity, promoting education and the awareness of best practice in groundwater protection is critical. This is especially the case in the protection of groundwater resources because the related issues are complex. The public needs to be informed about the impact of high-yield wells on the karezes and shallow wells on which the poorest communities depend as their only sources of drinking water (see elsewhere above).

Improving data collection and forecasting systems

Data collection and analysis are an overarching requirement in the development and management of water resources.

Using data and analysis to refine the understanding of water scarcity in sub-river basins: Quality planning in water resources management depends on sound analysis, which relies on accurate and reliable data. The available data on water scarcity and the risks and uncertainties of water resources in Afghanistan are sufficiently accurate for a general discussion (such as in this chapter), but, in general, are not up-to-date and are of limited reliability. For example, because of the significant geographical variations in the availability and use of water resources, most analyses do not capture the problem of water scarcity in river basins sufficiently accurately and are sometimes misleading. Indeed, the risks of water scarcity and climate shocks are most well understood at the level of the lower hydrological units, such as the sub-river basin. Recent efforts to install gauging stations offer a medium- to long-term solution.

Install a groundwater monitoring network: The sustainable use of groundwater will only be achieved if a national groundwater-monitoring network is established. The initial priority should be areas that groundwater vulnerability assessments identify as at risk. The organizations responsible for groundwater-based urban water supply schemes should ensure that all wells are equipped with discharge meters and that water levels and water quality are monitored regularly. The data should be routinely reported to river basin agencies.

In the absence of a reliable network, the groundwater used for irrigation should be carefully conserved to avoid depletion and prevent the poorest households from losing access to potable water.

Develop drought and flood forecasting programmes: A system should be established across the country for the detection of drought and floods. The system should focus on providing timely information and fostering the drafting of participatory preparedness strategies.

Tools are currently being developed through the Panj-Amu River Basin Programme for predicting floods and drought on the basis of satellite imagery, supplemented by data on precipitation. The forecasts have generally corresponded to subsequent observations. The forecasts are now shared with water users and the line ministries collaborating in multistakeholder platforms. Thus, for example, the speed and efficiency of the deployment of staff and emergency supplies in Kunduz Province in June 2009 by the United Nations Office for the Coordination of Humanitarian Affairs to assist 500 households likely to be affected by floods that were being predicted through the Panj-Amu River Basin Programme highlighted the potential of satellite imagery to forecast catastrophic events and enhance flood and drought preparedness.[101]

Remote sensing data can help improve planning, overcome logistical challenges and ensure the timely delivery of relief efforts, particularly those undertaken in the remotest parts of Afghanistan.[102] The Famine Early Warning Systems Network currently provides early warning information about emerging and evolving food security issues

in Afghanistan. Such initiatives should be strengthened.

The Government of Afghanistan should also identify those zones that are most prone to floods. The aim should be to determine the regions that should be considered off-limits to human settlement and the type of large infrastructural development that could increase susceptibility to catastrophic flooding. Floodplain maps, supplemented by detailed satellite imagery, would help planners determine what areas are most likely to be affected. In addition, the government needs to educate the public about the danger of locating settlements along riverbanks or flood ways.

Experience shows that citizens and local governments must be involved throughout all stages of the planning and implementation process if this process is to be effective. Because participation has consistently represented a major challenge, political will and long-term commitment are required to ensure that people living in the communities most affected continue to have a forum to express their views.[103]

Raising the awareness about water conservation

One of the key areas in which governments can make a difference is raising awareness about the importance of water conservation at the household level. To accomplish this, the government will need to undertake a comprehensive survey of indigenous knowledge and the improved technologies for agricultural, industrial and household water conservation. Such a survey would form the basis for the establishment of best practices and improved water conservation techniques at the grass roots.

Formal and informal educational channels are essential to raising awareness. Although environmental education is limited in Afghanistan, integrating environmental studies into curricula in areas such as science and geography could help introduce neglected issues such as natural resources, environmental protection and conservation.

Because formal environmental education is so poor, planners will likely need to focus on the informal sector in the short run. Students and other interested individuals should be encouraged to organize seminars, workshops and lectures. Reports and articles in newspapers, television programmes, posters, and other media tools can be effective in reaching the public.

Most water conservation activities require changes in behaviour and attitudes, which can be a slow process. Therefore, *ad hoc* public awareness activities are not effective. Water authorities should plan ongoing long-term activities. Local institutions, such as the community development councils, water user associations and irrigation associations that have recently been established, can represent entry points for awareness-raising campaigns.

Using Islamic principles to promote water conservation messages is another way to raise public awareness. This approach can be integrated with other communication tools and channels. As community leaders, mullahs can provide valuable support if they are properly trained and well informed about the facts and figures. Local and Friday mosques (where residents of several villages gather in larger mosques) are also potential venues for the launch of public awareness activities about sustainable water conservation.

Capitalize on climate change support funds

Afghanistan is not responsible for global warming or the related climate change, but it is bearing the consequences. *Human Development Report 2007/2008* of the United Nations Development Programme calls attention to the concept of adaptation apartheid, whereby the wealthier countries that are responsible for climate change possess the resources necessary to mitigate the impacts, while the poorer countries that are not responsible do not.[104]

The National Adaptation Programmes of Action associated with the United Nations Framework Convention on Climate Change offer a process by which the least developed countries may identify priority adaptation activities on climate change. Such activities are almost identical to those urgently needed to mitigate seasonal variations in water availability during floods and drought, particularly given the increasing demands of the growing population. The National Environmental Protection Agency of Afghanistan has been coordinating efforts with the United Nations Environment Programme to produce the country's National Adaptation Programme of Action for Climate Change.

Because poorer countries will increasingly bear the brunt of climate change, it is the responsibility of donor countries to invest in adaptation responses. This will enhance growth by preserving ecosystems and reducing the vulnerability of Afghans and the country's frail economic sector. Investments in adaptation responses will save lives, economies and natural resources if they are targeted at those people who are most vulnerable to the effects of climate change.

Call for support in the preparation of dialogues on transboundary water management

Transboundary water management should target the specific challenges Afghanistan faces in engaging in dialogue with neighbouring countries.

Improve the hydro-meteorological knowledge base in Afghanistan and the region: Reliable information is required to identify appropriate policies and water development projects. The collection and maintenance of the relevant data require capacity-building. The donor community should consider capacity-building as a priority and a long-term commitment. In a bid to foster mutual trust, The EastWest Institute has proposed that a shared repository of hydrological data on each of Afghanistan's transboundary river basins be established under the auspices of a trusted third party.[105]

Develop the capacity and expertise of Afghanistan in water management: Sufficient technical capacity is needed to make use of the available data and to support the planning process in water resources management. The establishment of this capacity should reflect Afghanistan's current and future needs, while ensuring an equitable distribution of benefits among riparian countries. It is ultimately up to Afghans to lead in the development of projects and plans before sharing them with neighbouring countries.

Mobilize the support of the international community: As proposed by the EastWest Institute, the government could leverage the international attention on Afghanistan's security and development. Nonetheless, the country will need to define its own proposals and pursue its own interests, without compromising the interests of neighbouring riparian countries. Meanwhile, the prospect of financial assistance from the international community is a strong incentive to engage in transboundary discussions. In the case of the Indus Waters Treaty, financial assistance ($900 million) was a decisive factor in ending the stalemate. Thus, the international donor community should consider using the same types of incentives to help initiate dialogue and foster cooperation.

3

Water for human consumption and water for sanitation

"I would have protected my 3-year-old daughter from all unclean things and would never have given her the river water if I had known that it would kill her."
—A mother mourning the death of a child

"There is no latrine in our village; all the people go to the open fields. We do not make latrines in our homes."
—A man in Faryab Province

CHAPTER 3

Water for human consumption and water for sanitation

Authors: Dr. Abdul Khabir Alim, Atal Ahmadzai, Joelle Rizk

Poor access to water and sanitation has a serious impact on health, the incidence of poverty and the success of efforts aimed at human development. In Afghanistan, which is among the countries with the poorest access, the problem is acute in rural areas. It is exacerbated by inadequate waste management. Equitable access must be put at the centre of the development agenda. The government and donors should adopt approaches that are responsive to local demand and reflect a long-term commitment to the quality and quantity of the water resource. Changes in behaviour, political leadership and the recognition of access as a human right are among the solutions. Community participation is essential.

In the late 1890s, King Abdul Rahman issued an order to transport water from a spring located near Ibn-e-Sina Hospital to Kabul. His engineers used a closed masonry channel to bring water to several thousand communities. This marked a milestone in the modern history of efforts to connect the Afghan people to improved water services.

In 2010, the rate of access to improved water sources and sanitation facilities in Afghanistan was one of the lowest in the world. Providing access to improved water and sanitation is among the greatest human development challenges facing Afghanistan today.[1] Limited access to clean water helps lock Afghans into poverty. Failure to provide safe water and hygienic toilets is considered a violation of the right to life and dignity because it negatively affects the lives and development potential of Afghans.

Before 2001, the country's water supply infrastructure had fallen into disrepair. Since then, there has been a significant opportunity to rebuild the infrastructure and to provide Afghans with safe water and improved toilets. Despite the progress, however, high levels of water insecurity continue to threaten the efforts to reduce poverty and reach the targets set out in the Afghanistan National Development Strategy and the Millennium Development Goals (MDGs). At the current pace of progress, the 2020 MDG of halving the proportion of people without access to safe drinking water would be met by 2043, more than two decades late. Sanitation coverage in Afghanistan is the lowest in the world, and progress is stagnant. Yet, the water resources available in the country have the potential to supply the entire population. Thus, the water crisis is not a crisis of resources, but a crisis of governance.

This chapter examines the accessibility and sustainability of safe water and improved sanitation in Afghanistan. It begins with a reminder of the meaning of poor access to water and sanitation in terms of health deprivation. After highlighting the scale of the progress in the provision of safe water and sanitation in urban and rural areas, the chapter focuses on cross-cutting factors, including the lack of political will, capacity constraints and the largely

Afghan children bear the highest human development cost of poor-quality water and sanitation

uncoordinated responses to the challenge.

Progress towards the nationwide provision of improved water and sanitation is possible. Innovative public-private and community partnerships and greater cooperation among the government, non-governmental organizations (NGOs) and international stakeholders have the potential to assist in extending access to safe water and sanitation to even the most deprived areas of the country. The chapter emphasizes that the adoption of a rights-based approach to access to water and sanitation would represent a unifying principle for public action and would act as a strong moral claim and a source of empowerment and mobilization among all stakeholders and beneficiaries.

Water-Related Diseases in Afghanistan

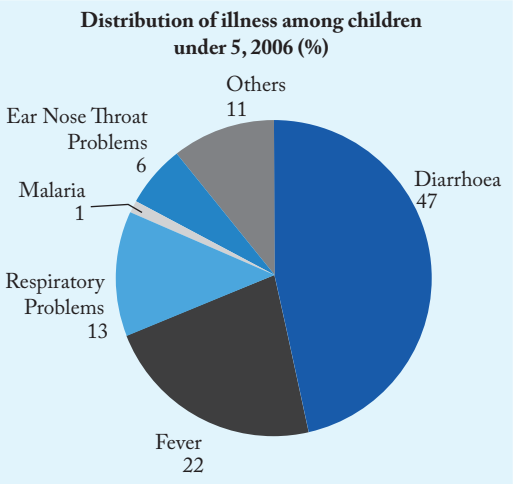
Despite a decade of commitment by numerous actors to the development of Afghanistan, many Afghans are still suffering and dying because of unsafe water and sanitation.[2] Only 27 percent of the entire population and only 20 percent of the rural population—the lowest rate in the world—have access to improved water sources. The accessibility to improved sanitation is even worse, 5 percent at the national level and only 1 percent at the rural level, making Afghanistan the worst place in the world for sanitation.[3]

Afghan children bear the highest human development cost of poor-quality water and sanitation. Estimates of the under-5 mortality rate in Afghanistan indicate that, per 1,000 live births, 161 children die before they reach their fifth birthday; in 23 percent of the cases, the deaths may be attributed to causes related to poor water and sanitation.[4] This means that, every hour, six children under 5 die because of the effects of diarrhoea. The infant mortality rate (children under 1 year of age) is 129 per 1,000 live births.[5]

Analysis of health management information system data reveals that an average of 43 percent (ranging from 22 to 51 percent) of the admissions of children aged 0–59 months across 70 hospitals were due to diarrhoea, including dehydration, bloody diarrhoea and other complicated cases of diarrhoea.[6] A study among 8,000 Afghans in rural and urban areas in 2006 found that diarrhoea was reported as the leading cause of illness among children under 5 years of age, at 47 percent of all cases (see figure 1).[7]

On average, Afghan children undergo six episodes of diarrhoeal disease each year.[8] Repeated bouts of diarrhoea contribute to an increase the occurrence of persistent diarrhoea, which is considered a cause of malnutrition. This, in turn, negatively affects the mental and physical development of the child. Among children aged 6–59 months, 54 percent suffer from stunting, and over 67 percent are underweight.[9] Impaired nutritional status renders the children more vulnerable to diarrhoea. Children who are malnourished are also susceptible to other health disorders

Figure 1 **Diarrhoea: the leading cause of illness among children under 5**



Note: The figure shows the percentage distribution of illness among children under 5 years of age reported during the 30 days prior to the study (2006).
Source: MOPH (2006).

with lifelong implications in terms of cognition and physical development. Such children are also less able to concentrate and to learn and may not perform as well in their professional lives later on.

Parasitic infections contribute significantly to poor health status and missed opportunities for human development. Intestinal helminth infection leads to iron deficiency, which facilitates anaemia. Anaemia among women is associated with low birthweights, premature births and disability among offspring. Among offspring, but also more generally, anaemia is associated with malabsorption of the nutrients from food, or malnutrition. Helminth infection also challenges physical growth and hampers cognitive development among school-age children.

Helminth infection is the most prevalent burden among people living in poverty. It arises because of poor-quality water and sanitation, as well as inadequate hygiene. A cross-sectional examination of 1,001 children aged 8–15 has revealed that approximately half (47.2 percent) are infected with at least one type of helminth.[10]

Diseases among children due to poor water and sanitation induce a high financial cost, particularly among poor households. A study in 2006 showed that Afghans who sought health care outside the home spent, on average, AFN 500 (equivalent to $10) for each episode of an illness. For 9 million Afghans who are living below the poverty line (AFN 1,255 per month), this represents around 40 percent of monthly income. [11]

Around 73 percent of the population still relies on improvised and inadequate facilities to supply water

Water Accessibility and Urban and Rural Practices

During three decades of turmoil in Afghanistan, water supply infrastructure has been neglected or destroyed, while the relevant institutions responsible for management and service delivery have collapsed.

Since 2001, there have been improvements in accessibility rates in rural and urban areas through government- and donor-driven projects. The achievements observed in some urban areas include greater access to piped water. The growing share of households enjoying access to municipal schemes has been encouraging in cities such as Herat (85 percent), Kabul (35 percent) and Kunduz (50 percent).[12] The construction of around 100,000 new water-points since 2001 is another clear illustration of progress.[13]

Despite these achievements, around 73 percent of the population still relies on improvised and inadequate facilities to supply water, while water sources are becoming increasingly polluted and overexploited in places such as Kabul.

Beyond improved and unimproved water sources

The availability of reliable and consistent information is a key challenge for national and international policy makers. The lack of reliable, up-to-date information to assess the status of and progress and trends in the water and sanitation sector is another obstacle hampering progress. Comparison between baselines is also a dubious task. For example, according to the National Risk and Vulnerability Assessment (NRVA) in 2007–2008, 27 percent of Afghans have access to improved sources of drinking water, but this information is inconsistent with the data provided by the World Health Organization/United Nations Children's Fund (WHO/UNICEF) Joint Monitoring Programme for Water Supply and Sanitation, which is responsible for presenting a global view on these trends (box 1). This discrepancy has arisen mainly because of the use of different definitions for improved water sources.

One should bear in mind that using the improved water source definition—no matter which definition is adopted—can be misleading if a direct relationship to access to safe water is to be drawn. This is because the definition of improved water source does not encompass all dimensions of water security, namely, quality, quantity, proximity and reliability. Patterns of water use are more complex and dynamic than the improved and unimproved categories suggest. Data on coverage do not take into account poor quality or intermittence in supply. For example, a handpump in Kabul functioning only intermittently to supply contaminated groundwater is considered an improved source according to these definitions, while a natural spring in the central highlands that might be free of microbiological and physiological contaminates and that supplies water 24 hours a day everyday is considered unimproved. Thus, improved water sources are not necessarily safe sources. Furthermore, if one uses an im-

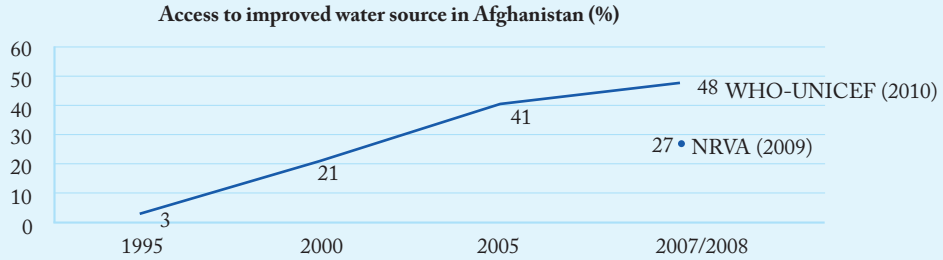
Box 1 Improved water sources: correcting a misdiagnosis of the crises

National and international statistics draw a distinction between improved and unimproved access to water. Improved access is defined as access that, by nature of its construction or through active intervention, is protected from outside contamination, in particular from contamination with faecal matter.

The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation estimated access to protected water sources in 1997 and 2000 based on data of the UNICEF Multiple Indicator Cluster Surveys. For 2005 and 2008, the monitoring programme relied on NRVA data collected in 2005 and in 2007–2008.

The NRVA and the Multiple Indicator Cluster Surveys use the same definition for improved water source. As part of the household questionnaire in 2005, the NRVA collected data on piped water access, wells, springs and handpumps, which are common in most places in the world, but also collected data on water sources specific to Afghanistan. These latter include karezes, *arhads* and *kandas*, which are traditional water supply systems used in Asia and a few other parts of the world with the appropriate geology. Similar to infiltration galleries, karezes are sloping channels or tunnels dug nearly horizontally into an alluvial fan that connects to a water source, layer, or other geological formation. In Afghanistan, people have depended upon karezes for drinking and irrigation water for centuries (see chapter 2). The arhad system lifts groundwater from shallow wells with the help of a Persian wheel (the arhad) to supply water to fields. Kandas are open depressions or excavations in which surface water, snow, or rainwater is collected for livestock or, during dry periods, domestic uses. These three sources are important for water access, but they are not all protected sources. This means they are of insufficient quality to provide improved water access.

While the NRVA in 2005 and the NRVA in 2007–2008 collected data on these three sources, the NRVA does not include them in the assessment's final estimates of improved water access. The joint monitoring programme estimate for 2005 does include this information, however. As a result, estimates of water access in Afghanistan are inflated, and, consequently, the scale of the water access challenge in Afghanistan is often understated.



In line with the NRVA in 2007–2008, this report relies on the following classification:

Improved	Unimproved
Pipe schemes, handpumps, bored wells, protected spring water, rainwater collection	Shallow open wells, unprotected spring water, arhads, karezes, rivers, lakes, channels, kandas Dams, pools, drainage, mobile water tankers (bowsers), water tankers, bottled water or mineral water

Note: 1995 and 2000: based on UNICEF (1998, 2001); 2005 and 2008: based on MRRD and CSO (2007, 2009).
Sources: MRRD and CSO (2009), WHO and UNICEF (2010).

proved water source, this does not mean that the source is necessarily reliable. People access water from multiple sources that may be improved or unimproved. Indeed, among the 6.1 million people in Afghanistan (or 26.5 percent of the population) who access multiple water sources, only 28.2 percent access improved multiple sources; a majority of these (61.8 percent) live in urban centres, while most of the others (21.1 percent) live in rural areas.[14]

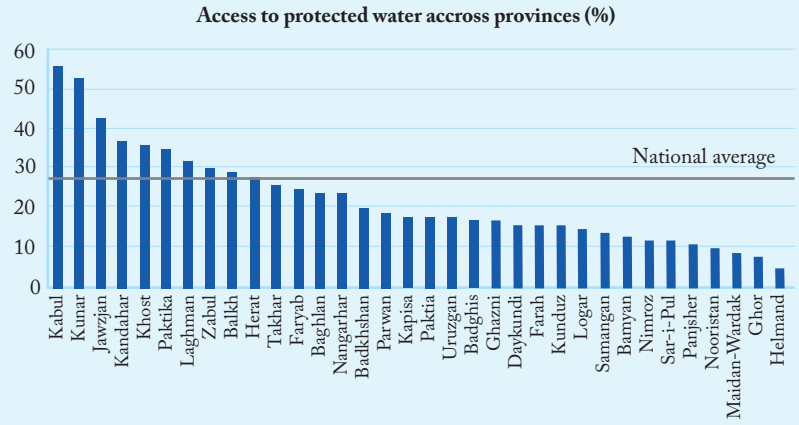
Thus, monitoring the progress towards safe, adequate access requires more than an assessment of whether the main sources are protected or unprotected. The development of participatory appraisals through qualitative and quantitative methods is needed to gain a better grasp of the progress towards meeting the water-related MDGs and the challenges remaining.

Despite these caveats, the improved-unimproved distinction is a worldwide reference point that has been used in the NRVA to monitor access. We shall therefore use it in this report.

Distribution in provinces: undermining the principle of universality in water access

The coverage of improved water sources differs significantly from province to province. Coverage ranges from 56 percent in Kabul to a drastically low 5 percent in Helmand (figure 2). In Kabul, there has been a strong focus on the rehabilitation of water systems. Additionally, access to improved water sources—mainly through protected wells—in the high-population capital city is also a determining factor in the relatively high accessibility in Kabul Province. Some provinces have low accessibility because of technical constraints owing to geographical particularities. For instance, in Samangan Province, the water-table is low, and water access is thus difficult and costly to develop. Yet, in most cases, the causes of poor accessibility are mainly related to insufficient aid and limited governance and management performance. The preferences and priorities of donors also affect the location of aid delivery.

Figure 2 **Accessibility rates across provinces**

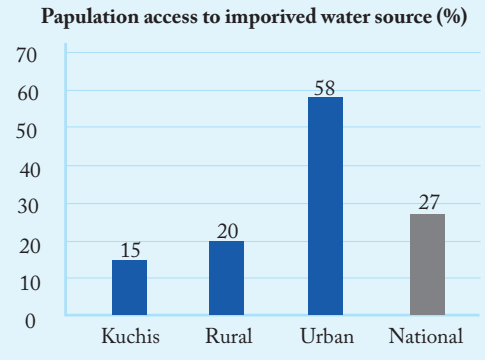


Source: Calculated based on MRRD and CSO (2009).

The urban-rural divide

Beyond the provincial disparities, access to improved water sources is characterized by a strong urban-rural divide (figure 3). The national average access to safe drinking water is 27 percent, but only around 20 percent is accounted for in rural areas, where 75 percent of the population resides.[15]

Figure 3 **Access to improved water sources is characterized by a strong urban-rural divide**

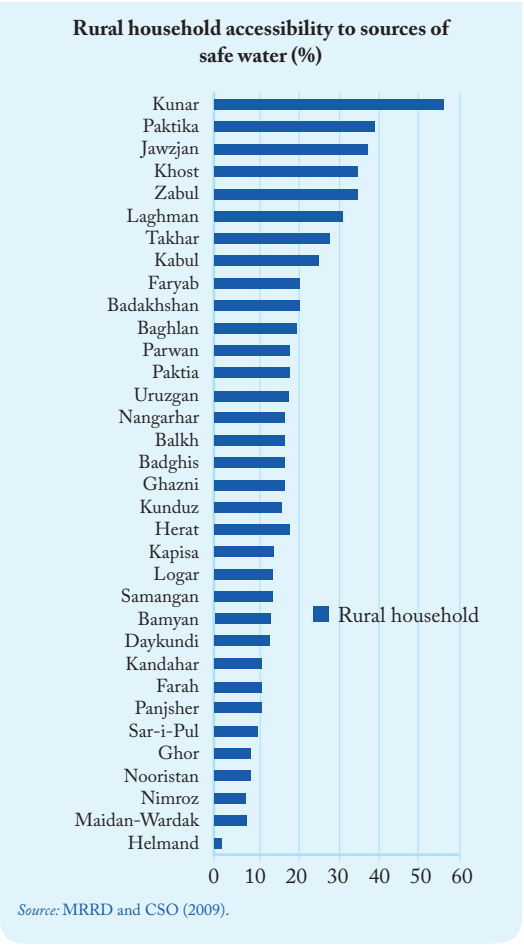


Note: Kuchis are nomads.
Source: MRRD and CSO (2009).

There are also great disparities among rural populations across provinces in the access to safe drinking water. Kunar Province shows the best access, while Helmand Province is at the bottom, with about 5 percent access (figure 4).

The average distance to a water source is highly variable from year to year

Figure 4 **Uneven rural access to safe water across provinces**

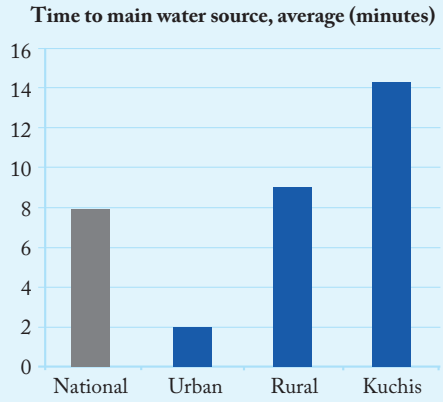


Source: MRRD and CSO (2009).

In an average year, the urban-rural disparity in proximity to improved water sources is not significant (figure 5). According to the NRVA undertaken in 2007–2008, a normal year, around 89 percent of the rural population reported that the walking distance to their main water sources was not substantial.[16] Only 2 percent reported a walking distance of one to three hours.

However, the average distance to a water source is highly variable from year to year. An assessment during a period of drought would produce more troubling numbers. Communities have reported that residents must travel great distances to collect water after the main water sources dry up. Case studies have indicated that residents of some rural communities may have to walk up to four hours to collect water.[17] During periods of severe drought, displacement and migration are non-exceptional consequences of the loss of nearby sources of drinking water (see chapter 2). The reliability of drinking water sources such as springs and karezes can be highly variable, impacting on the water security of numerous households. A case study in a village in Samangan Province is illustrated in box 2. If water availability is compromised to the extent that households become dependent on the water supplies of other communities, the consequences and the transaction costs involved in coping take a high toll on children's health and may generate conflict.

Figure 5 **In a normal year, accessibility to a main water source does not represent a major problem**



Note: Kuchis are nomads.
Source: MRRD and CSO (2009).

Access to piped networks: an urban privilege

Nationwide, only 8 percent of households have access to piped water. Moreover, this low share is heavily skewed towards urban areas, where 22 percent of households benefit from access to piped water.[18] In contrast, only 1 percent of rural households have such access (figure 6).

Access to piped networks varies across cities. In major cities, access has increased since 2002. In Kabul, 35 percent of households have access to piped water, though services are unreliable. In the city of Herat, 85 percent of households have steady access to piped water, while 70 percent have access in Mazar-i-Sharif. In the city of Kunduz, al-

Box 2 The heavy burden of water insecurity in Chenar Gai Payan, a village in Samangan Province

The village of Chenar Gai Payan consisted of 400 households, but, because of a water shortage, 200 to 250 households migrated to other places in Afghanistan or to Pakistan. The following is the account of a man from the village about the issue.

"We had one spring in our village, but the upstream village dug a deep well that caused our spring to dry up. We don't have a well, and now the spring is also dried up. During droughts, people who had money migrated to other places. We remained in the village, and, with great difficulty, life goes on. One of our villagers went to the neighbouring village, which is two hours away on foot, to fetch water. He was not given water. He came back and told us. We and several elders went to the neighbouring village. A man from that village said that they do not give water to Taliban and that we should dig our own deep well. At this, we all became angry, and we almost fought with them, but we could not fight with them, because, if we did, they would not give us water the next time. The elders intervened in the dispute and made arrangements that we should pay AFN 10 per sheep or AFN 100 per hour for water from the other village. The arrangement did not always work, and sometimes they [the people in the other village] refused to give us water, and we were thus forced to drink the same water our livestock drinks, from the kandas.

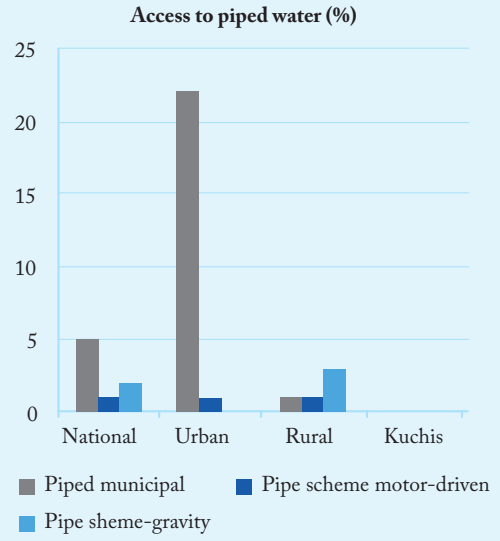
Our children go to the [neighbouring] village early in the morning and fetch water and then go to school. It takes at least two hours to reach home after fetching water. Sometimes, the children do not want to go for water. They bring three containers of 20 litres in one trip on a donkey, and they go two times a day: once before going to school and then once after school."

Source: CPHD interviews, 2010.

most 50 percent of households have access.[19]

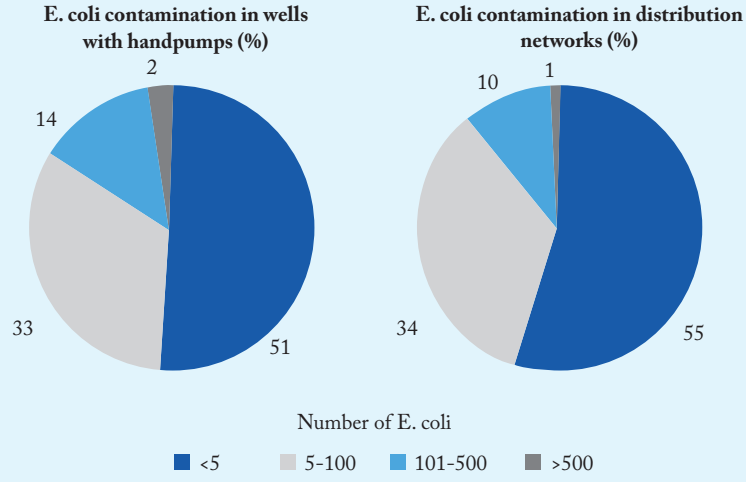
In Afghanistan, access to water through old piped networks is not a guarantee of better water quality. Because old systems are often ill maintained and leak, contamination by water pollutants is common.[20] Consequently, the quality of the water supplied through old piped networks may be no higher than the quality of water from hand-pumped wells (figure 7). The rehabilitation of old systems, as well as the maintenance of newly installed networks, is therefore paramount.

Figure 6 Piped water users are mostly in urban areas



Note: Kuchis are nomads.
Source: Calculated based on MRRD and CSO (2009).

Figure 7 Old water networks are no safer than handpumps



Note: Data are based on a sample of 1,400 households. After data by Timmins (cited in Banks and Soldal 2002)
Source: Houben and Tünnermeier (2003).

The remaining urban households rely on public standposts, protected spring and bore wells in compounds and unprotected shallow wells.

The challenge of unplanned settlements

Since 2002, the population of major cities has increased significantly. Over the last eight years, around 5.6 million Afghan refugees have returned to their homeland, and a majority have settled in cities.[21] The number of internally displaced persons (IDPs) is es-

The high economic cost associated with gaining access to water represents a burden for the poor population of these settlements

timated at about 300,000 as a consequence of mounting insecurity, land disputes and drought.[22] Around 70 percent of the urban population now lives in unplanned areas or in illegal settlements.[23] In Kabul, 80 percent of the population lives in unplanned settlements. [24] Poor sanitation and lack of access to safe drinking water are common in such areas. Access to water was indentified as one of the three main needs among returnees in Afghanistan.[25] A case study commissioned by the Centre for Policy and Human Development (CPHD) depicts a dire situation among the most vulnerable groups, particularly because gaining access to water is a costly and dangerous exercise (box 3).

A few unregistered companies that supply water using water networks, tankers, or animals have sprung up over the past years and are growing. The transactions are exploitative and often cause tensions within and among communities. The high economic cost associated with gaining access to water represents a burden for the poor population of these settlements (box 4). For example, in some areas that rely on water tankers, the cost to ensure a daily supply of 25 litres per person for a family of eight ranged from AFN 1,000 to AFN 1,250 ($22.50 to $27.50) a month. This is equivalent to around a quarter of the salary of a government employee, AFN 4,500 ($100). Some households have reported paying up to AFN 8,000 ($177) a month to ensure a sufficient supply of water. In contrast, urban households pay an average of AFN 175 per month ($4) for water (see figure 9 below). In one case, despite the huge cost and the payment of an exorbitant initial connection fee, poor households were unable to obtain piped water through a newly established private firm. The households complained to the authorities, but without success, and they were forced to send children to fetch water at distant water-points.

When households have their water turns (known locally as water days), it is not uncommon for male household members—usually the income earners—to stay home to collect the water, thus forgoing a day's income, typically between $7 and $11. Children are also often involved in collecting water. Spending an average of one to two hours each day fetching water—as recorded in some unplanned settlements—has a significant negative impact on the education opportunities and health of children.

Conflicts over water are part of the routine of collecting water. This creates stress and affects the well-being of households. Territorial claims on water-points have emerged as a problem in IDP camps and unplanned settlements. As a consequence, families living far from water sources are regularly harassed by

Box 3 Accessing water in unplanned areas: a dire situation

"Many conflicts take place among community members; the families farthest away from water-points usually come here to get water, but there is not enough water for all households. This creates conflict, and, once, three people were injured by others with knives because of disputes over water."

A man interviewed in an IDP camp

"My son Tawab Mohammad is in fifth grade. He likes to play with his friends and to fly kites. The bad water in this area has made him sick. He has lost a lot of weight and has skin lesions. Now, he does not like to go school because, he says, other boys make fun of him. It makes me so sad to see him like this."

A mother from Zor Abad

"My father died, and I have seven younger brothers and sisters. I am enrolled in 11th grade, but I have to work as a tailor to feed my family. I must also collect water. Every day after work, I have to get water from down the hill. It is a difficult task. After returning home, I'm so tired that I fall asleep. When can I find the time to study? This year I have failed five subjects."

A boy from Deh Mazang

Source: CPAU (2010a).

Box 4 Informal private service providers may cause difficulties for the poor

In an area of Khair Khana, a popular neighbourhood on the outskirts of Kabul, more than 2,160 families have settled in planned and unplanned settlements since 1992. A large majority of the population is considered poor. The most common sources of domestic water for these households are deep wells and water tankers. Because the government has not been able to provide water services, households have come to rely on small privately run companies for water. One of these private companies collected AFN 8,000 to AFN 15,000 ($177 to $300) per household as an installation fee for a water network and promised to provide safe drinking water through pipes. However, the water supply was stopped only six months after the installation of the network.

As one local resident commented, "They robbed us; our money has been stolen, and we are not being provided with water, and we didn't have any choice [but to try this system] because we had lots of difficulty getting water from distant sources." Some of the respondents even reported that influential ex-commanders were involved in the scheme to collect money. According to others, the reason for the failure of the project was the private company's complete lack of knowledge of the groundwater status and extraction potential in the area. Two similar cases were also reported. The private companies have now disappeared from the area. It was discovered too late that these firms had been operating without proper registration as businesses. Complaints were addressed to higher authorities in Kabul, but the issue has not been resolved, and the communities are facing difficulties because of the financial loss and the lack of easily accessible water.

Source: CPHD research, 2010.

families living nearer to the water. Disputes among children waiting to collect water are also frequent.[26]

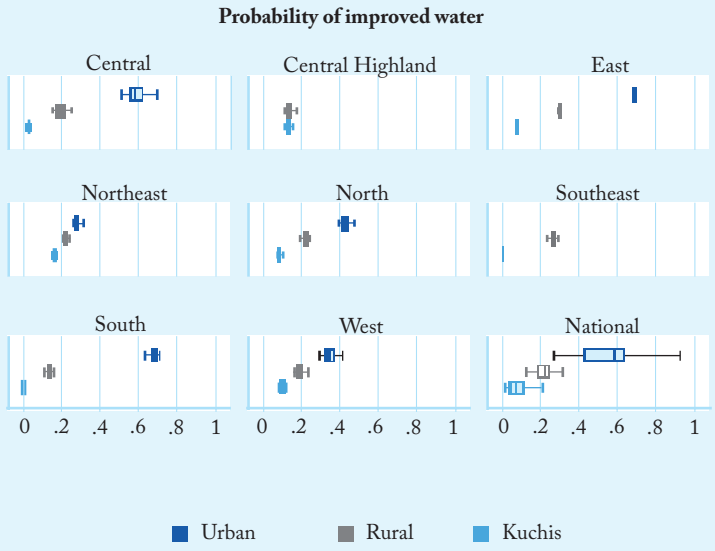
The most daunting problem in illegal settlements and IDP settlement areas, however, is sanitation. Shacks located on hilly plots cannot afford to construct improved sanitation facilities. When it rains, excreta are borne by surface runoff towards downhill shacks. The sanitation deficits increase the vulnerability of the inhabitants in the settlements and IDP camps. Most residents are forced to defecate in the open or in insecure pit latrines or dry vault toilets near their shacks. During the summer, the stench, the flies and the mosquitoes are severe nuisances. The lack of toilets and the unsanitary practices create serious health threats such as dysentery and diarrhoea for residents, especially the children.[27]

A majority of nomads are at risk

Kuchis (nomads) represent around 8 percent of the population of Afghanistan.[28] They are considered the most marginalized and vulnerable group in Afghanistan and, in terms of water security, are the least well off in many ways. In every region of the country, Kuchis show the lowest rate of access to improved water sources (figure 8). Across all subregions, urban households are 60 times more likely than Kuchi households to have access to improved water sources.[29] Kuchis also show the largest relative share of people who

Kuchis show the lowest rate of access to improved water sources

Figure 8 Probability of improved water sources: Kuchis communities lag far behind in every region



Note: The lines inside the coloured boxes indicate the median. Right edge of boxes: 75th percentile; left edge: 25th percentile. Lines extending outside the boxes: 99th and 1st percentile.
Source: Calculated based on MRRD and CSO (2009).

Nationwide, 95 percent of the population does not have access to improved toilets

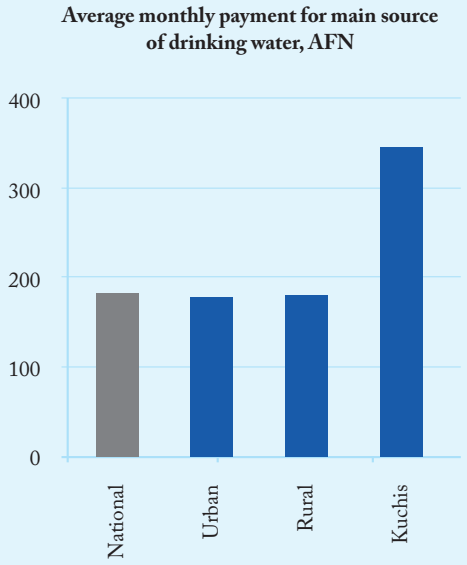
must travel from one to three hours to collect water. Indeed, they move their temporary settlements from place to place depending on the availability of water sources.

Nomadic women spend almost 30 minutes each day collecting water.[30] The share of Kuchi households that spend more than an hour to collect water each day is more than four times greater than the corresponding share nationwide. However, in some provinces, such as Badghis and Kunar, women report spending more than two hours each day travelling for water to meet household needs. This finding may only be valid for a year that is normal from an hydrological point of view (see elsewhere above). During periods of drought, the amount of time spent collecting water each day would be much greater.

Similarly, the share of Kuchi without access to any type of toilet, even an open pit latrine, is more than double the corresponding share nationwide.

Kuchis must also bear greater financial costs to obtain water. At an average of almost AFN 350 ($7) per month, a Kuchi household must spend twice the amount spent in urban or rural areas or nationwide (figure 9). Moreover, the current estimates on water payments focus only on household consumption; they do not cover the provision of water for livestock.

Figure 9 **Nomads spend the most to obtain water**



Source: Calculated based on MRRD and CSO (2009).

Sanitation Deficit

People without improved sanitation access

Many countries have made tremendous strides in enhancing access to improved sanitation facilities. From 1990 to 2008, 34 least developed countries more than doubled sanitation coverage.[31] Afghanistan, however, has yet to begin its climb up the sanitation ladder. Fractured institutions, poor capacity, low public awareness concerning the benefits of sanitation, and insufficient effort in the donor community are critical factors explaining why the sanitation coverage in Afghanistan is the lowest in the world.

Nationwide, 95 percent of the population does not have access to improved toilets. This reflects, in cold statistics, the affront to human dignity represented by poor sanitation. Overall access to improved sanitation facilities is low in rural and urban areas and across provinces, though differences exist in the types of sanitation facilities used. One in five Afghans resorts to bushes, or dearans or sahrahis (open fields). Around 65 percent of nomads defecate in the open, but only 1 percent of urban residents do so.

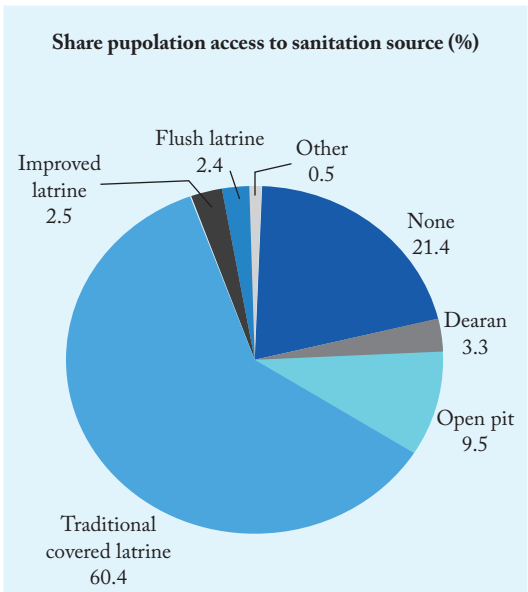
Differences in type of sanitation access vary across regions (figure 10). Four in five residents of the central highlands have no choice but to defecate in open fields or sah-

rahis. Four million residents of this region lack access to improved toilets, and it thus has the worst sanitation deficit of any region in the country; the share of households defecating in open fields is more than double the corresponding share in western Afghanistan, the second worst region, and 20 times greater than the share in northern Afghanistan, which shows the smallest share.

A majority of Afghans rely on the traditional latrine as their primary sanitation facility. Used by about 60 percent of households across the country (figure 11), it represents a significant advance over defecating in the open. Yet, it does not provide the health benefits of improved sanitation facilities. This is because the traditional latrine does not isolate the excreta from human physical contact and does not effectively dispose of the waste by taking it outside the home.

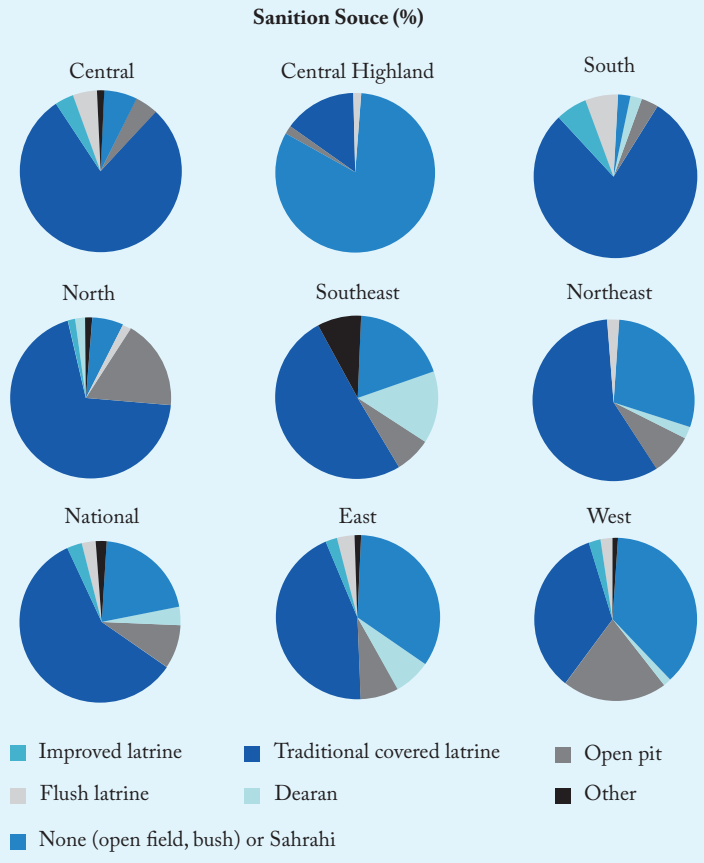
Figure 12 highlights the difference between rich and poor households in terms of access to sanitation facilities. The richest 10 percent (the top decile) in the population is 16 times more likely than the poorest decile to have access to improved sanitation facilities. While income status certainly contributes to this outcome among the poor, lack of awareness and low demand for improved sanitation also contribute.

Figure 11 **The traditional latrine: the main sanitation facility**



Source: Calculated based on MRRD and CSO (2009).

Figure 10 **Sanitation facilities differ across regions**

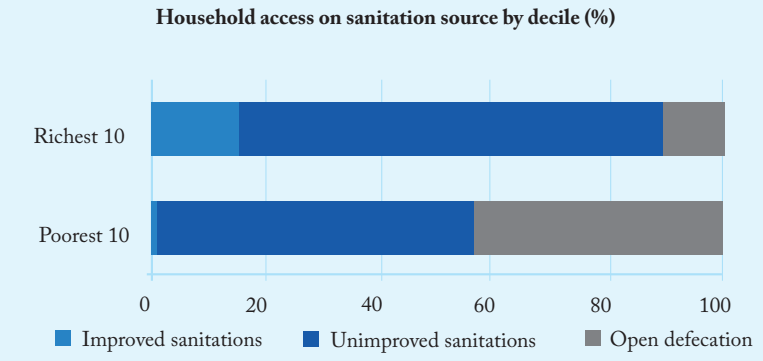


Source: Calculated based on MRRD and CSO (2009).

The measurement of changes over time in access to improved sanitation facilities is even more complex than the measurement of the progress in improved water sources (box 5).

Across nearly all regions of Afghanistan, the access rates for improved sanitation facilities lag far behind the access rates for drinking water. The only exception is the central region, where the access rates are about the same. In the western region, the access rate for improved sanitation is less than one eighth the access rate for improved water sources. These gaps must be closed to reinforce the links between health outcomes and access to water and sanitation. If sanitation infrastructure lags, the resulting untreated sewage will undermine any progress made by connecting households to improved water sources.

Figure 12 **Greater income helps enhance the access to sanitation facilities**



Source: Calculated based on MRRD and CSO (2009).

The neglect of waste management

Waste management in urban areas suffers from neglect. Prior to the 1980s, congestion in cities was less of a challenge. Sanitation departments were still able to collect and dispose of solid waste. This is no longer the case. In Kabul, for instance, population estimates in the late 1970s did not exceed 300,000 people, and the amount of solid waste was not beyond the management capacity of the municipal government or the absorption capacity of the environment. Now, however, because of the growing population and the stagnation in the capacity of the government,

Box 5 **Definitions matter: identifying improved sanitation**

How one assesses Afghanistan's progress towards achieving the MDG target of 66 percent access to improved sanitation by 2020 depends on how one chooses to classify the traditional covered latrines (dry single-vault latrines) found throughout the country. Traditional covered latrines are the most common type of sanitation facility in Afghanistan. They are used by about 60 percent of the population. Thus, if traditional covered latrines are included as improved sanitation facilities, then nationwide household access stands at 65 percent, only slightly below the MDG target. If they are not included, then household access drops precipitously to 5 percent.

According to the description of improved sanitation provided by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, a pit latrine with slab is within the improved threshold. This represents a relatively modest standard that may be satisfied by the traditional covered latrines found in Afghanistan. According to the NRVA in 2007–2008, however, traditional Afghan covered latrines represent an unimproved sanitation facility, and the NRVA finds that only 5 percent of households have access to improved sanitation facilities.

To understand why traditional covered latrines are considered unimproved requires a closer examination of the criteria behind improved sanitation and an understanding of the nature of the traditional Afghan covered latrine. According to the joint monitoring programme, the crucial criterion distinguishing improved and unimproved sanitation is whether the facility ensures hygienic separation of human excreta from human contact. Because it removes human excreta to a sufficient distance and reinforces this separation through the use of a slab, the pit latrine with slab achieves an hygienic separation. In this perspective, more than a third of Afghans have access to improved sanitation facilities.

However, the disposal of excreta also matters. Rural households usually either leave excreta in the pit or dispose of it near water sources, thereby contaminating areas from which drinking water is often drawn. Traditional covered latrines, while covered in a technical sense, are too poor in quality to ensure adequate sequestration and are insufficiently deep to remove excreta to a sufficient distance away from homes. Traditional latrines therefore fail to meet the definition of a sanitary latrine, that is, a latrine that does not do one of the following:

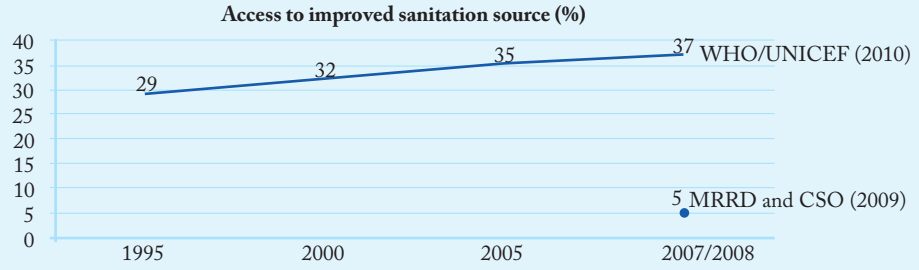
- Pollute or contaminate soil
- Pollute or contaminate groundwater
- Pollute or contaminate surface water
- Act as a medium for flies to breed or allow access to flies and animals
- Require handling
- Produce odours and be unsightly
- Require huge investments in money and technology

The 37 percent access rate to improved sanitation facilities reported by the joint monitoring programme for Afghanistan in 2008 is a projection based on the 2005 rate, which was calculated based on the NRVA in 2005 (see the figure). Comparisons between the NRVA in 2005 and the NRVA in 2007–2008 show a decline in the access to improved sanitation facilities, as well

(Continued on next page)

Box 5 **Definitions matter: identifying improved sanitation**

as in the share of the population with access to traditional latrines. These findings may be doubted, and this underscores the challenges involved in undertaking reliable data assessments and the difficulties in survey methodologies in Afghanistan. In any case, rapid population growth may be outstripping the rate of increase in sanitation facilities.



Improved sanitation	Unimproved sanitation	Open-air defecation
Improved latrine, flush toilet	Traditional covered latrine, open pit	Open field, bush, dearans, sahrahis

Note: 1995: UNICEF (1998); 2000: UNICEF (2001); 2005: MRRD and CSO (2007/2009).
Sources: MRRD and CSO (2007, 2009), WHO and UNICEF (2010).

the city lacks effective solid waste management.

The inadequacies in services are exacerbated by the inadequacies in the waste disposal practices of individuals. A 2004 study found that 47 percent of the population leaves household garbage on the streets, while only 51 percent takes garbage to dump sites, and 2 percent buries garbage within the household compound.[32] Waste left in open areas within municipalities produces strong odours, attracts flies and rodents and represents a threat to water and air quality. During summer, wind storms raise plastic bags and other light solid wastes into the air, and ear, nose and throat infections and diseases are common nearly throughout the year and affect around 13 percent of all children (see figure 1 elsewhere above).

With the exception of the Mickrorayan housing complexes in Kabul, no area in the capital or any other city has a functioning sewerage system. Even in Mickrorayan, sewage goes untreated. Wastewater is disposed directly into the Kabul River. In Afghanistan, most excreta are disposed on site, and only a small amount is handled through off-site septic tank or sewerage systems. Waste disposal relies on traditional vault latrines. The use of traditional latrines is an improvement over open field defecation, but is still inadequate. Agencies in Kabul and other urban and rural areas have recently introduced ventilated double- or single-vault latrines. There must be more scaling up.

Establishing functioning wastewater management facilities is extremely difficult in the capital for the following reasons:

Limited surface water supply: The construction and operation of sewerage systems need to involve upgrades in water supply capacity. A sewerage system requires a water supply able to satisfy a demand for 100 litres per capita per day. Unfortunately, demand in the capital city is already outstripping supply even at a relatively low requirement of 40 litres per capita per day (see chapter 2).

High capital expenditures: The construction of sewerage systems is much more expensive than the construction of water supply systems.[33]

Technical capacity: Developing and maintaining a sewerage system require knowledgeable and experienced staff. This is lacking in Afghanistan, and, without this, sewerage systems cannot be sustainably managed in coming decades.

Even septic tanks are not properly constructed, that is, in a manner that prevents environmental pollution, including groundwater contamination. In Kabul, shallow groundwater wells, which are 10–25 metres deep, are vulnerable to contamination from leaking septic tanks, but also from open sewers and waste deposits.[34]

Without an effort to raise the awareness of communities about the consequences of poor hygiene, no sophisticated hardware can sustainably correct problems

Hygiene Promotion and Behaviour Change

The provision of safe sources of drinking water and safe sanitation facilities is not sufficient to change living standards. Other, complementary interventions are also needed, including proper personal and environmental hygiene practices. Global estimates suggest that interventions aimed at improving hygiene lead to reductions in the frequency of diarrhoea by up to 37 percent, which is greater than the reductions achieved through improved water supply alone (25 percent) or sanitation alone (32 percent) (table 1).

Indeed, research has demonstrated that the impacts of water supply infrastructure projects are more significant if proper hygiene is also promoted. A case study in Wardak Province shows that households in a village that had received a combination of three interventions—chlorine distribution, hygiene education and tube-well development—was the only group that was associated significantly with a decrease in the incidence of diarrhoea (including bloody diarrhoea) relative to households in villages receiving only one or the other of the various interventions.[35]

It is thus crucial to recall that, without an effort to raise the awareness of communities about the consequences of poor hygiene, no sophisticated hardware can sustainably correct problems. A number of countries in which hygiene promotion is included in school curricula have made great strides in reducing diseases associated with deficient water resources and poor sanitation facilities. Hygiene promotion is the most cost-effective tool in controlling such diseases.

Various surveys have found that many people understand the importance of hand-washing in preventing diarrhoea, particularly hand-washing after using sanitation facilities. Several factors, including shortages of water, the absence of washing facilities near latrines or in kitchens, the lack of soap, and so on, prevent the application of this knowledge in practice (table 2).

Table 1 **Hygiene promotion is key to reducing the frequency of diarrhoea**

Intervention area	Reduction in frequency of diarrhoea, %
Water supply	25
Hygiene	37
Water quality	31
Sanitation	32
Multiple	33

Source: WHO (2009).

Table 2 **Hand-washing: knowledge versus practice, %**

Practices	Small-scale household survey, Kabul, December 2007	Safe Water Systems Project, Wardak Province, 2006	
	Knows or stated the importance	Knows or stated the importance	Practising
Hand-washing after defecation	87	52.5	9.0
Hand-washing after changing baby	27	30.2	4.9
Hand-washing before preparing food	23	82.7	9.9
Hand-washing before feeding children	3	46.1	1.4
Hand-washing before eating	60	69.4	6.2

Source: Opryszko et al. (2007).

Why Water and Sanitation Coverage Is So Low

The Afghanistan National Development Strategy has identified several challenges in the delivery of clean water and improved sanitation. Chief among these are the lack of skills, reliable information and water-related data; poor water infrastructure and equipment; inadequate coordination among donors and water-related institutions, especially in the provinces; and low investment (see chapter 5).

Institutional capacity: In government departments, there is a lack of technical expertise in the design of water and sanitation projects and in monitoring the work of NGOs and subcontractors. There is also inadequate capacity for monitoring water quality at all levels throughout the country.[36] Provincial departments suffer from a lack of staff and skilled personnel, and there is a flight of expertise from provincial departments to NGOs and the private sector, where pay and resources are better.[37] For instance, it was reported in one institution that, of 1,050 staff, only 30 were actually qualified in the relevant areas of institutional activity.[38] In another case, a water lab had been installed in a government institution and then remained unused for many years because of operational deficiencies and capacity shortages.

Lack of sufficient material and spare parts: The lack of spare parts is a major constraint on the sustainability of water system infrastructure. An estimated 30 to 50 percent of all water-points fail to sustain water delivery a minimum of two years, and there are many other problems at the operational level.[39] The timely availability of quality construction materials and equipment are among the chief causes of this outcome.

A case study in Surkh Rod District (Nangarhar Province) found that 16 of 52 wells available for the use of communities were not working, partly because of the lack of spare parts.[40] Communities complained that spare parts were not locally available for the handpumps that had been installed; stakeholders stated that spare parts take months to reach Afghanistan, mostly from Pakistan, and that the quality of the parts they receive is unreliable.

Manufacturers could be encouraged to produce the equipment locally by mobilizing local entrepreneurs and by ensuring an appropriate market environment. Local businesses would need the proper licenses to import the raw materials, and tax policy should encourage, rather than inhibit local industry. Manufacturers in other sectors such as plastics and steel could also be spurred to manufacture their products locally.

Lack of management information systems: The shortage of information is a major barrier to sustainable and efficient operations. The lack of tracking and of a uniform database across the country often leads to duplication in projects and unequal development. Thus, some villages may have more water-points than they need, while others lack improved water sources: a scenario that has occurred in Faryab Province.[41] Attempts to develop a comprehensive database have not been successful because of poor cooperation among agencies and inadequate follow-up by the government. In the absence of reliable, up-to-date information, the quality of project planning is limited, and project implementation is slowed. For instance, wells dug in communities by NGOs have sometimes produced water that is unusable because of excessive salinity that was not noticed because of the lack of information on water quality.[42]

Lack of coordination among partners: For many years, the lack of coordination among NGOs, donors, government entities and provincial reconstruction teams has generated duplication in projects and imbalances in the

An estimated 30 to 50 percent of all water-points fail to sustain water delivery a minimum of two years

distribution of aid. Recent efforts have aimed at enhancing coordination through a number of forums, including technical working groups, provincial coordinating bodies, meetings between provincial reconstruction teams and NGOs, interagency meetings, clusters, and so on, but coordination is still being hindered by a lack of information, skills, capacities and access.

At the national level, actors in the water and sanitation sector participate each month in the Water and Sanitation Group meeting chaired by the Ministry of Rural Rehabilitation and Development and the Water, Sanitation and Hygiene cluster meeting led by UNICEF. In the meetings, agencies present planned interventions and report problems. At the provincial level, activities are coordinated to a certain extent, but not all aid providers take part in the coordination effort. At the district level, there is no sectoral coordination, and powerful local leaders exercise influence without much transparency.

Lack of monitoring and evaluation: Monitoring and evaluation are crucial in ensuring the proper application of aid. Aid should contribute to outcomes that improve the well-being of the targeted populations. Implementing agencies undertake project and programme evaluation, but there is no sectorwide monitoring and evaluation.

A case study on a project to improve the supply of water in Surkh Rod District (Nangarhar Province) offers an example. Technicians were involved in the installation of handpumps and in training community members in pump maintenance. Although the project goal was to install 250 handpumps, only 82 pumps were set up, according to the implementing agency. Yet, the case study found only 52 installed pumps, 16 of which were not working. Moreover, few of the pumps had been placed in the planned location.[43] Project reports indicated wells were dug 60 metres and 100 metres deep, but community members and experts stated that the wells had only been dug to a depth of 40 metres.

Low demand for sanitation: In general, sanitation facilities and the construction of latrines are not a priority in communities; the demand is therefore low for related projects.[44] The absence of social marketing, the limited training and guidance in hygiene and the lack of policy campaigns mean that there is no foundation for social mobilization to raise the awareness of the benefits of sanitation and thereby increase the demand. In turn, this tends to affect the desire of donors to fund massive sanitation interventions.

Poverty barrier: Poverty represents a barrier to greater access to improved water sources and sanitation facilities. Poor households experience more insecurity, and they lack the financing and the skills to upgrade water infrastructure or access improved water sources.

Gender barrier: Social practices and gender segregation impact women's access to supplies of safe water and to sanitation facilities. Women are more affected by unimproved sanitation than men in terms of health outcomes. Women's participation and empowerment may boost the recognition of the need for sanitation and therefore raise effective demand.[45]

Inefficient community mobilization and participation: The insufficient time and resources invested in meaningful participatory processes during design, implementation and follow-up represent barriers to the sustainability of water and sanitation projects. This may partly explain the emergency orientation of many projects. Over the long term, these emergency approaches will not lead to steady growth in the coverage of improved water and sanitation.

The absence of efficient mechanisms for opinion gathering, decision making on installation and delivery, the performance of maintenance and management after installation and gender participation and community inclusion has limited community mobilization and participation.

Delivering Safe Drinking Water and Proper Sanitation

The first step in delivering safe drinking water and improved sanitation involves putting the issue high on the policy agenda. Access to improved water sources and sanitation facilities remains poor after almost a decade of international support; much stronger political leadership is therefore required. Reducing inequities in service delivery across provinces, between urban and rural dwellers and between formal and informal settlements should be given as much importance as increasing coverage. This may include adopting a new MDG benchmark for equity. Such a benchmark should at least become an integral part of national water policies.

Reaching equitable outcomes also suggests that there must be a coherent pricing policy and a strategy of targeted subsidies, as well as sound goals with regard to access.

Stronger engagement with communities provides a basis for progress. This includes assigning greater emphasis to an approach that is responsive to demand and that focuses on what users want and are able to maintain.

Political leadership is important

The biggest barrier to success in the drive towards universal access to water and sanitation is the lack of political resolve to put the issue at the centre of the development agenda. In particular, there is no single water supply and sanitation strategy for the country within the Afghanistan National Development Strategy. Access to drinking water is a priority in communities across the country; yet, this fundamental issue has not been elevated to become a pillar of national development policy.[46]

Although deficiencies in sanitation can offset any progress in the delivery of water in terms of enhancing the health and well-being of targeted communities, sanitation has not been given the importance it deserves. Domestic water and sanitation form a subsector in the broader strategies of line ministries and agencies, and water and sanitation activities are dispersed with little coordination across institutions. The responsibility to provide sanitation is currently spread out among the Kabul municipal government, the Ministry of Rural Rehabilitation and Development and the Ministry of Urban Development.

Establishing a dedicated water and sanitation ministry led by a senior minister would send a clear signal across government and society that water and sanitation are truly a national policy priority. This would also create an institutional structure capable of overcoming the fragmentation of policy and reducing the challenges in coordination.

Recognizing the right to water and sanitation

A starting point for public action in the effort to achieve greater access to improved water sources and sanitation facilities is the recognition of the right to water and sanitation.

In 2002, the United Nations Committee on Economic, Social and Cultural Rights declared that access to adequate amounts of clean water for personal and domestic uses is a fundamental human right of all people. In its General Comment 15, the committee noted that "the human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights."[47]

A central feature of the rights-based approach is the principles of equality, universality and freedom from discrimination. Exclusion from water and sanitation services on the basis of poverty, ability to pay, group membership, or place of habitation is a violation of the right to water.[48]

To meet the human rights principles, wa-

Establishing a dedicated water and sanitation ministry led by a senior minister would send a clear signal across government and society that water and sanitation are truly a national policy priority

ter should be as follows:

- *Affordable for all:* money and status should not be an obstacle to water services.
- *Accessible to all, physically and legally:* no groups within a community should be denied access because of any class, status, political, gender, or other factor.
- *Adequate:* clean, acceptable and safe.
- *Sufficient;* the WHO guidelines set a minimum of 20 litres per capita per day, although the amount has not yet been generally agreed.
- *Sustainable:* water-points should be sustainable for the use of families and communities.
- To meet the human rights principles, sanitation should be as follows:
- *Safe:* sanitary toilets that separate excreta from human contact and that safely dispose of waste.
- *Physically accessible:* toilets should be located close to users and should be accessible to children, women, the elderly and the disabled.
- *Affordable:* the construction or improvement of sanitary toilet facilities, including maintenance costs, should be affordable to all users.
- *Culturally sensitive:* cultural practices, including gender segregation, impose many restrictions on the movement of women; the location of toilets should be culturally sensitive to insure the dignity, privacy and safety of women and other vulnerable groups.

Although the water crisis in Afghanistan will not be solved only because of the adoption of a human rights approach, this approach represents a powerful moral claim and fosters the creation of policy tools to help prioritize improved water and sanitation. It promotes public awareness and the shared responsibility of water users. Experience in other countries shows that the right to water and sanitation can become a source of empowerment and mobilization and can raise expectations among the public (box 6). Afghanistan is undertaking efforts to develop and enable civil society, including though water user associations and community development councils. Recognition of the right to water and sanitation offers a strong foundation for holding government accountable for the provision of basic water and sanitation services. This is particularly relevant in the case of the poor and other vulnerable groups such as the Kuchis, IDPs and urban slum dwellers.

The provision of at least 20 litres of water a day to each person should be accepted as the minimum standard for compliance with the right to water. The government should establish strategies and policies to meet this target and set benchmarks to measure progress. National policies in water, sanitation and hygiene have set a standard of 25 litres per capita per day in rural areas and 50 litres per capita per day in urban areas and advocate for the use of sanitary latrines that are culturally sensitive as a norm in the delivery of water and sanitation services.[49] The Afghanistan National Development Strategy includes specific benchmarks in enhancing the accessibility to safe water in urban and rural areas. This is encouraging.

However, the recognition of the right to water and sanitation has not been realized. A right cannot be protected unless it is supported by nationally binding laws. Adherence to a rights-based approach in Afghanistan requires the development of laws, policies and procedures that will lead steadily to the realization of the right to water. As the South African experience suggests, there is a need for regular monitoring, which is now inadequate in Afghanistan (see chapter 5).

Though the governments of developing countries bear the primary responsibility for responding to the obligation to provide water for all, governments in developed countries also have a moral obligation to contribute. General Comment 15 of the United Nations Committee on Economic, Social and Cultural Rights recognizes a special responsibility of developed countries to support developing countries through the provision of interna-

Box 6 The right to water: the experience of South Africa

After the end of apartheid in South Africa, public policies and a rights-based legislative framework were adopted to extend the access to water and thereby help reduce inequality in South Africa.

The 1996 Constitution included a Bill of Rights enshrining "the right to adequate food and water". This constitutional right was given legislative content under the Water Services Act (1997) and the National Water Act (1998). Key provisions include the following:

- Clearly defined medium-term targets to provide 50–60 litres of clean water to all households, along with adequate sanitation for all urban households and 75 percent of rural households.
- Lifeline tariffs to ensure that all South Africans can afford sufficient water services for adequate health and hygiene. The government used its regulatory powers to require all municipalities to provide a basic minimum of 25 litres free of charge to each household. The target is to achieve free basic water for all by 2008, with no household more than 200 metres from a water source.
- Stepped tariffs to provide a cross-subsidy from high-volume users to low-volume users.
- Equitable share transfers that take into account the number of poor people in each municipality in the formula for fiscal transfers.

The new policies have achieved important advances. Since 1994, 10 million more people have benefited from access to safe water; coverage rates have risen from 60 to 86 percent. Some 31 million people are now served by free basic water systems.

Empowerment has been a less tangible, but important aspect of the reform. The Department of Water Affairs provides a national regulatory framework, but responsibility for implementation has been transferred to local governments. Regulation places obligations on municipal providers and elected local authorities and gives users a rights-based entitlement to demand that these obligations be met. In addition, municipal water companies are required to publish detailed information on water provision by district, disaggregated for poor and non-poor users.

As the reform has been rolled out, it has generated a political debate over design and implementation. Some argue that the 25-litre threshold for free basic water is too low. Supplies in some areas have been unpredictable, forcing households to collect water from far away. Moreover, government pricing policies have led to supply cutoffs for nonpayment in some areas, raising concerns about affordability.

Progress has been less impressive in sanitation than in water. There are still 16 million people— one in three South Africans— without access to basic sanitation. The absence of a consensus on an acceptable basic level of sanitation, allied to problems in generating demand, has contributed to the failure.

The South African experience highlights three crucial policy ingredients for progress: a clear national plan with well-defined targets, a strong national regulatory framework with devolution to local authorities, and constant monitoring of performance and progress.

Source: UNDP (2006).

tional assistance in this effort.[50] This gives governments and NGOs leverage in requesting donor support for water and sanitation services.

Reducing inequality and extending coverage to the poor

The current global MDG framework focuses on halving the share of national populations without access to water and sanitation. The dataset used to guide the MDGs in Afghanistan sets 2003 as the baseline: about 23 percent coverage.[51] Despite an upward trend, the current state of the progress in expanding access to drinking water in Afghanistan is unlikely to be sufficient to meet the MDG target of connecting 62 percent of the population to improved water services by 2020. At the current rate of progress, Afghanistan will not meet the MDG until 22 years later, in 2042 (figure 13). The slow rate of expansion in the access to safe drinking water highlights the severity of the water crisis in Afghanistan.

Overcoming inequality should be an integral part of national water policies. This is particularly relevant in Afghanistan given the highly inequitable water coverage across provinces, between urban and rural dwellers and between planned and unplanned urban settlements. Afghan national plans should

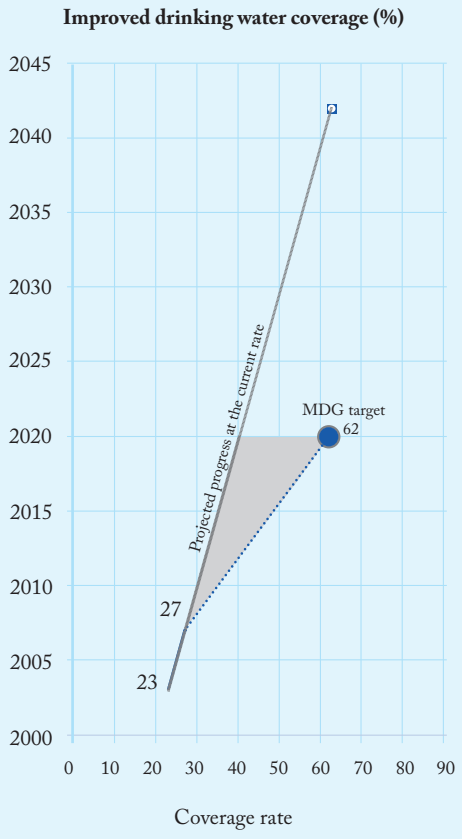
The current state of the progress in expanding access to drinking water in Afghanistan is unlikely to be sufficient to meet the MDG target for water

therefore focus not only on benchmark indicators of coverage, but also on indicators of equality. The coverage target should be supplemented by an equality target of halving the gap in water and sanitation coverage rates between urban and rural areas by 2020, and local governments should report on strategies for achieving the target and on outcomes. A similar target could also applied to the gap between the province with the best coverage rate and the province with the worst coverage. Adopting new territorial benchmarks will not be sufficient. Pro-poor targets will also be required, particularly in expanding coverage to unplanned settlements.

The most urgent challenge in water and sanitation is to extend access and improve quality among people who are inadequately served. All water providers should be bound by equity performance targets stipulating goals in extending coverage to unserved urban and rural communities, expanding stand-pipe provision in informal settlements and the delivery of free or affordable water to low-income households. Contracts drawn up within public-private partnerships should include targets in these areas, with full public disclosure, monitoring by an independent regulatory body and penalties for non-performance.

If service providers are unwilling to extend networks to households lacking legal title, fearing that this could jeopardize revenue collection, authorities may provide intermediate residency rights in established informal settlements. Authorities could also require that service providers supply water to everyone regardless of location, if necessary by providing financial guarantees or investment incentives.

Figure 13 **Missing the Millennium Development Goal**



Source: Calculated based on MRRD and CSO (2007, 2009).

The role of the private sector

Meeting the MDGs in water and sanitation by 2020 will require a dramatic scaling up both in the actions undertaken and in the speed with which these actions are implemented. What role could the private sector play? Elsewhere in the world, the debate about the appropriate role of the private and public sectors has become polarized. According to some, the private sector should be responsible for achieving the equity and efficiency needed to accelerate progress. Others question the appropriateness of the involvement of the private sector in meeting the needs of the poorest populations.

In 2009, the government approved the corporatization of all urban water supply and sanitation systems. Subsequently, the Afghan Urban Water Supply and Sewerage Corporation was established to transform poorly functioning public companies into organizations able to provide better services. The expected advantages of corporatization include the implementation of procedures for managing water projects, the creation of capable strategic business units to improve services, and the introduction of innovations in the field. The ability to make

a profit serves as an incentive for more efficient practices. Yet, there is still the risk that the poor may not be reached if they cannot ensure some profit to service providers. The poorest communities would thus continue to be obliged to rely on low-quality or contaminated water to meet daily needs.

In Afghanistan, the private sector could support the use of new low-cost technologies in the market for spare parts, for example, so as to enhance accessibility and the sustainability of water and sanitation infrastructure. However, high levels of corruption and insecurity, the complicated bureaucracy and the limited purchasing power of most Afghans would hinder the commercial viability of the involvement of the private sector in the delivery of water and the provision of sanitation facilities that are affordable to all. Obstacles must be overcome. The capacity of the government to realize good governance and proper accountability and to carry out the needed regulatory function is limited. There is a lack of transparency. A key prerequisite of effective service delivery is that communities should be able to hold service providers accountable, whether they are public or private.

Independent service authority and social policy strategies

Under current conditions in Afghanistan, it is probably unrealistic to expect traditional government services or an emerging private sector to confront the water and sanitation challenge in the near future. This means that poor water and sanitation will continue to contribute to serious human development failures among women, men and children. From a human development perspective, it is therefore essential to seek other channels for the provision of water and sanitation services, including NGOs and decentralization to local governments, as well as the national government and private enterprises.

The recent history of these services in Afghanistan highlights one basic point, however: the human cost of an uncoordinated, unsustainable approach to water services, alongside the near complete absence of support for sanitation. In the short term, the government, civil society and donors could build an alternative system for public investment: an independent service authority.[52] The key features of such an authority would be a high degree of scrutiny by civil society; competing channels for expenditure, encompassing public and private entities and NGOs; and continuous evaluation to determine what is working best. Representatives of government, donors and civil society would be members of the board of such an authority.

The independent service authority could be part of the government, analogous to an independent central bank, and its budget could be included in the government budget, but the authority would not be part of the civil service, and its role would involve contracting out service delivery rather than providing service delivery directly. Donors would fund the independent service authority through recurrent expenditures that would be predictable and reliable. The authority could also serve as a viable training site for sharing knowledge and building capacity in the sector.

From a rights perspective, the public sector must eventually be able to provide water services or monitor the private sector provision of such services. Nonetheless, an independent service authority may represent a feasible temporary approach within the difficult context in which services are acutely needed, yet largely lacking.

Civil society organizations could also be a formal part of the independent service authority so as to ensure that the voices of all Afghans help keep the authority and the government accountable.

Developing, testing and applying targeted subsidies and pro-poor pricing

The adequate financing of water services is a key to the expansion of access. The aim should

Meeting the MDGs in water and sanitation by 2020 will require a dramatic scaling up both in the actions undertaken and in the speed with which these actions are implemented

The adequate financing of water services is a key to the expansion of access

be to generate sufficient revenue to cover the recurrent costs of the services. Water tariffs should be determined so as not to exclude the poorest from access to piped water. Otherwise, the impact on health and development will continue to be negative. Because of the limited purchasing power of most Afghans, the generation of revenue through water services represents a major challenge. An evaluation of the costs to the poor should be conducted as part of the feasibility assessment of any proposed policy change.

As access to piped networks increases, the establishment of a lifeline tariff so that a specified amount of water may be provided at no cost to each poor household would represent an interim measure to help protect the right to water. In Afghanistan, the lifeline tariff model is not entirely practical. Because of low rates of connection, lifeline consumption cannot be applied in the case of poor households that are not on the network. Moreover, the arrangement requires metering, which is not widespread in the country.

The Afghan Urban Water Supply and Sewerage Cooperation is planning to implement cross-subsidies for water services.[53] The plan aims at using utility pricing to transfer some costs from lower- to higher-income households. The subsidies should be targeted to ensure that the non-poor pay a greater share of the costs of service provision than is the case in most countries. Yet, delivering subsidies through water tariffs is pro-poor only to the extent that the poor are on a water network.

Service providers should set charges to cover recurrent costs, and public financing should cover the capital costs of network expansion. Affordability is a key to equity. A rule of thumb is that no household should be spending more than 3 percent of its income on water and sanitation.

To hold providers to account, contract arrangements under public-private management agreements should set clear goals in expanding the access of households in slums, stipulating the number of households to be reached, the investment levels and the pricing arrangements. Non-performance should result in financial penalties. The same rules should apply to public providers, among which non-performance should be penalized through incentive systems.

An appropriate mechanism to supply spare parts should be identified and implemented.[54] The supply of spare parts can be improved if the parts are manufactured within the country. Equipment should be designed in such as way that parts that wear out can be easily manufactured using readily available materials.

Community participation is essential

Communities should be involved in determining the design and location of water and sanitation projects so as to maximize the potential positive impact. Community participation will create a sense of ownership, which will contribute to long-term sustainability. The capacity and level of awareness of communities must be taken into account in this process. Communities usually lack technical expertise in the effective operation and maintenance of infrastructure and hardware. It may also be difficult to acquire spare parts because of the distance to relevant product markets. However, technical capacity can be enhanced through training among community members. Access to spare parts can be improved by supporting local markets for the products or maintaining stocks of spare parts for the use of the communities.

In water and sanitation, as in most areas, governments work most effectively if they listen to the people. Partnerships based on participation create the potential for the rapid scaling up of individual local success stories (box 7). It is important that governments and donors work through an approach that is responsive to demand. This means that approaches to the provision of water and sani-

tation should focus on what users want and the technologies they are willing and able to maintain. Involving local communities can help in identifying appropriate low-cost technologies in the effort to improve coverage.

The establishment of an independent regulator to oversee water providers is vital in ensuring that water provision reflects the public interest. Putting poor people at the centre of service provision by enabling them to monitor and discipline service providers and by creating incentives for service providers to offer effective services is an overarching goal. Bringing the voices of slum dwellers, the rural poor and other marginalized groups into national policy debates requires fundamental political change.

Monitoring the quality of drinking water

The quality and reliability of the data on the supply of and demand for drinking water must improve. Water quality indicators must be regularly monitored to ensure that the quality of the water available to consumers is adequate. However, Afghanistan lacks the necessary infrastructure and expertise to ensure that water quality meets strict standards. The development of a comprehensive database is critical in establishing priorities and facilitating strategic decisions in the course of the planning and implementation of sectoral initiatives.

As part of its water, sanitation and hygiene policy, the government is requiring all water, sanitation and hygiene programmes, projects and partners to provide data on a quarterly basis to the Ministry of Rural Rehabilitation and Development for a sector management information system. If an agency does not comply with this requirement, an emergency review of its activities and terms of reference will be undertaken by the ministry on behalf of the government. Laboratories must be established in the capital and in other cities to train professional staff and implement mechanisms to promote sustainability in this important effort. As a first step, a major water laboratory should be established at Kabul University to guide and assist in the creation of a network of water laboratories throughout the country.

Box 7 The clean village: a success story that should be scaled up

The clean village concept was first initiated by UNICEF as a pilot project in one district in each of the 34 provinces. The project involved an integrated approach to the supply of safe water and sanitary latrines and the promotion of basic hygiene practices among families.

The project aimed at developing local capacities, enhancing monitoring and delivery systems, inducing changes in behaviour, instilling knowledge, and encouraging greater motivation and more effective resource mobilization among donors and governments and increased social mobilization and involvement among communities.

The project was a success. Each and every project household was provided with a sanitary toilet so that open-air defecation could be eliminated. All project families are now practicing hand-washing and following other personal hygiene recommendations. They have access to and use safe drinking water throughout the year. Local schools have well-maintained water and sanitation facilities. Water system maintenance technicians are available and able to respond quickly to local needs. Solid waste management is ensuring general cleanliness in the districts.

The 2010–2013 national policy is piloting the clean village model in five villages per district in all 34 provinces and is developing best practices as part of a nationwide programme. The pilot phase of the clean village initiative and policy framework has demonstrated that the full coverage of improved water sources and sanitation facilities, as well as behaviour change, is possible even in poor villages in Afghanistan.

Source: UNICEF (2009).

Using household filters

A small but powerful menu of water treatment options exists to raise household consumption. These include the installation of household filters, the application of solar disinfection methods and rain harvesting techniques in periods of scarcity. These interventions are rather simple and inexpensive (table 3).

Solar disinfection is among the most appropriate water disinfection technologies in Afghanistan, where poor households may become quickly overburdened by expensive treatment methods. Untainted, clean glass bottles filled to the brim with water can be disinfected by the sun in three or four hours.

Table 3 **Water treatment methods**

Conventional treatment methods	Appropriate technology	Advanced treatment methods
Screening	Household filters	Ion exchange
Sedimentation	Solar disinfection	Reverse osmosis
Aeration		Desalination
Filtration		Nanofiltration
Disinfection		

Source: WHO (2009).

Through this basic method, water becomes safe to drink after it has been cooled if it is consumed within 24 hours.

Focusing on long-term operation and maintenance

Without adequate operation and maintenance, water and sanitation projects will not be sustainable, and international targets—to halve the percentage of people without improved water sources and sanitation facilities by 2020—cannot be met. Because of poor operation and maintenance, many Afghans continue to rely on old and most likely contaminated water supplies. The government can play an enabling role by fostering an environment in which effective and efficient operation and maintenance can be developed. A national strategy for operation and maintenance must be drafted, and the relevant operation and maintenance capacity must be created.

The current system for supplying spare parts must be analysed and reformed.[55] The supply of spare parts can be improved if the parts are manufactured within the country. The parts and other equipment should be designed so that, if parts wear out, the replacements may be easily manufactured from readily available materials.

Promoting hygiene on a large scale

Hygiene promotion is a key in the provision of improved water and sanitation. Hygiene promotion makes people aware of the adverse effects of open defecation, which causes infection and disease. It is also a key complementary step in the provision of infrastructure solutions and in encouraging safer practices in water and sanitation. It helps foster local resource mobilization, which increases the ownership of communities and thus makes improved water and sanitation more sustainable.

A nationwide campaign is thus necessary and should be pursued so that improved sanitation facilities are sought by communities. Indeed, hygiene promotion requires a long-term commitment. It takes time to build fundamental awareness of the health costs of the lack of proper sanitation facilities and to establish new, safer practices, and it takes steady engagement to maintain community involvement.

Public campaigns that can spread hygiene awareness may include the following steps:

- The establishment of radio and television programmes to disseminate water, sanitation and hygiene messages and instructions
- The development of social marketing tools to spur demand for the design of safe sanitation facilities. This can be effective in accelerating sustainable coverage

For hygiene promotion to be successful, it has to be adapted as much as possible to local realities. Experience shows that it is not practicable to impose a uniform toilet or latrine design on users. Several designs should be offered so as to respond to variations in household preference and income. The choice should be left to the beneficiaries, who will

make a decision in line with their resources.

The role of NGOs is crucial in the implementation of a sanitation programme throughout the country. Among NGOs, the entire range of training initiatives, including in data collection, awareness campaigns, education, communication and follow-up, should be assigned to the same entity. Experience shows that, if the work is divided among various organizations, the division in responsibilities hampers progress.[56]

Support for formal education in universities and other academic institutions to advance capacity is critical. Technical courses and management programmes should be offered at vocational schools so as to build a capable workforce that can construct and maintain water and sanitation systems. The private sector should be encouraged to assist in filling this urgent gap.

Upgrading traditional latrines

The majority of Afghan households already designate a specific space for traditional latrines. Converting traditional latrines into pit or vault latrines can be accomplished at relatively little cost. Replacing the structure above the latrine with a stone masonry wall surrounding the pit or vault and installing vent pipes connecting the squatting plate and the roof are the key steps.

Construction of low-cost disposal systems

Low-cost systems for the disposal of excreta have been designed for conditions in which there is adequate water available for a wet latrine (pour-flush latrine) and for conditions in which a dry latrine (ventilated improved pit latrine) is preferable. The disposal systems most appropriate in Afghanistan are the single-pit latrine and the double-pit latrine. The single-pit latrine is suitable in places in which the available space is more limited. The disadvantage is that the excreta must be removed from the latrine while the excreta is fresh. There is thus the chance that the waste will be dispersed in the open environment.

Converting waste into a resource

The construction of facilities to convert human waste to bio-gas as a fuel for cooking or to heat buildings should be explored. Human waste can be mixed with animal dung and vegetables in digestion chambers to produce methane gas. Household bio-gas processors can be affordably constructed by large families, while communal bio-gas plants can be used by small families. Sulabh latrines are suitable in helping to manage waste in congested city settings.[57]

Ecological sanitation is an alternative approach to human excreta disposal that aims at recycling nutrients back into the environment and into productive systems. The aim is to protect human health and the environment, while limiting the use of water in sanitation systems. By recycling nutrients, ecological sanitation helps reduce the need for artificial fertilizers in agriculture. The implementation of ecological sanitation concepts has been tested through small projects that have been supported mainly by donors. The projects have been undertaken in Ghor, Kabul, Kunduz and Uruzgan and have shown positive results, although the installation costs may represent a constraint among the poorest segment of the population (box 8).

Technological fixes

Sanitation necessarily involves technology, which requires adequate investment. Beyond the moral reasons for providing improved sanitation facilities at the household level, there is a cost-benefit argument as well: the cost of improvement is a fraction of the financial burden of lost incomes, overburdened health systems and missed employment opportunities through higher education if nothing is done. Two key technological strat-

Support for formal education in universities and other academic institutions to advance capacity is critical

egies to accomplish this improvement are highlighted by the analysis in this chapter, as follows:

- The implementation of on-site sanitation facilities through the construction of double- or single-pit latrines in areas subject to water shortages
- The conversion of traditional latrines into improved single-pit latrines or, wherever possible, double-pit latrines.

Box 8 Ecological sanitation shows positive results, but is costly

The International Water Association and the German Agency for Technical Cooperation implemented a pilot ecological sanitation (ecosan) system in nine villages in Herat Province beginning in 2000.

A year after the installation of the ecosan system, a satisfaction survey was conducted. The results of the survey show that all the respondents were using the ecosan latrines and considered them an improved sanitation system. The absence of noxious odours and a significant decrease in the number of flies compared to the results using traditional latrines were major areas of satisfaction. Among respondents, 65 percent appreciated that the new latrines isolate waste in a single location, while 58 percent indicated that the latrines are cleaner and more hygienic relative to bushes and the traditional latrines, and 42 percent indicated that the new latrines were an improved source of fertilizer.

However, most of the respondents considered the ecosan latrines expensive: a clear sign that the poor might not be able to install the latrines. Furthermore, the use of urine as fertilizer is taboo. The conclusion based on the survey was that a long-term awareness campaign would be necessary before the ecosan latrine could be widely adopted.

Source: Bregnhøj et al. (2003).

4

Sharing irrigation water equitably

"Better to be a servant in the upstream area than a king in the downstream area."
—Local proverb

"Anyone who solves the problem of water deserves not one Nobel Prize but two: one for science and the other for peace."
—US President John F. Kennedy

"This is the first time I've seen water flowing in this village in the last 30 years. I actually forgot we had rights to water from the canal."
—A Baghlan farmer

"Within our downstream area, we don't have a problem with water distribution. It's the most equitable system: nobody receives water."
—A downstream farmer in Nimroz Province

CHAPTER 4

Sharing irrigation water equitably

Authors: Vincent Thomas, Naeem Sabawon

Agriculture is a key socio-economic sector in many countries, especially developing ones. In Afghanistan, irrigation is a mainstay of the sector. Because of numerous factors, including inadequate management, neglected infrastructure, the collapse of local institutions and of government support, and a trend towards water-intensive crops, water sharing has become highly inequitable and a source of intercommunity tension and conflict. In such a context, an integrated approach is needed that covers infrastructure rehabilitation, efficient on-farm water management and collective water management practices and institutions. The establishment of a respected regulatory authority that is backed by a strong judiciary and that protects equitable water rights is essential.

Representing 37 percent of national income, agriculture is a key component of livelihoods and economic growth in Afghanistan. Within the sector, irrigation plays a crucial role in food production and job creation. Irrigation is also the main use of water: it accounts for over 95 percent of all water consumption. The equitable sharing of water for irrigation is therefore a critical component of human development in Afghanistan.

This chapter assesses the management of irrigation water in river basins and along canals in Afghanistan through community-based institutions. It sets out the multidimensional links among irrigation, poverty and inequity. While an important component in poverty reduction, irrigation can also act as a strong vector of economic polarization, leading to tensions among users who share water as a common property. Ensuring the fair distribution of water resources among farmers is vital to rehabilitating the country's agriculture and achieving economic recovery.

The current reform of the water sector in Afghanistan seeks to introduce changes in water management in river basins and along canals to enhance the efficiency of water distribution and make access to water for agriculture more equitable. Articles 1, 11 and 12 of the 2009 Water Law all refer to the need to ensure fair distribution. The chapter stresses the relevance of integrating a focus on equity in irrigation development.

Possessing multiple socio-economic benefits, water is a key factor in the effort to reduce poverty in countries heavily dependent on agriculture.[1] If not properly managed, irrigation systems can generate significant human health risks and environmental impacts, from water-borne diseases, including malaria, to land degradation owing to the soil salinization and sodification resulting from poor drainage practices.[2] However, experience shows that, if properly managed, irrigation systems can support a great variety of human development outcomes, including among the most vulnerable in communities, such as the landless.

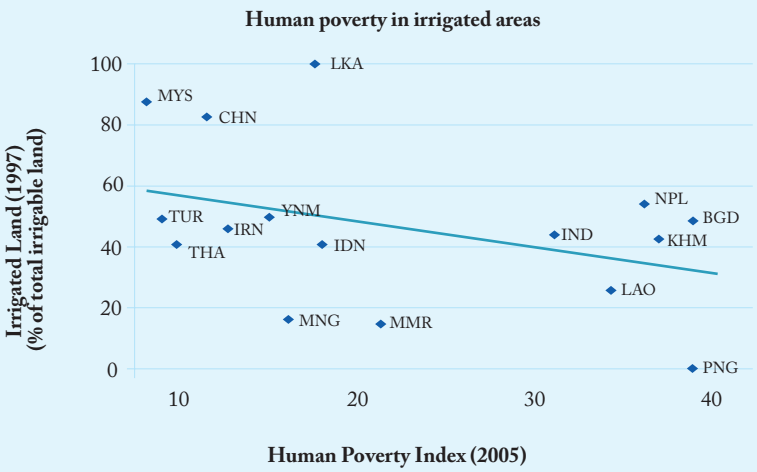
Canal Irrigation, Poverty and Governance

Sustained access to adequate irrigation water helps deliver multiple human development benefits, including food security, income-generating production and employment and reduced indebtedness and out-migration

Irrigation and human poverty

Evidence drawn from North Africa and the Pacific Islands shows that poverty has been substantially reduced in areas with large proportions of irrigated land.[3] Poverty tends to fall in proximity to irrigated systems (see figure 1).[4] Various studies have confirmed this irrigation–poverty reduction nexus.[5] For instance, a World Bank study in India shows that around 70 percent of the people in districts lacking irrigation systems are income poor. The share drops to 26 percent in irrigated districts.

Figure 1 **Human poverty falls in irrigated systems**



Source: UNESCAP (2008).

Sustained access to adequate irrigation water helps deliver multiple human development benefits, including food security, income-generating production and employment and reduced indebtedness and out-migration (figure 2). Many rural poor work directly in agriculture as smallholders, farm labourers and herders. The availability of water opens to these people numerous opportunities to boost food production in quantity and diversity, satisfy their needs and generate income from surpluses. By raising land productivity, irrigation can mark the difference between extreme poverty and the satisfaction of basic household necessities.

In Afghanistan, irrigation plays a vital role in crop production: it is involved in the cultivation of 85 percent of all crops. Among households engaged in agriculture, 79 percent have access to irrigated land, highlighting the importance of this access to rural livelihoods.[6] Higher returns and incomes are derived among farmers in irrigated agriculture relative to rainfed agriculture. Rainfed areas have yielded an average of about 0.6 tons of wheat per hectare in recent years. In irrigated areas, the yield is 1.8 tons, a threefold increase.[7] During drought years such as 2000 and 2001, irrigated yields can be 5 to 13 times greater than rainfed yields, while, in good years, such as 2003, the difference is still around a factor of 2.5 (figure 3).[8]

Crop production in Afghanistan is largely subsistence-oriented and thus a key to food security. Wheat accounts for about 80 percent of production.[9] Irrigation provides a more reliable source of food and income relative to rainfed production. This is primarily because irrigated agriculture, which relies on river flows, is less sensitive to climatic drought impacts, while rainfed agriculture is more dependent on rain. In a drought-intense year such as 2008, rainfed wheat production was about 85 percent less than production in a normal year, such as 2007. Irrigated wheat production only fell by 16 percent (figure 4).

Reliable and efficient irrigation helps reduce food prices. Because more food stocks are generated through agricultural production, it becomes more likely that prices will eventually drop. Similarly, the food price increases usually witnessed during regional droughts may be more easily limited, thereby benefiting landowners, but also the landless and other vulnerable groups sensitive to food price increases.

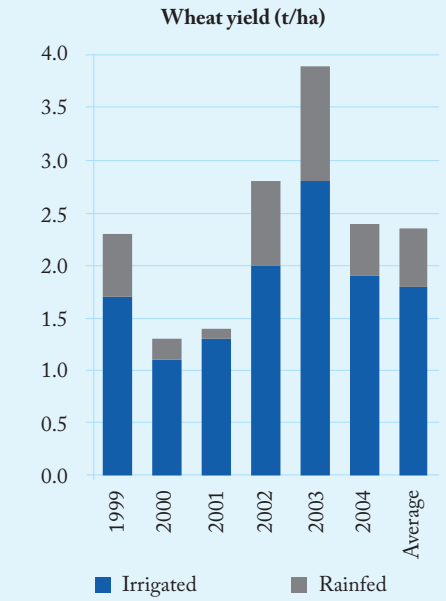
Land that is associated with formal or informal irrigation water rights and that consistently receives water for the cultivation of at least one or two crops a year is much more valuable than land used in dryland farming (figure 5). Irrigated land can thus become a key asset, especially in leveraging access to credit and loans (see chapter 2; also see elsewhere below).

Provinces and districts with large tracts of irrigated land may be less subject to migration outflows and urban overcrowding because of the expanded employment opportunities in agriculture arising because of the advantages of irrigation. The rural poor may thus receive incremental benefits from irrigation development. This is especially true if the areas under labour-intensive crops, including rice, are expanded through enhanced access to irrigation. [10]

The potential of irrigation to assist in the reduction of rural poverty is undeniable. Irrigation development should therefore be a priority. Yet, poverty cannot be eliminated only by improving the access of the poor to water. To maximize the impact on poverty, irrigation development projects should involve complementary measures such as credit, marketing

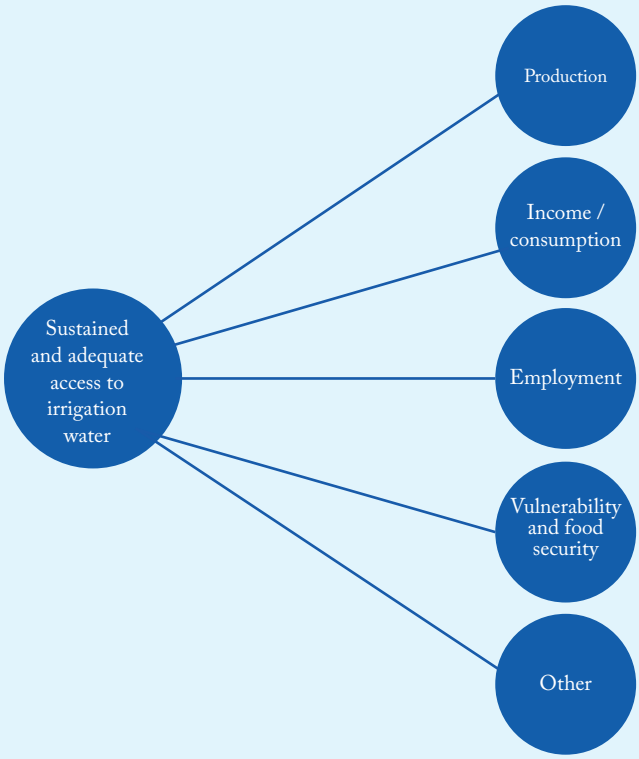
The potential of irrigation to assist in the reduction of rural poverty is undeniable. Irrigation development should therefore be a priority

Figure 3 **Average irrigated yield of wheat is three times greater than rainfed yield**



Source: Adapted from Chabot and Dorosh (2007).

Figure 2 **Irrigation can help reducing poverty in multiple ways**



- Increased crop yield
- Increased crop areas
- Increased cropping intensity
- Increased crop diversification
- Opportunity for year round cropping

- Increased income from crop production
- Increased family consumption of food
- Stabilization of family income
- Reduced food price

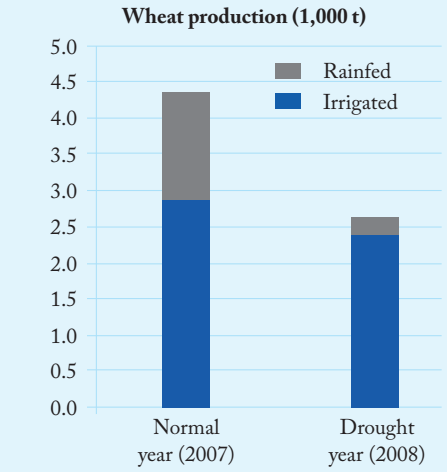
- Increased on farm employment opportunities
- Increased off farm employment opportunities
- Stabilization of employment opportunities
- Increased rural wage rate

- Enhanced food availability
- Increased opportunity to produce and retain food for home consumption
- Reduced level of consumption shortfall
- Reduced risk of crop failure
- Reduced seasonality effects of production

- Reduced out migration
- Reduced indebtedness
- Increased resource for health and education
- Improved overall resource base

Source: Adapted from Hussain and Hanjra (2003).

Figure 4 **Irrigated areas: more drought resilient than rainfed areas**

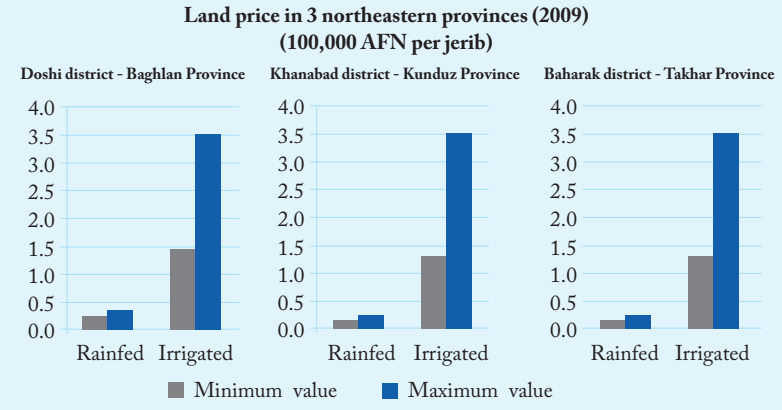


Source : MRRD and CSO (2009).

and agricultural extension services, and communication, health and education infrastructure. In this way, access to irrigated agriculture can become a key to food security, poverty reduction and income growth.

Unfortunately, the potential of irrigation is not being embraced in Afghanistan. The country has the capacity to mobilize over 7.5 million hectares of cultivated land, of which 60 percent could be irrigated.[11] By the mid-1970s, over 3 million hectares were being irrigated. Today, only an estimated 1.8 million hectares are irrigated.[12] This means human development opportunities are being missed. While efforts are undertaken to reach the potential of irrigation in Afghanistan, a central pillar of human development should not be overlooked. Ensuring equity in water sharing is essential.

Figure 5 **Land value is boosted by irrigation water access**



Source: CPHD focus group discussion (2010).

Why equity in access to irrigation water matters

While access to irrigation can contribute to food security and the opportunities opened up by higher rural incomes, irrigation can also produce severe inequities in livelihoods.[13] Human development outcomes are closely tied to the distribution of water across the reaches of a canal. The head-tail divide illustrates this inequity. Extremely uneven agricultural production between users at the head of a canal and users at the tail of a canal can mean that downstream farmers face depressed incomes, insecure livelihoods and greater food insecurity even though the two groups share the same water resource system.[14]

Three decades of civil unrest have already eroded intercommunity relations and trust (see section on causes of inequity in water sharing). If the opportunity to use water equitably to help achieve inclusive human development is missed, tensions may be exacerbated, and resentment across communities is more likely to increase and add fuel to conflicts over other ethnic and political differences. Improvements in collective canal irrigation management and large-scale irrigation systems can help extend the benefits of the equitable sharing of the commons, thereby contributing to conflict resolution and conflict prevention. Equity helps rebuild social capital, which is critical to supporting Afghanistan's recovery and development. Equitable water sharing directly supports social equity and justice as guiding principles of human development.

Inequitable water sharing and poor access among downstream users are not an unavoidable curse. In most areas in Afghanistan, water is not scarce; the main problem is management (see chapter 2). Improved maintenance and management in irrigation systems are key to delivering equity. Even in areas with relatively low water availability, scarcity cannot be a justification for inequity. Community participation and dialogue are necessary to

establish equity according to moral principles (see box 1). Equity and inclusive human development must guide irrigation projects and the design of policies and institutions.

Box 1 Equity as a strong Islamic principle

Equity is a core principle of approaches to human development, but it also stands naturally as a basic Islamic value. Indeed, in Islam, a fundamental principle in dealing with wealth-generating resources (such as water for irrigation) is the need to combat unfairness in the distribution of the resources in order that riches "may not (merely) make a circuit between the wealthy among you".

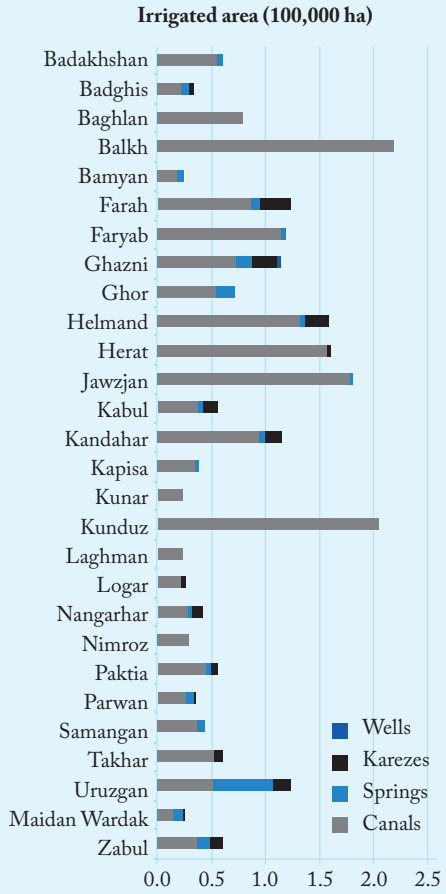
(Holy Quran, 59:28)

Irrigation canals, equity and social capital

Canals are the backbone of agriculture in Afghanistan. To irrigate crops, 67 percent of all farmers rely on canals in the summer, and 75 percent in winter and spring.[15] Karezes, springs, or wells are also important sources of irrigation water, though on a much smaller scale (figure 6).[16] Around 90 percent of canal irrigation systems are managed by farmers.[17] In many communities, irrigation canals are considered durable social capital (box 2).

These traditional canal systems have fallen into disrepair, and rehabilitation is needed. Improving irrigation systems is the top priority among male shuras (consultative councils), even ahead of establishing and maintaining health facilities or improving the availability of drinking water. It is also a top priority, though not the first priority, among female shuras, although women are traditionally not involved in issues related to water management, including decision-making. This priority-setting underlines the importance of irrigation in household incomes and food security across the gender divide.[18]

Figure 6 In Afghanistan, irrigation depends mostly on canals



Source: ICARDA (2002).

Canals are the backbone of agriculture in Afghanistan

Box 2 Irrigation canals as community social capital

"Canals are very important in our lives. They have caused a lot of people and ethnic groups to have good relations in the past, as these canals were a link among all of them."

A farmer in Zabul Province

"A canal is very important in the life of human beings. It gives people work and prevents them from migrating to cities. It provides water for people and livestock and for agriculture."

A farmer in Herat Province

Source: CPHD focus group discussion, November (2009).

While other irrigation technologies are important, this chapter focuses primarily on water sharing in canal irrigation and farmer-managed systems along main rivers. In irrigation, the largest challenges in the effort to tap into the country's human development potential are found in these areas.

In many parts of Afghanistan, water rights are no longer effectively exercised or protected

Community-based irrigation management

This section explores community-based irrigation water management in canal systems in Afghanistan. A concept behind the analysis is that variations in relationships among actors, functions and management correspond to variations in agro-ecological, agrarian and socio-political conditions. The *mirab* system underscores the effects of these variations. Shifting mirab election procedures bring into focus issues of inclusiveness and disagreement among water users, highlighting the limits in local water management institutions as these have evolved in response to specific conditions.

Despite the differences across river basins, most systems depend on the relatively fair allocation of water based on the principle that, in basins and along canals, water should be allotted according to the amount of land to be irrigated. The challenge lies in the fact that water rights are no longer effectively exercised or protected.

Millenniums of experience, but ruptures in the transfer of knowledge

Agriculture first appeared in the country in the area around Kandahar over 4,500 years ago.[19] Since then, the river valleys of Afghanistan have witnessed the birth, flourishing and collapse of many civilizations.

Archaeological excavations in Ay Khanum in the Panj-Amu river basin indicate that the local gravity irrigation systems date back at least to the Bronze Age. Development was intensive during the Greek occupation of Bactria in the 4th and 3rd centuries BCE.[20] Superior land fertility fostered dense population growth until the ravages of Genghis Khan in 1220 CE. In the 19th Century, Murad Beg, an Uzbek amir (leader) in Kunduz, relocated the mountain population of Badakhshan to colonize the fertile plains. [21]

Established in the 6th Century BCE during the Persian Achaemenid Empire, the Hazhda Nahr irrigation network in the Northern river basin was managed by hereditary priest-governors, servants of the patron goddess of the old city of Bactria in modern Balkh. The priest-managers continued their functions even after Islamic rulers invaded the area. The 13th Century Mongol conquest, however, wrought devastation across the land, killing a large portion of the population and nearly destroying the canal system.[22] The Hazhda Nahr network was not rehabilitated for 200 years. In the mid-19th Century, war and poor management led to neglect of the network. Under the governments of Amir Amanuallah Khan (1919–1929), Nadir Shah (1930–1933) and King Zahir Khan (1933–1973), the network was finally improved.

The excavated remains of old canals and other considerable hydraulic structures testify to the existence of an ancient hydraulic civilization in the Helmand river basin. In the 14th Century, Tamerlane's destruction of retention structures on the Helmand around the modern town of Chahar Burjak caused the abandonment of most of the canals, leading to the disappearance of an entire civilization. [23]

These successive periods of settlement and complete abandonment nearly to our day highlight the difficulty of maintaining the view that there is an ancient, unbroken tradition of water management influencing current practice. Indeed, it is clear that ancient skills have been eroded through interruptions in the transfer of knowledge until modern times. [24]

Current actors, roles and levels of management responsibility

The majority of the country's irrigation schemes are managed by communities of water users. One or more mirabs is in charge of most management tasks. Typically, a mirab

is a community-based water service provider responsible for the following:

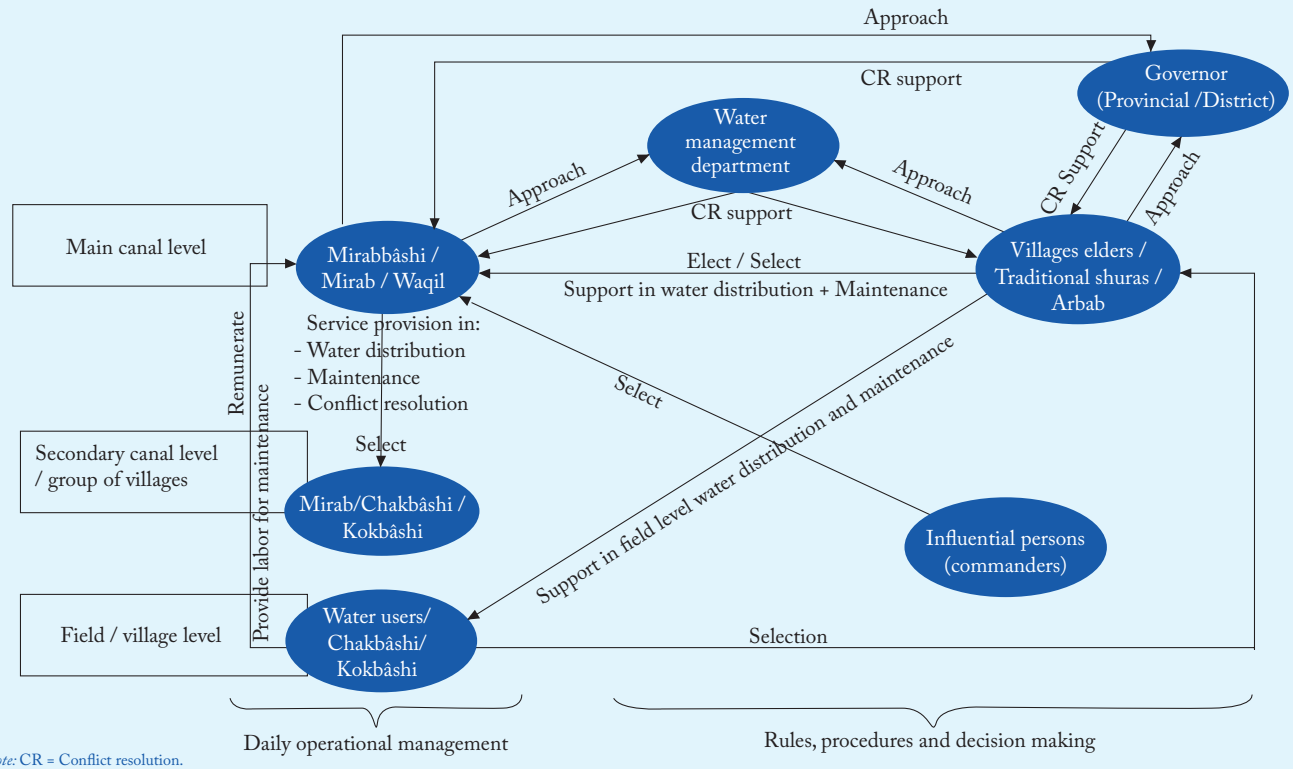
- Ensuring water distribution according to specified allocation norms, including defining and implementing a schedule of water turns among irrigators.
- Organizing collective maintenance by supervising resource mobilization, including materials and labour in villages and monitoring implementation.
- With variations across levels of authority, assisting in the prevention and resolution of conflicts over water distribution and maintenance.

Traditionally, local elders in the shuras have usually played the main role in electing mirabs and in conflict resolution. However, in recent decades, new actors, including local commanders, have started influencing the process in parallel with the shuras. Local government agencies and other entities are important along some canals, although their influence has diminished since the 1980s, at the begining of the war.[25] These may include water management departments, agriculture departments and district and provincial governors. Because of these links, the mirab system is not always an exclusively community-driven process, although most irrigation systems are considered farmer-managed systems. Moreover, the water laws of 1981 and 1991 highlight that official links also existed between the mirabs and the government. The penetration of these laws into practice has been variable, however. Thus, for example, the upper valley canal systems are usually beyond most government influence.

Canal system management is often organized according to defined levels of responsibility. A three-tier system exists in the administration of most canals along the main rivers in parts of the Northern, Harirod and Panj-Amu river basins, for instance (figure 7).[26] Another management structure also operates along the Harirod, where the canal is run according to a three-block (*buluk*) system divided among upper, middle and lower divisions. In each block, a number of mirabs

The majority of the country's irrigation schemes are managed by communities of water users

Figure 7 **Illustration of a three-tier mirab system**



Note: CR = Conflict resolution.
Mirabbashi, mirab, wakil, bqiliff, chakbashi, kokbashi are terms that are used to describe service providers with different levels of responsibility, but such terms are often used interchangeably from one canal to the other ans may represent persons with similar levels of responsibility.
Source: Compiled by CPHD (2010).

A majority of water users believe the mirab election process is unfair and should be changed

serve under a single canal wakil (an overall manager). The mirabs may represent a particular community or a cluster of communities within a block.[27] Several canals in Takhar and Baghlan, in the upper parts of the Panj-Amu river basin, are run mainly through a two-tier administration: each of several mirabs work along the main canal, while chakbâshi (assistants) oversee water distribution along one or more sub-canals or tertiary canals.

One mirab might be sufficient to cover non-perennial rivers or small canals, such as in the Kabul basin where there is only a few communities from a single clan.[28] In some cases, the demand for and the challenges of water management are so limited that a mirab may be needed only if water becomes scarce. Management can then be performed by others, such as the arbabs, the heads of community shuras.

Given the wide diversity in needs, more detailed studies must be undertaken to gauge local water resources, agro-ecological conditions, the status of government involvement, the characteristics of the agrarian sector, and the influence all these exercise on water management.

Mirab elections: issues of representation and inclusiveness

Transparent and inclusive mirab elections provide legitimacy to water distribution and conflict resolution practices. A proper election process also offers water users insight into decision-making entitlements and the respect shown for the principles of participation and empowerment. Studies on canals in the Panj-Amu, Northern, Harirod and Kabul river systems have found that there are important differences within and across river basins in the inclusiveness of elections. This highlights that the mirab system is not always solely a community-driven process and that a myriad of government and vested interests sometimes influence the local political landscape.

Though the participation of women in farming is not negligible, including during harvest, and though women use canals on a daily basis, including for domestic chores and to water livestock, women do not participate in mirab elections or in any other decision-making in irrigation water management. Small farmers and the landless are, in most cases, also excluded. Decision-making remains a prerogative of influential individuals. In most cases, participation in mirab elections is restricted to a small number of landowners through local shuras, and, in rare instances, the mirab position may be hereditary.[29]

In most irrigation systems in the plains of Afghanistan, mirabs are registered with water management departments. This is a formality because the mirabs do not work as government employees. Local governance is also dynamic and subject to important changes. In Takhar several decades ago, for example, only one mirab was usually responsible for each canal. Since then, changes have led to the election of several mirabs for different parts of canal command areas. This has resulted in the emergence of separate domains of influence and fragmented management structures rather than the creation of unified canal management, a break with past practices (box 3).[30]

Promoting a reform of the mirab election system presents dilemmas. Because of the overall lack of inclusiveness and transparency, any given election has the potential to undermine the goal of greater participation and empowerment. Yet, the elections are part of the arrangements embedded in specific community cultural practices, and attempts to alter the process profoundly would likely be resisted. Nonetheless, according to a survey conducted for this report by the Centre for Policy and Human Development (CPHD) to deepen the understanding of current views on the election process, more than 60 percent of the water users in 15 canal systems and across five river basins believe the election process in their area is unfair and should be changed (figure 8).

The main grievance is that shura meetings

Box 3 Mirab structures respond to change in social factors: an illustration in Takhar

The 1,497 hectare Zargar canal command area is located on the left bank of the Takhar irrigated plain. Until the 1970s, only one mirab was responsible for organizing water allocation, water distribution and canal maintenance. At the time, the dominantly Pashtun upstream settlements cultivated cotton and rice. The downstream Uzbek settlements grew mostly cotton. The support of the department of agriculture largely reinforced the authority of the mirabs to ensure that downstream areas received sufficient water for cotton cultivation so as to satisfy the demand of the local cotton industry.

Beginning in the 1980s, however, the collapse of government support for cotton processing led to the intensification of rice cultivation in the upstream areas. Tensions along the canal rose as downstream water access became threatened. Meanwhile, because of the civil war, it was not uncommon for canal areas to be divided among various commanders. In the case of Zargar, this division evolved along ethnic lines. Tensions intensified between the downstream Uzbek commander and the Pashtun commanders upstream. The result was a split in canal management into two territories. Each ethnic group selected their own mirab representatives. Water management became fragmented along socio-political lines.

One Pashtun mirab oversaw the upstream sub-canal, while two Uzbek mirabs managed the downstream sub-canal. The two areas generally failed to cooperate. Rice cultivation became entrenched upstream, where the mirab allowed unrestricted water use. Consequently, the downstream area had to deal with greater water scarcity. The two downstream mirabs had to cope by developing independent water allocation rules, water turn schedules and cropping pattern restrictions within their areas, but could not interfere with upstream water use practices.

This highlights how tensions among villages can interact with ethnic polarization between upstream and downstream areas to generate substantial changes in organizational structures in the face of the challenge of water scarcity. Similar stories can easily be found in other river basins across Afghanistan.

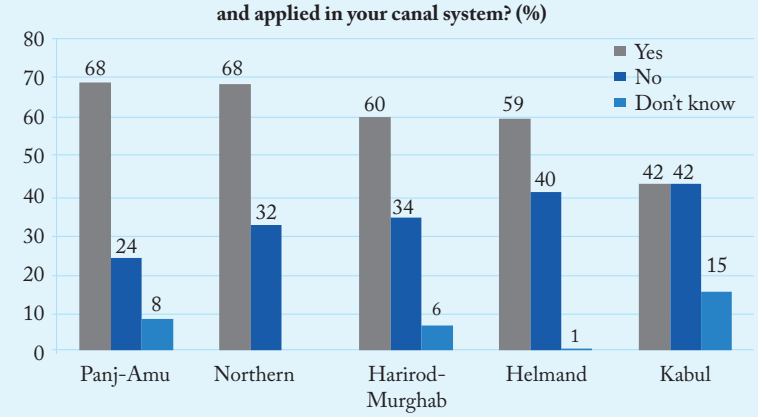
Source: Adapted from Thomas et al. (2009a).

fail to allot sufficient time to public debate on issues. Another grievance revolves around the ability of influential individuals to impose candidates (figure 9). The amount of dissatisfaction points to the need to facilitate change. As part of efforts to establish and build the capacity of water user associations (WUAs), recent projects have sought to make the elections more inclusive (box 4). This may represent a model for broader participation in the choice of community-based service providers. However, modifications in the mirab election procedure can only be realized if there is a strong desire for change and intercommunity disagreements do not block negotiations. In any case, though there has been progress towards more democratic elections, women's participation remains a major challenge.

Water rights along canals and river basins

Water allocation involves entitlements to the use of irrigation water that have been formally or informally agreed by all beneficiaries (box 5). In general, the recognition of water rights may assist the poor to safeguard their access to water, sustain their livelihoods, participate in governance (for instance, in the selection of service providers), prevent and resolve conflicts (for example, by using rights as a basis for conflict resolution), and invest in improving their lives.[31]

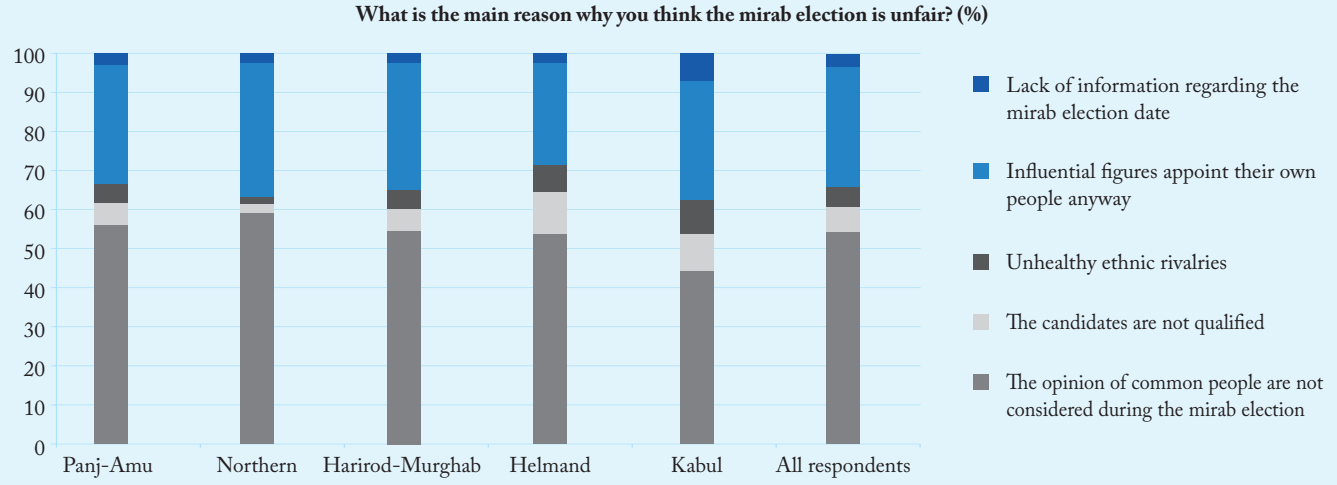
Figure 8 The mirab election procedure is widely contested



Note: Data is based on a sample size of 1,252 water users in 15 canals equally distributed over 5 river basins.
Source: CPHD survey (2010).

Though there is a lack of detailed studies on many parts of Afghanistan, most procedures for recognizing water rights across river

Figure 9 **Mirab elections: non-inclusive and dominated by influential persons**

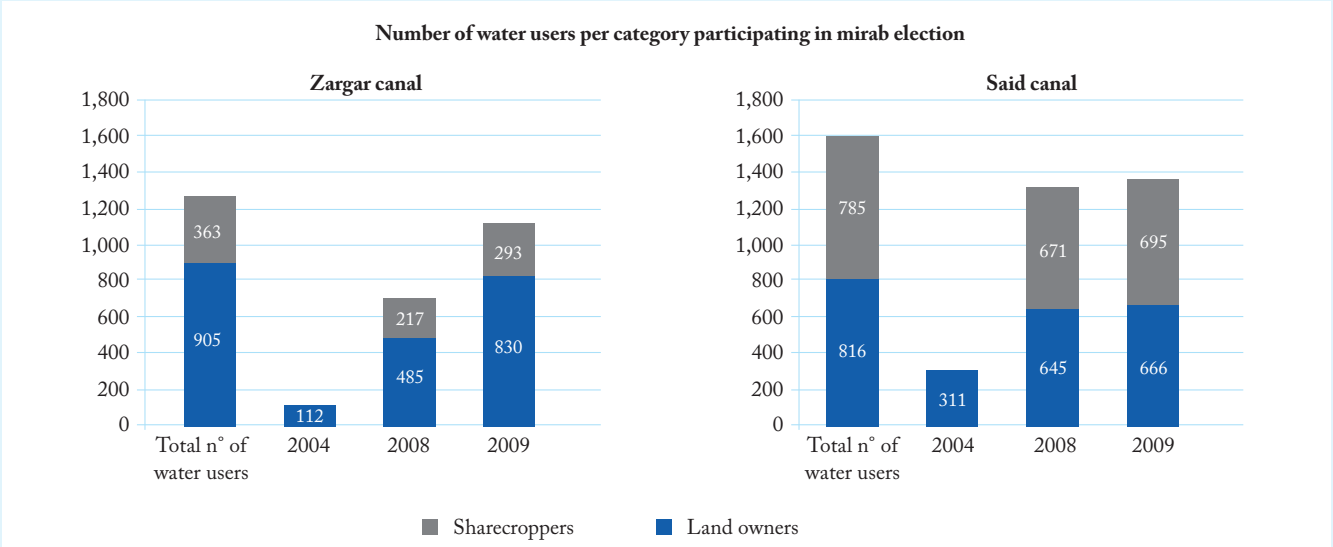


Note: Data based on a sample of 754 water users in 15 canals equally distributed in 5 river basins.
Source : CPHD survey (2010).

Box 4 **Towards a more inclusive mirab election process**

Recent elections along the Said and Zargar canals on the left bank of the Taloqan plain were widely criticized for the lack of inclusiveness and transparency. In response, working groups of representatives from throughout the command area of both canals were charged with identifying and defining appropriate regulations for local mirab elections within the context of social water management projects as part of the Government-led Panj-Amu River Basin Programme. The chief recommendations specifically addressed the lack of inclusiveness by pointing to the need to compile a comprehensive list of water users, including not only landowners, but also sharecroppers; the establishment of a one person–one vote rule; and the scheduling of elections at local mosques on Fridays.

The functions of the new WUAs represented a positive change. In the Zargar canal area, overall participation rose from 112 to 702 contributors in 2008 and to 1,123 contributors in 2009. The participation of sharecroppers also rose steadily in the Said canal area. One practical result in the Said canal area was the displacement of a mirab who had been in office for 20 years in the upstream part of the canal. Whether the overall effort will foster long-term positive outcomes in water sharing is not certain and does not depend exclusively on election procedures. Nonetheless, election reform can help build trust in new governance systems.



Source: Adapted from Thomas et al. (2009b).

basins appear to allocate water shares, in principle, according to the amount of land irrigators own or cultivate. The technical terms used to describe the systems may vary, reflecting local social relationships and customs. For example, the paikal system in the Northern river basin represents one of the most sophisticated systems in the country (box 6).[32] It is applied in canal areas along the Balkh River and in the canals of the Hazhda Nahr system. Similarly, the juftgaw, qulba, or bail systems in Herat, Kunduz and Takhar, respectively, follow the same principles of proportional water sharing in canal areas.[33] In Herat, a buluk system is used to share water according to the amount of land in each canal command area (see elsewhere above).[34] Studies and reports indicate that traditional systems of water rights, such as the paikal, the juftgaw, the qulba, and so on, are considered legitimate and equitable.[35] CPHD focus group discussions in 2009 confirmed the principle of allocation according to landholdings in Uruzgan (Helmand river basin) and Nangarhar (Kabul Indus river basin).

Box 5 Useful terms

Water rights: Entitlement to the use of irrigation water, formally or informally agreed mutually by beneficiaries. In this text, water rights are equivalent to water allocation principles.

Water distribution: The actual delivery of water to fields according to the agreed rights or allocation entitlements. In reality, distribution practices may bear little resemblance to allocation principles, particularly in the case of Afghanistan.

Box 6 Variations in water allocation principles based on context

The paikal system: Northern river basin, Balkh Province

In the paikal system, water rights are proportional to irrigable land size: the larger the land, the greater the entitlement to water. While a paikal unit may vary from 72 to 80 hectares in the lower Balkh River area, a paikal in the Hazhda Nahr system is usually equal to 80 hectares or 400 jeribs (1 jerib = 0.2 hectares or 0.49 acres). The delivery of irrigation water for 1 paikal is determined by the width of the head of the canal (sarband). Initially, 1 paikal was equal to a 3–3.5 inch width in the sarband, but it was reduced to only 1 square inch in 1939 during the reign of King Nadir Shah. This paikal system was revised more recently, in 2005, under the supervision of the governor.

Paikal allocations are based on a legal document (qauwala) granted in 1925/26 during the reign of Amir Amanullah Khan. Communities and individuals with water rights dating from this period consider themselves people of the contract (ahl-i-bast). However, according to the director of the land reform office in the department of irrigation in Mazar-i-Sharif, the use of the paikal unit was first introduced in the 1930s by Governor Wazir Mohamed Gul, who was involved in the resettlement of Pashtun families from other parts of Afghanistan.

While water distribution may differ from the allocation principles in practice, the paikal system is recognized as a legitimate water rights system by water users, mirabs, local government agencies and other actors.

The bel system: Panj-Amu river basin, Kunduz Province

In contrast, water rights in the Asqalan and Tarbuz Gozar canals in the Panj-Amu basin in Kunduz depend on the size of a bel. A bel is equal to a specified number of jeribs of land, plus a contribution of labour for canal maintenance. The size of the bel depends on the location of the irrigated land, which, in these two areas, directly relates to the quality of agricultural land.

Land at higher elevations is usually calculated at fewer jeribs per bel; for example, 10 jeribs might equal 1 bel. Land at lower elevations and located closer to water-tables and, thus, with higher water-holding capacity are accorded more jeribs per bel (30 jeribs might equal 1 bel). The size of a bel can, however, be adjusted through negotiations with community elders, mirabs and kok-bashis (or chakbâshis, the community water bailiffs on canals or parts of canals), but the adjustment would involve larger contributions of labour. The smaller the size of the bel, the greater the contribution of labour. The opposite is also true: if a water user wants to reduce his contribution to canal maintenance, he may increase the number of jeribs per bel. As in the paikal system, water distribution in practice may vary from the principles of allocation.

The paikal and bel systems together illustrate how water rights may be locally defined according to environmental conditions, social management relationships and principles of equity.

Sources: Adapted from SMEC (2006a) and Lee (2003).

No single model exists across Afghanistan for the mirab system

Similarly, in a CPHD survey, 84 and 89 percent of farmers in Helmand and Logar Darya, respectively, indicated that proportionality with respect to landholdings was the basis for water rights.[36]

While the basic principle of allocating water based on the size of land is shared in the bel and the paikal systems, allocation in the bel system can be negotiated based on contributions to labour maintenance (box 6). While proportionality to labor contribution is also found in certain karez systems (see elsewhere above), the bel system is not the most commonly used system in Afghanistan.

Parts of the Panj-Amu river basin (namely, the Taloqan and lower Kunduz river sub-basins) rely on a water rights system across canals that is different from the systems in operation in the Northern basin. In the former, there is no formally defined water rights system defining how water should be shared across canals. Only during periods of drought, temporary *ad hoc* water allocation agreements may be reached between canals located in the upper reaches of the sub-basin (for instance, in Takhar Province) and canals located downstream (for instance, in Kunduz Province).

Similarly, studies have shown that, in some canal areas (such as on the left bank of the Taloqan river), water allocation was defined solely by a community's position relative to the canal. According to a study in the late 1960s, this led to a free for all over water that inevitably benefited upstream communities over downstream ones, especially during droughts.[37] A system of rights giving priority to upstream users means that downstream users must make do with whatever water resources remain. In the 1960s, this lack of defined water rights did not represent a serious threat to human development. Because of the substantially smaller population at the time, there was less demand and less pressure on agricultural land. Water abundance had led to the absence of any elaborate water rights systems.

Organizational structure and water rights in changing contexts

No single model exists across Afghanistan for the mirab system, although there are common standards in canal areas in different river basins. This reflects the reality that local water management structures are rarely, if ever, rigid features of social organization. It highlights how the mirab system may respond and become transformed in the face of rapidly and drastically shifting contexts.[38] Such transformations may lead, however, to both improvements and problems in the management of water scarcity.

Standards exist in local water management regimes. However, analysis of the factors triggering diversity in responses to water issues in specific socio-economic contexts is required to support the planning of projects and interventions. Factors typically influencing the operations and performance of local water management institutions include the following:

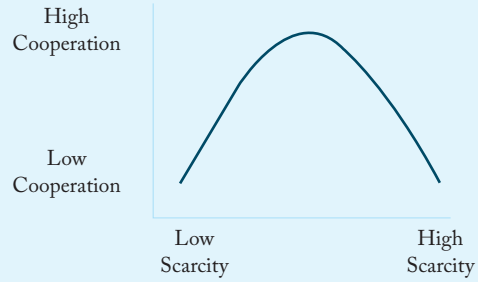
Scale of irrigation systems: Generally, the larger the command area, the more demanding the tasks of mirabs in ensuring proper operation, control and monitoring along main canals and sub-canals and in meeting the diverse needs of upstream and downstream areas.

Types of infrastructure: The operation of traditional in-canal infrastructure is typically more difficult and time-consuming than the operation of modern infrastructure. A lack of management skills, technical expertise, or appropriate water control technology often leads to low efficiency in water use and hampers the capacity to implement equitable water sharing. Proportional divider structures found mostly in Balkh and Herat require less work along the main canals. This can improve equity in water sharing, though there are other factors as well.

Water scarcity: Cooperation on water issues among individuals and communities depends on the scarcity of the resource. Where water is

abundant relative to demand, there is little need for cooperation. As scarcity increases, however, water users are likely to see more need for cooperation. Elaborate water rights regimes are more likely to emerge in such a context. This tendency is reversed under extreme scarcity. In this case, individual interests begin to prevail, making cooperation unlikely (figure 10). The Northern river basin offers an example of the way scarcity may be linked to cooperation. The basin has an average of less than 700 cubic metres of water per person per year (see chapter 2). Because this significant scarcity has been a characteristic of the basin for decades if not centuries, local institutions are well adapted to the hydrological constraints at least in terms of the recognition of water rights through the recognition in the paikal system. In contrast, canal water rights are virtually non-existent in the relatively water-abundant Panj-Amu river basin.

Figure 10 **Cooperation and scarcity in water management**



Source: Adapted from Wade (1987).

At the canal level, rather substantial water availability relative to demand alleviates management pressures on mirabs. Typically, small canals in upper catchment areas in which only one crop is grown a year—preferably at low water consumption—rarely require more than one person to supervise maintenance and water distribution. Research on the triggers of cooperation and conflict in a context of water scarcity would be of significant benefit.

Ethnic diversity and tensions among communities in canal command areas: Tensions among communities, including ethnic tensions and tensions over other issues not involving water, may lead to growing numbers of mirabs, as each group wishes to have a mirab representative. While the nature of irrigation and water distribution often justifies the presence of only one mirab or team to oversee water distribution along an entire canal, tensions can lead to a situation in which different mirabs act independently in separate parts of the system. Even if tensions are low, water users may prefer to have a chakbâshi at the local sub-canal or village who is a member of their ethnic group. Thus, ethnicity may influence the composition of the team of mirabs and chakbâshis in a canal system. This often results in inefficient water management and waste, which tend to affect water access in downstream areas more seriously. Additional research on such determinants and on ways to address the underlying management issues would be of great benefit.

Elaborate water rights regimes are more likely to emerge in context of water scarcity

Proximity to government and other actors: The management of canal systems in large irrigated plains close to cities may be affected by local government interventions and the influence of vested interests. This is the case in Balkh (Northern river basin), Takhar, Baghlan and Taloqan (Panj-Amu river basin), Herat (Harirod-Murghab river basin) and Helmand (Helmand river basin).[39] An appreciation of the formal and informal links between water management institutions and external power brokers is essential to understanding the dynamics of water sharing along canals and river basins.

Overall, a grasp of the relationships among water scarcity, ongoing conflict, political tensions and ethnic diversity is necessary for sound analysis of the reforms needed in local organizations that will lead to sustainable and equitable water sharing practices.

Putting irrigation water rights back on the agenda

The new Water Law promotes the transformation of existing water rights into permits.

Providing more protection for water rights would require an enforcement capacity that is much stronger than the current capacity

This represents an opportunity to provide more protection for water rights that are still considered legitimate by a majority of farmers. It would, however, require an enforcement capacity that is much stronger than the current capacity. In areas where water rights are virtually non-existent, the new Water Law offers a chance to define and secure the rights. Although, for example, the absence of water rights in the Panj-Amu river basin was not a serious threat to human development a few decades ago (see elsewhere above), putting the definition of water rights back on the agenda has now become a priority because water resources are becoming depleted relative to the growing demand within the agriculture sector, but also in terms of competition with other water uses. Experience shows that, as the competition for water increases within and across water sectors, the first users to lose adequate access to water are those users who have unsecured water rights or little capacity to obtain recognition or enforcement for their rights.

Water Sharing and Equity: Poor Performance in a Difficult Environment

The existence of formal or informal water rights is rarely a guarantee that water distribution will reflect the rights. This section examines the performance of local institutions involved in water distribution in basins and along canals in Afghanistan. It finds that the gap between water allocation and water distribution looms large. The human development consequences are underlined by the polarization in food production and in the opportunities for income generation, the disempowerment of downstream communities and the emergence of conflicts over water sharing. It also looks at the root causes of the current trend towards inequity in water distribution and highlights the complex, multilayered and socio-technical nature of these causes.

Inequities in river basins and along canals

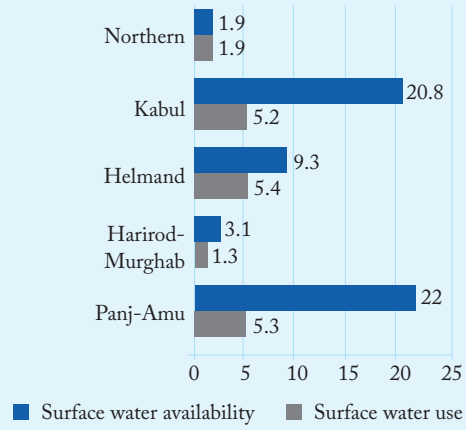
In this subsection, we take river basin and canal command areas as the units of analysis in investigating equity in water sharing. We explore water sharing in river basins in terms of variations in flow distribution from the head to the tail reaches of canals located along main rivers. Water sharing along canals is surveyed in the areas at the canal head (or upstream), middle and tail (or downstream).

There are not many quantitative data on the level of inequity in irrigation water sharing in Afghanistan. Most data presented in this chapter have been collected in the Northern and Panj-Amu river basins (where projects have been implemented). Although located in the northern part of Afghanistan, these river basins offer contrasting perspectives on overall water resource availability relative to use (see chapter 2 and figure 11). Presumably, the finding that water sharing is inequitable in these basins would be echoed in many other river basins. To capture variations and common trends, the CPHD has conducted focus group discussions among representatives of irrigation water users in several provinces in which irrigation is critical to local livelihoods.

From inequity in river basins . . .

As water flows in a river basin, various canals on both banks abstract part of the flow for crop use. If not regulated, especially if water is too limited to satisfy the demand of all users, this

Figure 11 **Water availability and use show great differences from basin to basin**



Source: Based on Government of Afghanistan (2008a).

abstraction is likely to cause downstream farms and populations depending on surface water for various purposes to be deprived of a fair share of the commons. Figure 12 illustrates how, in two sub-river basins, the upstream canals benefit from significantly greater flows relative to the downstream canals.

Canals in the upper reaches of the Taloqan sub-basin obtain significantly more water than required by the demand even under a scenario in which the entire command area would be under a crop, such as rice, associated with substantial water consumption (though this is not actually the case). In practice, upstream farmers have been known to dam the river to divert as much water as possible into their canals. This leaves downstream farmers with a water supply much below their irrigation requirements even for a crop, such as mung beans, associated with low water consumption. However, in water-abundant river basins such as the Panj-Amu, such a drastic scenario unfolds primarily only during droughts. In normal years, poor system management is masked because the water is abundant.

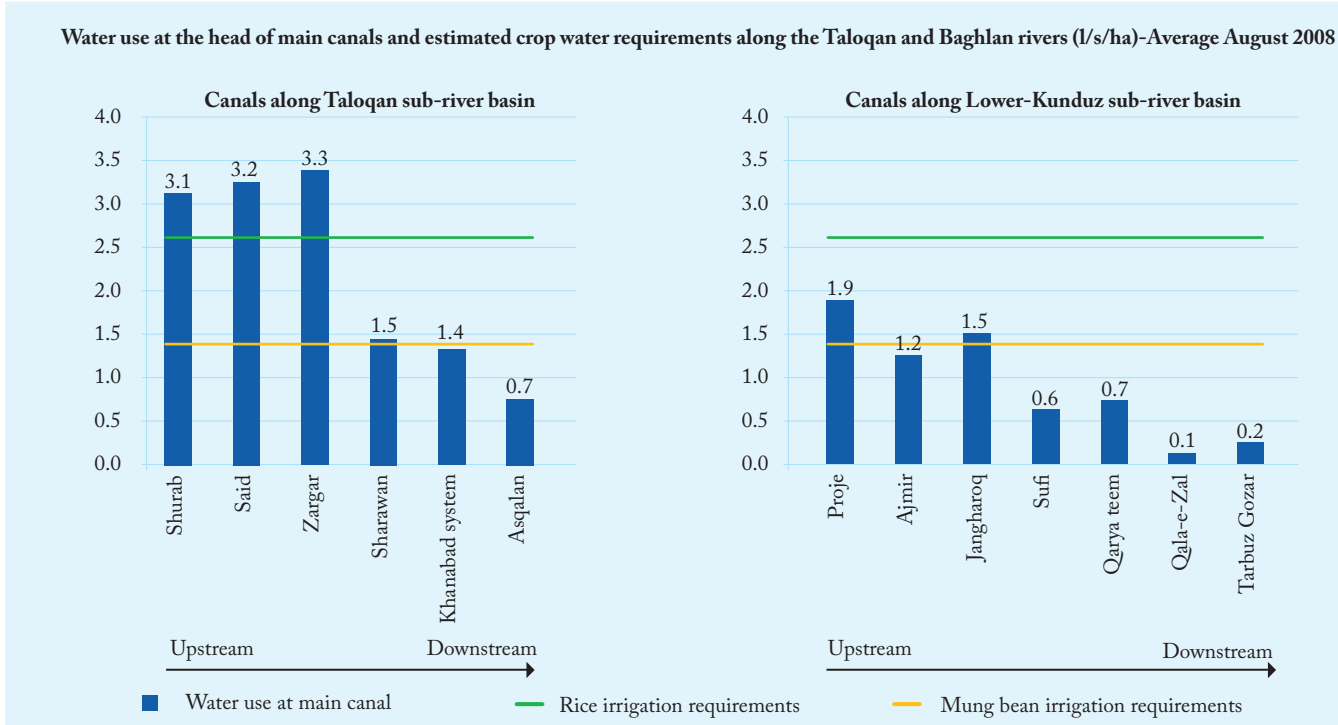
In Afghanistan, the gap between water rights and water distribution looms large

"The water distribution is not fair. In good years, the Taloqan River can provide water to all Taloqan canals, and the remaining flow would still be enough for Kunduz. But in times of drought or limited water availability at the river, Taloqan people still take as much water as they can to irrigate their lands. As a result, nothing remains for Kunduz lands."

Professor, Takhar University

Source: CPHD focus group discussion, November 2009.

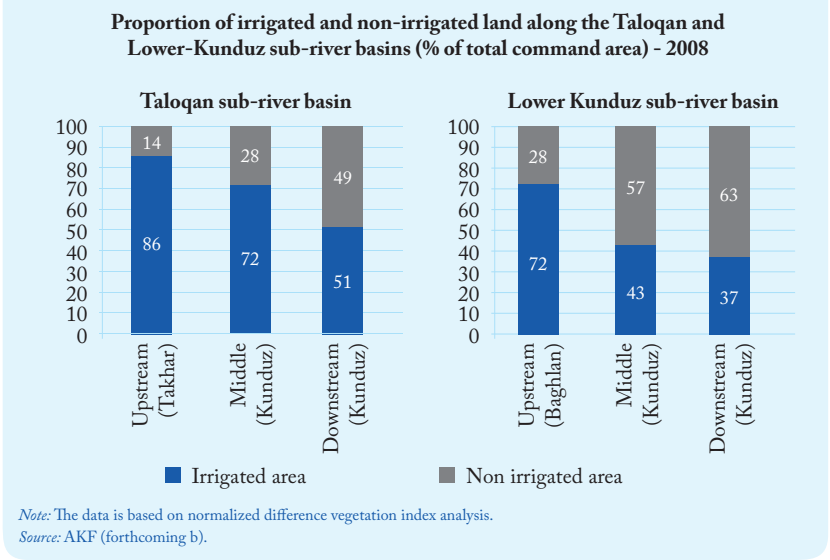
Figure 12 **Irrigation water access decreases from upstream canals to downstream canals along rivers**



Note: Rice irrigation requirements estimated based on 50% irrigation efficiency and 5 mm/day soil infiltration rate. Mung bean irrigation requirements based on 45% irrigation efficiency.
Sources: AKF (forthcoming a), Welthungerhilfe (2008), AHT (2009).

A normalized difference vegetation index analysis for the summer of 2008 illustrates the inequitable water access along the sub-basins (figure 13). From the upper reaches of the Taloqan sub-basin to the lower end, the non-irrigated area increases from about 14 to 49 percent.[40] A similar gap is found in the lower Kunduz sub-basin.

Figure 13 **The amount of effectively irrigated land declines from the upstream to the downstream sections of sub-basins**

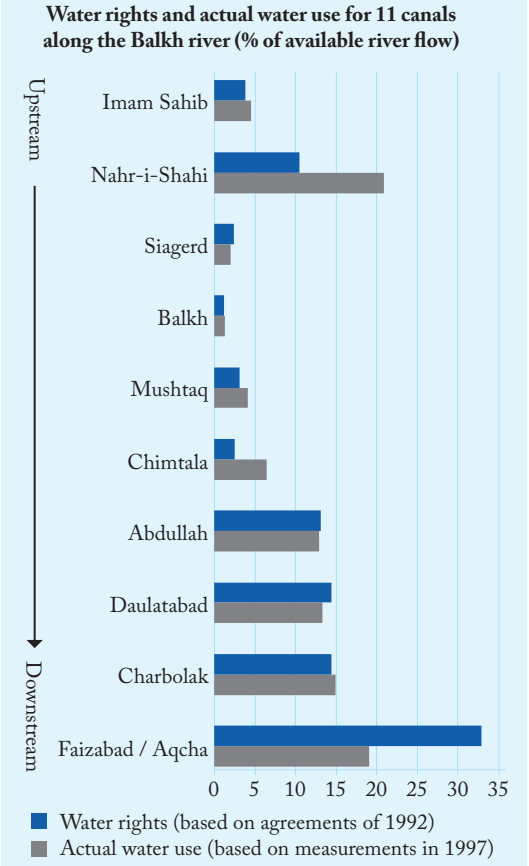


Note: The data is based on normalized difference vegetation index analysis.
Source: AKF (forthcoming b).

Studies in the Northern basin, where water rights are clearly defined according to the paikal system described elsewhere above, show a similar trend. Flow measurement analysis indicates that many canals take no more than their appropriate share, with the notable exception of two canals (Nahr-e-Shahi and Chimtala). The consequences for the two canals the farthest downstream (Faizabad and Aqcha) are significant, however: they were receiving only 58 percent of their due share, though they represented over 37 percent of the command area of the Hazhda Nahr network. In contrast, Nahr-e-Shahi was receiving twice its share, but covered only 9 percent of the command area (figure 14).

Another study confirms the existence of inequitable sharing among canals more recently, in 2006, a drier year. It shows that, on average, the two canals farthest upstream managed to irrigate 2.6 times more land than

Figure 14 **While some upstream canals take more than their share, downstream canals suffer the consequences**



Source: Department of Agriculture and department of irrigation, cited in ADB (2005).

the two canals farthest downstream and 2.0 times more than the two canals located in the middle section of the river (figure 15).

....to inequity along canals

Similar to the situation along rivers, water distribution along canals shows serious inequity between the head and the tail reaches of the canals. As indicated in figure 16, the water available at the heads of canals such as Said, Shurab, or Zargar would be sufficient for all farmers to grow rice if the water were efficiently used and equitably distributed. Figure 16 shows that this is not the case: irrespective of the location of a canal within a river basin, farmers at the tail of the canal lose out relative to farmers at the head of the canal. Indeed, in 2008, 60 percent of the downstream area along the Zargar canal could

not support rice cultivation, while approximately 20 percent of the downstream land in the Shurab canal command area could not even be irrigated. Meanwhile, the water arriving at the heads of canals such as Sharawan and Jangharoq was sufficient to irrigate successfully a non-rice crop such as mung beans within the entire canal command area. Yet, in practice, the tail areas of both canals hardly received any water. In most cases, low water access in downstream areas is not a matter of insufficient water; it is primarily a management issue (see chapter 2). CPHD focus group discussions in other provinces, including in the south, confirm these findings.

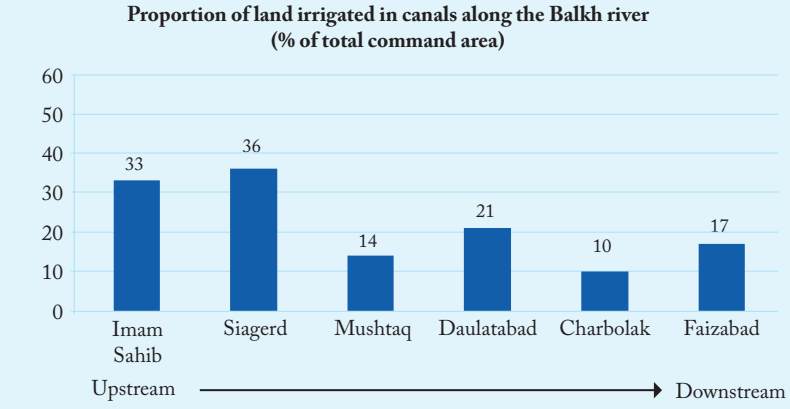
> "Within our downstream area, we don't have any problem with water distribution; it is the most equitable system: nobody receives water."
> A downstream farmer in Nimroz Province

Source: CPHD focus group discussion, November (2009).

In the Northern river basin, a survey of cropped and non-cropped areas within head, middle and tail sections of canal command areas shows that the average tail sections would not be able to put more than about 5 percent of their irrigable land under cultivation during the summer season (figure 17). In contrast, upstream areas managed to irrigate close to 58 percent of the irrigable land. Results were similar in Baghlan and, to a lesser extent, in Takhar.

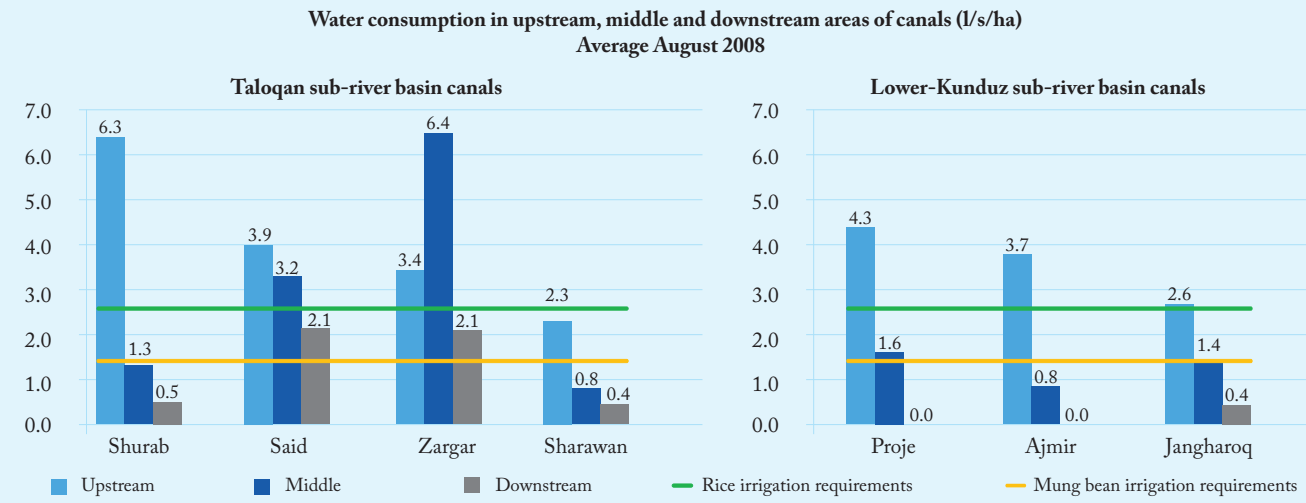
Studies in other river basins show similar trends. In Herat, for instance, observers have found that inequitable water sharing practices prevail despite the use of proportional divider structures. Indeed, this outcome is achieved by irrigators especially through a disregard for agreements and by tampering with the divider structures.[41] A brief study in 16 canals across eight provinces concluded that 14 canals showed clear signs of inequitable water sharing.[42] CPHD focus group discussions among representatives from Nimroz, Arghandab, Nangarhar, Helmand and Kandahar highlighted similar trends.

Figure 15 Upstream canals irrigate proportionally more land



Source: SMEC (2006b).

Figure 16 Within canals, the area at the tail of the canal systematically loses out over the area at the head



Note: Rice irrigation requirements estimated based on 50% irrigation efficiency and 5 mm/day soil infiltration rate. Mung bean irrigation requirements based on 45% irrigation efficiency.
Sources: Adapted from AKF (forthcoming a), Welthungerhilfe (2008).

In the end, the findings on the inequity in water sharing largely confirm local proverbs about water access along irrigation canals (box 7): the benefits of irrigation water access are mainly driven by location within the system.

Box 7 Old Afghan proverbs about water access along irrigation canals

"Better to be a servant upstream than a king downstream [along the canal]."
"Even though you may be the son of the mirab, it's better to be one offtake higher up [the canal]."

The human development costs of inequitable irrigation water sharing

Inequitable water sharing has multiple consequences affecting the livelihoods of downstream farmers. As farm incomes fall short of their potential, the assets of downstream farmers, including land, lose value. When the availability of surface water is chronically low, farmers at the tail reaches of canals have to resort to expensive and often unsustainable alternatives such as pumping. Over the long run, this contributes to the weakening of the resilience of downstream farmers to shocks such as droughts and pressures them to adopt confrontation as a coping mechanism to resolve their water insecurity.

"During drought or water shortages at the river and the canals, upstream farmers would put obstructions in the canals to divert more water for their own benefit. They do not respect the water turns that have been decided. This causes lots of problems for downstream farmers, and it leads to conflicts."
A farmer in Kandahar Province

Source : CPHD focus group discussion, November 2009.

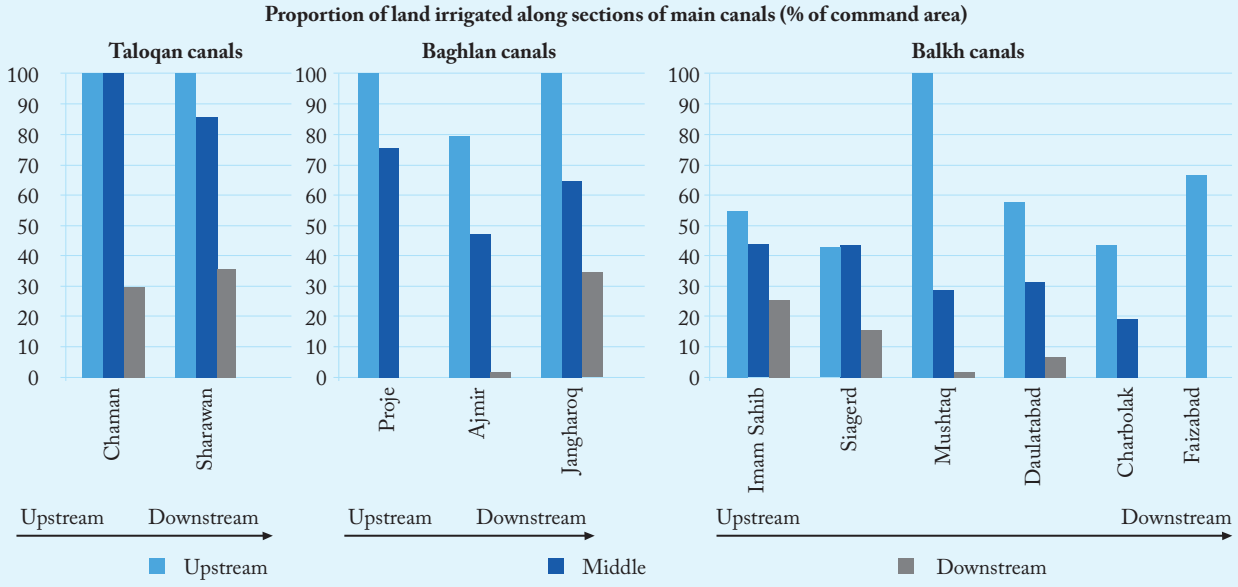
Downstream farmers: deprived of cropping choices and income opportunities

Unfair water acquisition by upstream farmers reduces the cropping choices and income opportunities among downstream farmers. In the Panj-Amu river basin, rice is the preferred summer crop because of the higher economic returns. Figures 18 and 19 illustrate that, in a drought year such as 2008, rice cultivation benefits mainly farmers located in the upstream parts of the Taloqan and lower Kunduz sub-basins to the extent that numerous downstream farmers even lose the opportunity to grow a second crop.

Thus, the economic returns decrease moving from upstream areas towards downstream areas (table 1).

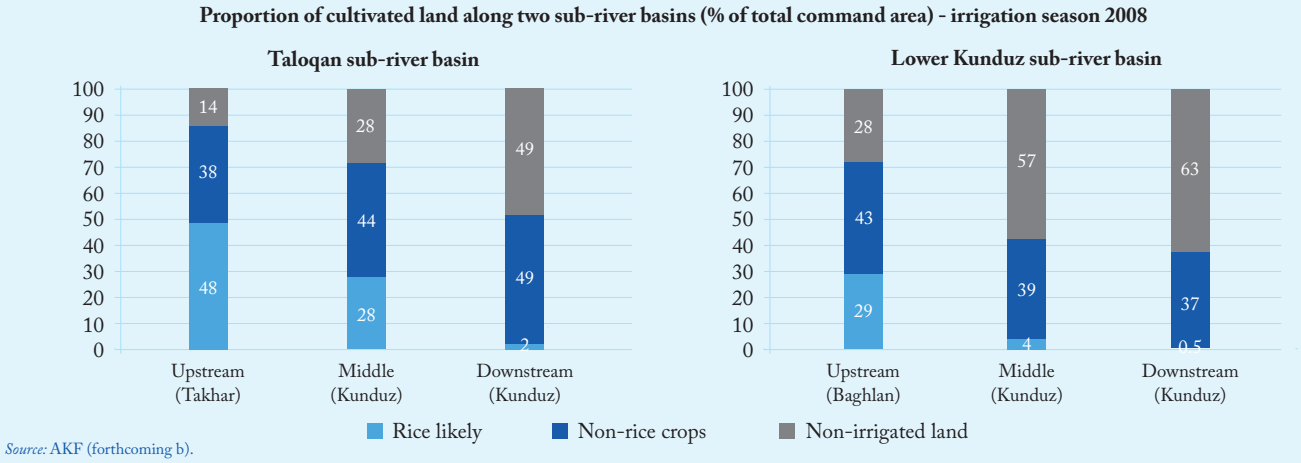
Studies in Ghazni in the Helmand river basin show that, even for wheat, average yields upstream were 78 percent greater (2.13 tons per hectare) than yields downstream (1.19 tons per hectare).[43]

Figure 17 Irrigated areas shrink in downstream canal sections



Source: Adapted from AKF (forthcoming a), Welthungerhilfe (2008), SMEC (2006b).

Figure 18 More lucrative rice crops benefit primarily upstream farmers at the expense of downstream water users



Source: AKF (forthcoming b).

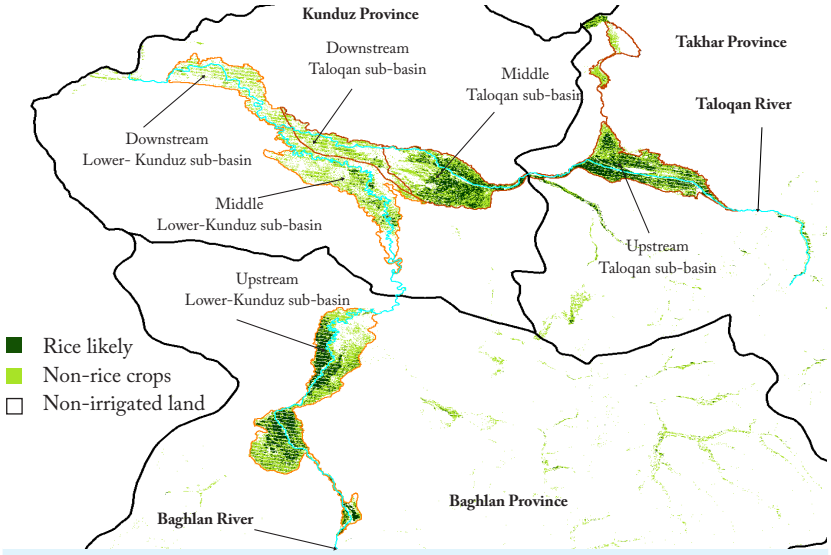
Figure 20 illustrates that, in 1979–1990, the area of irrigated land available in Chahar Bolak, Dawlatabad and other districts that are located along lower river canals or at the tails of canals has contracted significantly more than the corresponding area in Dihdadi, Chimtal, Balkh and other districts located along upper river canals or at the heads of canals.[44] The decline in irrigated area was 46 percent overall and ranged from 8 percent upstream to 83 percent downstream.

Undermined coping capacity and disempowerment of downstream households

- **Declining land values at the tail reaches of canals and river basins**

The value of irrigated land is generally greater than the value of rainfed land (see elsewhere above). However, irrigated land values within a canal system are directly related to the level of water access because this conditions crop selection and agricultural productivity (table 2).[45] Because of their more limited access to irrigation water, downstream farmers are faced with relatively lower irrigated land values. This affects their long-term livelihoods.

Figure 19 Upstream sub-basins grow mainly rice, while large areas downstream are not irrigated



Source: AKF (forthcoming b).

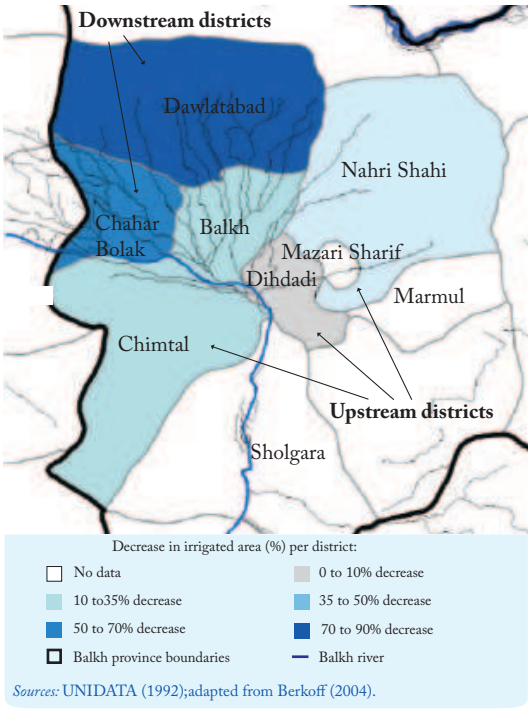
Table 1 Typical economic returns decline proceeding from upstream towards downstream areas

		Taloqan[a]		Baghlan[b]	
Area along the main canal	**Typical cropping pattern**	**Average yield (ser per jerib)**	**Average economic return (AFN per jerib)**	**Average yield (ser per jerib)**	**Average economic return (AFN per jerib)**
Upstream	Wheat/Rice	75/95	8,538	80/145	10,618
Middle	Wheat/mung bean	75/25	7,235	80/25	6,491
Downstream	Wheat/-	75/-	4,199	80/-	3,455

Notes: 1 ser = 7 kilograms.
a Based on a sample survey in the entire Taloqan irrigated plain.
b Based on a sample survey along the Jangharoq canal.
Source: Based on Pasquet (2007).

Unfair water acquisition by upstream farmers reduces the cropping choices and income opportunities among downstream farmers

Figure 20 **During 1979–1990, the irrigated land in downstream districts contracted the most**



Sources: UNIDATA (1992);adapted from Berkoff (2004).

Over 60 percent of households may be highly debt in secure during extended drought (see chapter 2). Mortgaging land is a common, but risky initiative for gaining cash. The higher the land value, the less vulnerable households are in clearing debt. Thus, by reducing land values, inequitable water access increases the vulnerability of downstream farmers and weakens their capacity to cope with drought.

Table 2 **Land value is directly related to the level of access to irrigation water**

Area along the Jangharoq canal	Water access in 2008 (l/s/ha)	Minimum land price (AFN/jerib)	Maximum land price, (AFN/jerib)
Upstream area	2.6	250,000	400,000
Middle area	1.4	150,000	250,000
Downstream area	0.4	90,000	130,000

Note: l/s/ha = litres per second per hectare.
Source: Based on CPHD focus group discussions among local elders along the Jangharoq canal (upstream, lower Kunduz subbasin), (2008).

- **While upstream farmers more easily cope with drought, downstream farmers must adopt survival strategies**

Inequitable water access has the long-term impact of weakening the resilience of downstream communities during climate shocks such as drought. During water shortages and drought, rural households adopt coping and survival strategies, the nature of which depend on the value of available assets and capital (see chapter 2). Within irrigation systems, recurrent inequities in water sharing tend to create a divide along geographical lines between households that can cope without eroding their capital and those that are forced to undertake more severe measures to survive. Of course, not all households at the tails of irrigation water systems are affected so acutely, nor are all farmers at the heads of systems exempt from the worst impacts of a drought. Nonetheless, geographical location along a canal is usually a critical factor. For example, in Balkh Province, the combined economic losses caused by declines in poppy cultivation since 2007 and the effects of the 2008 drought put all communities at risk. Yet, the communities farthest upstream, which had become more resilient over the years largely due to improved water access and, thus, better crop production, managed to cope by relying on grain stocks they had previously accumulated. They were therefore able to absorb the sharp increase in commodity prices between 2006/07 and 2008.[46] In contrast, downstream communities, which had been regularly deprived of their water rights over the years and even decades, had no stocks and thus had to depend on the market. As a result, they faced an average 185 percent increase in wheat prices, combined with a 70 percent decline in daily wages.[47] In such circumstances, some downstream farmers were obliged to sell their most productive assets, including plough oxen, making it more difficult to recover once the drought was over (see chapter 2).

In the long term, this inequity has a disempowering effect on downstream communities, and it may create exploitative relationships and social dependence. For instance, reports in Balkh and Baghlan indicate that, ironically, downstream farmers had to seek work on the land of the upstream farmers who had probably contributed to depriving

them of their water rights (see elsewhere below). This must be taken into consideration in examining ways to empower downstream communities to reclaim their water rights, including through the establishment of WUAs as promoted by the government.

- **The high transaction costs associated with accessing irrigation water in downstream areas**

Downstream farmers not only receive a less than fair share of water managed as a resource held in common, but they also usually have to pay high transaction costs to access the resource. Even if water turns have been defined by mirabs, downstream farmers must still struggle to ensure that the water reaches them (box 8). They could use this time and effort in other productive activities instead.

- **Inequitable water sharing increases the opportunities for bribes and corruption**

Resolving the violation of the principles of equitable water distribution by upstream farmers poses significant challenges to mirabs. The opportunities for bribery are considerable, whether the goal of the bribery is to maintain the *status quo* in upstream areas or to change it in downstream areas. During the 2007 irrigation season, a study along a canal in Baghlan showed that more than 87 percent of the downstream farmers reported paying bribes to the mirab to gain access to even limited amounts of water. In several cases, the extra access was still not sufficient to grow a crop to full potential.[48] Such practices contribute to the long-run erosion of the belief of farmers in the possibility of a fair system.

The alternative of costly pumping mainly burdens downstream farmers

If there is a decline in the availability of surface water in a situation in which the dependence on agriculture is high, farmers tend to resort to the use of groundwater through the application of expensive pumping equipment.[49] With the exception of the Panj-Amu river basin, where it remains marginal, pumping is used widely in the irrigated areas of all river basins. Pumping tends to increase the burden on downstream farmers, thereby magnifying long-term economic inequalities. In recent years, the cost of a litre of diesel fuel has been increasing; it rose from $0.27 in 2003 to almost $1.00 in 2009.[50] Thus, pumping is becoming less and less profitable for farmers at the tail reaches of irrigation water systems.

The quality of the groundwater available to these farmers may also be affected by the inequities in surface water distribution. Thus, in the Northern basin, the highest quality groundwater is located in the areas farthest upstream along the river and the canals because the greater abundance of surface water means that the groundwater is recharged regularly.[51] Meanwhile, the quality of the groundwater tends to worsen in the areas towards the tail of the river and the canals because of the higher salinity due to the absence of active water recharge.

Box 8 The daily struggle to obtain water for downstream farmers

"When I know our water turn is coming, my brother, my cousins and myself wake up very early and start walking along the canal towards the upstream area. You can't irrigate your field alone when you are living downstream. One person has to stay in the field and be ready to divert water to the field when it reaches the tail of the canal. But you also need two or three people to bring the water from the upstream area. These persons have to close the upstream offtakes to ensure that water is not used in the upstream area, but remains in the main canal, flowing towards the tail-end. The problem is that, if you don't control constantly these offtakes, the upstream farmers reopen them as soon as you leave. Even if the mirab has defined the turns, they [the upstream farmers] don't respect anything. There are so many offtakes, it's not possible to keep an eye on each of them. So, we have constantly to walk kilometres along the canal. Those who have houses nearby the canal in upstream areas are constantly complaining, and they accuse us of watching their women. Sometimes, upstream farmers ask their children to reopen the offtakes after we have tried to close them. They do this purposely because they know we cannot fight with children; it would give us a very bad image. So, sometimes I also have to bring my son along and ask him to close the offtakes. Instead of walking along the canal all day, my brother and my cousin should be looking for jobs in the city. Really, we are sick and tired of this struggle to irrigate our little piece of land. But what else are we supposed to do?"

A downstream farmer in Takhar Province

Source: Focus group discussion, Participatory Management of Irrigation Systems (PMIS) project, August (2007).

Water is the second major cause of disputes in communities

Measurements of the quality of groundwater in the Northern basin show that downstream farmers will likely produce lower yields if they use groundwater to irrigate vegetables, almond trees, or mung beans because these crops are especially sensitive to highly saline water. In contrast, upstream farmers are able to supplement the surface water through pumping to grow more lucrative but also more water-demanding crops such as cotton, almonds and vegetables without facing yield reductions. For farmers at the tail reaches, the crop production costs are higher, while the yield and crop selection are more limited.

Conflict, bribery and loss of water rights

- **The cycle of inequitable water sharing and conflict**

The competition for water and the loss of access to the resource, particularly in tail areas, fuel sporadic tensions and disputes that can lead to violent events. According to a study commissioned by Oxfam, water is the second major cause of disputes in communities (figure 21). Poor water management, insufficient irrigation and environmental degradation were identified as key contributing factors. The study cited the head-tail divide as the main component of grievances over irrigation and the defining obstacle blocking achievement of equitable access to irrigation water.

Other actors play a substantial role in conflict mediation. If they are not a part of the problem, the mirabs are usually involved in mediation. Additionally, the nature of the conflict and the social capital of the parties determine who becomes involved in mediation, from local elders to influential community members and representatives of local government such as irrigation department officials or the staff of the office of the governor. The process is rather *ad hoc* and depends on the context.

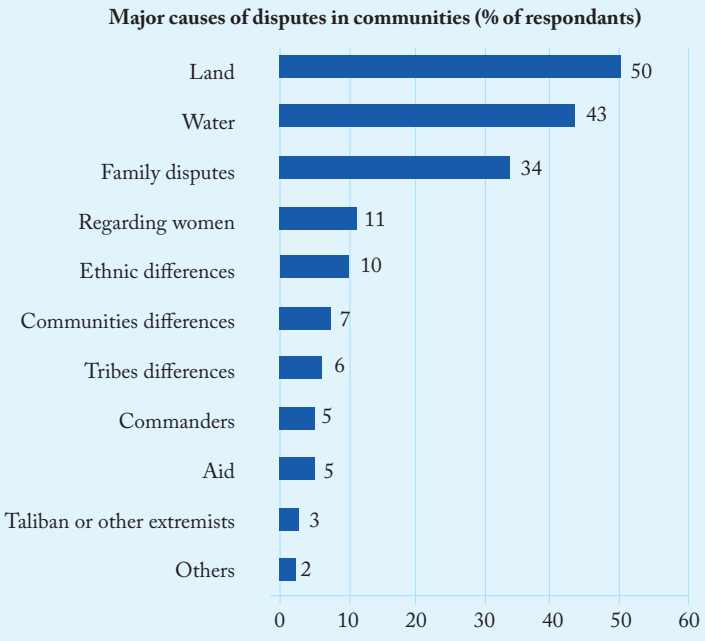
To examine in greater detail the nature of these conflicts, CPHD conducted a survey to gather the views of farmers (figure 22). Around 40 percent of the respondents, on average, assigned the cause of the repeated occurrence of conflict to a perceived lack of sufficient water to meet their needs or to poor infrastructure that limited their control over the water supply. Management and governance issues account for the majority of the responses. Within this broad category, a lack of clear water distribution rules and a lack of local government support and enforcement capacity were viewed as the chief challenges.

The wider context of the socio-political tensions of the last three decades has been a major contributor to the current head-tail divide along rivers and canals. Thus, conflict and social capital degradation have promoted additional conflict (box 9). Indeed, water is rarely the only factor or even the most important factor behind the escalation in the intensity of disputes.

- **Inequity in water sharing and ethnic tensions**

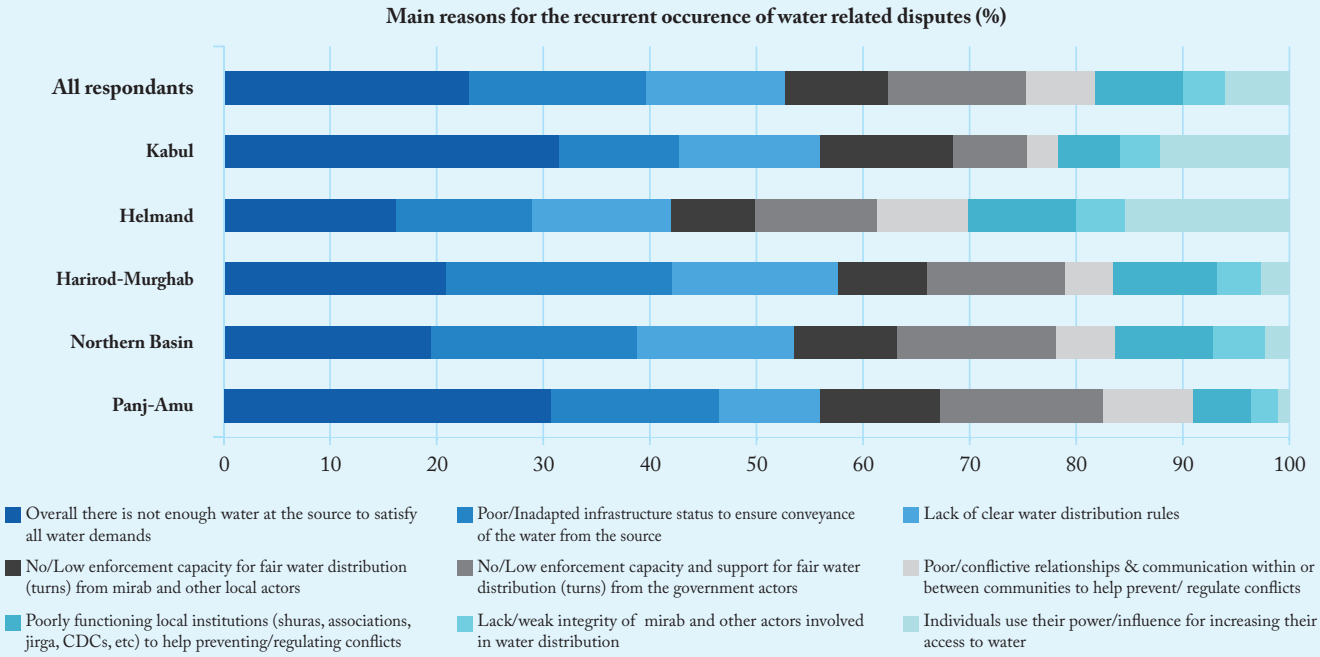
Inequitable water distribution has contributed to economic polarization within and among communities and to intercommunity tensions along the divide between the head and tail reaches of irrigation water systems.

Figure 21 **Water is the second major cause of disputes at the community level**



Note: Water is seen as a major cause of dispute in 217 of 500 interviews. The study covered six provinces: Herat, Nangarhar, Balkh, Ghazni, Daykundi and Kandahar.
Source: Adapted from Waldman (2008).

Figure 22 **Management and governance issues are behind most disputes**



Note: Data base on a sample of 1,060 water users in 15 canals equally distributed over 5 river basins.
Source: CPHD survey (2010).

Box 9 **Conflict, water access and livelihood: a life story in Baghlan**

"Before the revolution, life was good thanks to the Spinzar and Baghlan Sugar beet factory. I had 23 jeribs, and I was teaching in a school where my two sons were also studying. We had only around 20 head of livestock. Water was rarely a problem, and we could make at least AFN 10,000 of four land, which was very good at the time. But, when the fighting started, water access decreased rapidly, and the factories closed and were looted. I couldn't rely on agriculture alone due to water shortages. I had a good relationship with Commander Ahmad because some of my students were his relatives, but he asked me to provide one of my sons for the jihad. At the same time, the government put pressure on me because I was teaching in a school under Ahmad's control. I negotiated with both sides to teach in two schools. I didn't get a salary from Ahmad as a compensation because I didn't send him my son. I didn't have a choice because I didn't have any water for cultivation. I used all our savings to send my son to Pakistan, and I survived on my teacher's salary from the government.

During the winter,Ahmad's men cut our trees for fuel. If I couldn't teach on both sides, it would have been impossible to stay in the area despite my son's remittances. Lots of people have left the area because there is no water access and no job opportunities.

During the 1990s, the upstream areas were cultivating paddy [rice], and the downstream families, deprived of their water rights, were going to those farmers to work as sharecroppers or labourers. To me, this was not acceptable. Together with influential persons from the downstream areas, we organized a meeting with Commander Ahmad and other influential leaders in the province. They agreed to support us. We went with more than 50 people along the canal and started closing the upstream offtakes to ensure that water would flow downstream. But, at one offtake, the son of Hajji Mirzahad had put a bomb. When some people tried to close the offtake, it suddenly exploded, killing two and injuring five or six. Everybody knows that some upstream farmers also used the situation to resolve old political conflicts with downstream villagers whom they accused of being communists. As a retaliatory measure, after a week, we went to four houses during the night and threw bombs. We heard later that four persons had been killed, including a woman and a 10-year-old boy. The situation escalated, and this made it more difficult for us to get water because, from that day onward, there was a person with a gun at each offtake. Once again, people lost hope that they would ever be able to farm. After a month, Commander Ahmad invited all downstream people and the water users from the area where the incidents happened to come to him. Lots of influential persons were present. The meeting prevented further

(continued on next page)

Box 9 Conflict, water access and livelihood: a life story in Baghlan *(continued)*

escalation, but the conflicts continued, fortunately without people being killed. Only a little water reached the downstream areas, barely enough for domestic uses and to keep our trees alive.

At the beginning of the Taliban period, we complained that there was no equity in water sharing between upstream and downstream areas. The Taliban changed the mirab and managed to bring water for one year. But that wasn't enough; furthermore, they asked every family to give one person per household to help them in the fighting. I had to pay them $40 a month to spare my second son. Both of us managed to work as labourers in Pul-e-Khumri. In the evening, we returned by taxi to New Baghlan and then walked 15 kilometres from there to save money.

When the Taliban were removed, the situation didn't really improve downstream because a lot of people in the upstream areas had become influential and powerful at our expense. The situation started changing in 2006 with our canal rehabilitation and desilting and the formation of our WUA. My 2008 and 2009 farm incomes were the best since the 1970s. But the security situation is bad again in Baghlan. If it continues like this, people will leave this area permanently. If it improves, there is a chance to bring this canal back to life."

A farmer from the downstream area of a canal in Baghlan Province

Note: Names have been changed to protect interviewees.
Source: Interview, Participatory Management of Irrigation Systems (PMIS) project, March (2010).

For example, in the Hazhda Nahr canal system, the inequity in water distribution has been fueling resentment between the dominant ethnic groups settled in upstream areas and other ethnic groups downstream. After settlement in the 1880s, 1920s and 1930s, the majority of upstream communities in Balkh Province belong mainly to one ethnic group, and "resentment against these settlers by communities of much longer standing is never far away from the surface of local politics in this area". [52]

- **The risks involved in resolving conflicts outside formal channels**

As conflicts recur and become more acute and as local government agencies, with the assistance of the international community, prove unsuccessful in mitigating or resolving them, there is a risk that farmers will increasingly turn to local informal shadow governments setup through the insurrection (box 10). This means that, as inequitable water sharing fuels more tension and causes more disputes, the lack of support by formal governmental actors for conflict resolution may drive more farmers towards an arbitrary system of justice that is based on fear and intimidation, as the country witnessed a decade ago. Farmers may come to lose faith in the ability of the government and local institutions to prevent or mitigate conflict. Unfortunately, the practice of seeking justice outside formal channels has been growing in recent years, including in the Panj-Amu river basin. This is an especially sensitive issue in the areas of the country that are currently unsecured.

- **Long-term inequity and conflict may lead to the *de facto* loss of water rights**

In numerous cases of inequities between the head and tail reaches of water systems, when the disempowerment of downstream water users attains a point that they lose faith in the possibility of accessing water equitably or at all, they focus on alternative coping strategies. When practice differs from principle for so long and when the transactions costs of changing the status quo become too high, then the practice is transformed into a de facto right. Thus, not correcting the inequities in irrigation water access is to legitimize a system that fails to realize a core aspect of human development: the provision of equal opportunities and the range of choices in employment.

"This is the first time I see water flowing in this village in the last 30 years. I actually forgot we even had rights to the water in this canal."

A Baghlan farmer after the 2008 irrigation season

Source: Informal discussion, Participatory Management of Irrigation Systems (PMIS) project, (2008).

Poppy cultivation: harmed or bolstered by water scarcity?

There is a widespread belief that water scarcity is encouraging farmers to turn to the cultivation of drought-resistant poppy. However, studies of the topic are not conclusive about the existence of a direct link between water scarcity and poppy cultivation.

The experience of Helmand Province from the 1950s to the 1990s suggests that there is a relationship between opium cultivation and water and food security, but also that this is not the only factor. In the early 1950s, a major reason for poppy growing was the unreliable water supply and the cropping patterns, which were otherwise limited to wheat and maize.[53] Following the development of the Helmand Arghandab Valley Authority in the mid-1950s and the expansion of irrigation, the government prohibited the cultivation of opium poppy, and the sector largely died out in the principal irrigated areas. In the mid-1980s, as irrigation management and maintenance broke down, poppy cultivation remerged. In 1992, after the fall of the Najibullah Government, the price of inputs began to rise rapidly, and, as input subsidies and the market for cotton disappeared, the maintenance of irrigation systems declined further, and water shortages occurred. Along with the need for revenue among local commanders, the decrease in water availability was a considerable push factor behind opium production.

In the Northern river basin (Balkh Province) prior to 2001, the cultivation of opium poppy was largely restricted to the upstream reaches of irrigation canals. This was primarily related to issues of market control.[54] In 2001, cultivation began expanding. This was driven by a relaxation in market access controls, but also by price fluctuations linked to farming practices among downstream households seeking to recover from a long drought that had led to a loss of livestock assets and high levels of debt. In 2005, opium cultivation was concentrated mainly in Balkh, Chahar Bolak and Chimtal districts.[55] In the case of Chimtal, opium poppy cultivation came to be concentrated in the lower reaches of the irrigation system where water was scarcest. Upstream areas had sufficient water for double cropping and, although opium was cultivated as an additional cash crop, the cultivation was less intensive there than downstream. However, in Chahar Bolak, in upstream villages where ethnic connections provided good access to the opium market, the pattern of cultivation was reversed. In Chahar Bolak, the parts of the district receiving the most water supported the greatest density of opium poppy cultivation as part of an intensive cropping system, and this outcome was favoured by local power structures with good connections in the district and beyond.[56] This is inconsistent with the idea that there is a direct link between water scarcity and the intensification of opium cultivation in these districts. Meanwhile, a sharp decline in poppy

Box 10 Resorting to insurgency to achieve conflict resolution at high price

"I was working as a mirab along a canal and had given a three days' water turn for downstream farmers,but it was not respected. Several times, there were disputes, and the downstream farmers blamed me for not being able to enforce the decision. Later on, these farmers turned towards the district governor, from the Taliban. Some Taliban supporters asked me to gather upstream farmers and to bring them to the locations where the offtake had to remain closed for three days. The Taliban themselves closed the offtakes, and one of them told the audience: 'this offtake will remain closed for three days, as was decided. If I hear that this offtake has been opened, we'll come back to you and to you [he pointed his finger at two farmers who had land that was supplied by the offtake] and remind everybody what it means to be a thief.' On that day, I had to go to Kabul for personal business, and I only came back five days later. Upon my return, I patrolled along the canal, and I saw that the offtake was still closed. I asked a farmer nearby why the farmers there weren't usingthe water: it had been two days since the water turn for the downstream farmers had been completed. The farmer told me that, out of fear, nobody had dared touch the offtake yet because they wanted to make sure there would not be any confusion about whether or not the offtake had been reopened only after three days."

A Baghlan mirab referring to the 2008 irrigation season

"We would like to get support from the government, but, unfortunately, it is not possible today because I didn't bring my credit card."

A Baghlan farmer

Source: Interviews,Participatory Management of Irrigation Systems (PMIS) project, August (2010).

In recent decades, local institutions, including governmental and community-based institutions, have been facing increasing challenges in the management of water along river basins and canals

cultivation in the Northern basin—where the dedicated area of cultivation plummeted from 10,837 hectares in 2005 to 4,882 hectares in 2007 and 766 hectares in 2008—was related primarily to changing socio-political and market conditions rather than changes in water availability.

Overall, the link between water scarcity and opium poppy cultivation is only indirect. That poppy can be grown in relatively water-scarce areas is a factor supporting its adoption in places with limited water access. The economic returns of poppy cultivation have had a greater and more durable impact in poorer, food-insecure areas, which overlap, to a certain extent, with areas that are water insecure. Among poorer rural households,the multiplier effects of the crop in terms of access to land and employment in crop management and harvesting have also been considerable. Yet, in areas in which the water supply is assured and in which households have been food secure, opium poppy has also been an extremely lucrative crop. In these areas, factors other than water scarcity, including price fluctuations, market access, economic returns and antinarcotics activities, have had a major role in the decisions of landowners about opium poppy cultivation. Meanwhile, in Helmand and other areas where markets are extremely risky because of conflict, opium poppy is the one crop for which the market remains viable.

The causes of inequitable irrigation water sharing

In recent decades, local institutions, including governmental and community-based institutions, have been facing increasing challenges in the management of water along river basins and canals. This has played a significant role in observed patterns of inequity in water sharing. The turmoil in the socio-political environment has not facilitated the search for solutions.

Inequity in water access, which includes unfair distribution to downstream areas, is associated with three broad categories of factors, as follows:

- *Water demand:* A progressive rise in the demand for water and the withdrawal of water in upstream areas in a context of increased pressure on agricultural land.
- *Social capital:* A degradation of community social capital and the resulting weakening in the performance of local water management institutions.
- *Infrastructure:* A degradation in the efficiency and conveyance capacity of traditional canal systems that are already characterized by low efficiency and limited control over water.

Figure 23 highlights the complex relationships among the factors falling under these categories. It also illustrates that interventions aimed at tackling the causes of inequity and the indirect consequences should adopt an integrated approach focusing on technical, social and management issues. The problem tree shown in figure 23 has been developed by water users in the Panj-Amu river basin. Differences should be expected in other river basins, though the three main categories are likely to be the same. Some of the main elements of the problem tree and the nature of the interrelations are detailed hereafter.

Population growth

The rising number of users, in tandem with the intensification of agricultural land use, has placed increasing pressure on water management. In many canal systems, the current number of water users is far higher than the number only four decades ago. Growing population is inevitably linked to shrinking land resources for the production of food for household consumption and declining farm incomes to sustain already fragile livelihoods. For example, in the Taloqan and lower Kunduz sub-basins, a comparison overtime highlights the dynamics involved in population increase (table 3) and the shrinking average size of a landholding (table 4). Over four decades, the average amount of irrigated land held by farmers declined by a factor of from

three to five. In 1966, over 20 percent of all farm landholdings were larger than 100 jeribs (20 hectares), while the size of the largest recorded landholdings was 2,000 hectares. Today, landholdings of more than 100 jeribs are rare.[57]

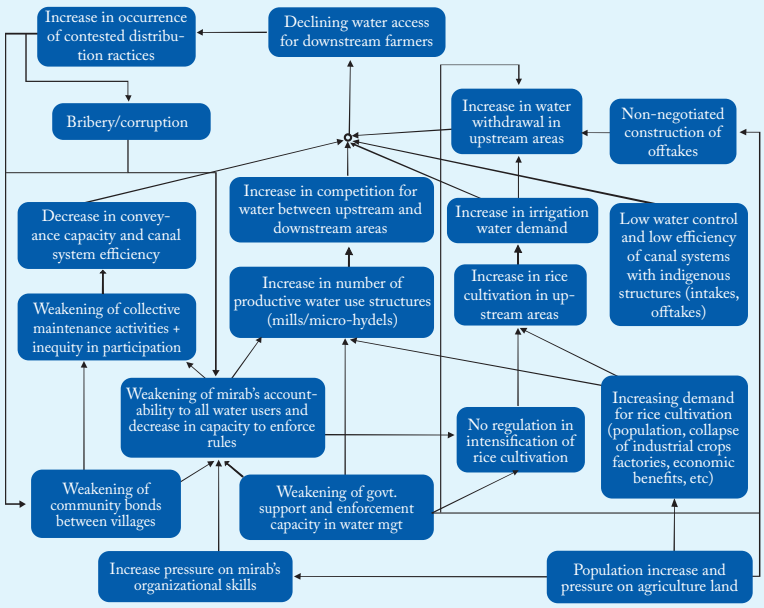
In addition, in the 1960s, cultivation was not as intense as it is today, and crops required less water in any case because of the preference for cotton and sugar beet over rice.[58] The double cropping of wheat and cotton was not possible because of the overlap in growing seasons. The total intensity of irrigation for a second crop was lower then than it is today because double cropping is now more widely practised.

Such an environment characterized by a growing number of water users competing for a shrinking land resource is usually conducive to greater challenges for mirabs and other actors in controlling water distribution because there are more opportunities to steal water, thus by-passing local agreements; meanwhile negotiations become more difficult.

The increasing demand for irrigation water

The upstream areas along numerous canal systems in the large irrigated plains of Afghanistan often use irrigation for cash crops, such as rice (Panj-Amu river basin) and cotton (Northern river basin), that consume significant amounts of irrigation water, while the downstream farmers are left with few options to satisfy their food consumption needs or ensure adequate farm incomes. Thus, for instance, the increase in rice cultivation in most of the upstream areas of the canals located near the head of the Taloqan and Lower-Kunduz sub-basins since the early 1980s is widely cited nowadays as a major cause of the inequitable water distribution and the relative water scarcity along the tail reaches of these canals and along the canals in the lower part of the sub-river basins (figure 24).[59] One might also say that the rice cultivation is both cause and consequence of the inequitable water sharing.

Figure 23 **The root causes of irrigation inequity are complex, multi-layered and socio-technical in nature**



Source: Adapted from Thomas et al. (2009).

Since the 1980s, paddy cultivation in the Panj-Amu river basin has become much more attractive than cotton cultivation and also less risky economically because rice can also be used for home consumption. With the collapse of the cotton industry in the early 1980s, the white gold (cotton) era ended, and the area became a grain basket of Afghanistan, thereby raising the demand for irrigation water.[60]

There is little doubt that rice cultivation has advanced significantly since the

Table 3 **An increase by a factor of five in population . . .**

Estimated total population	1966	2009
Taloqan and lower Kunduz sub-basins	576,000	2,557,800

Sources: Based on the populations of Baghlan, Takhar and Kunduz: column 1: Sogreah (1966), vol. 2, chap.5; column 2: CSO (2009).

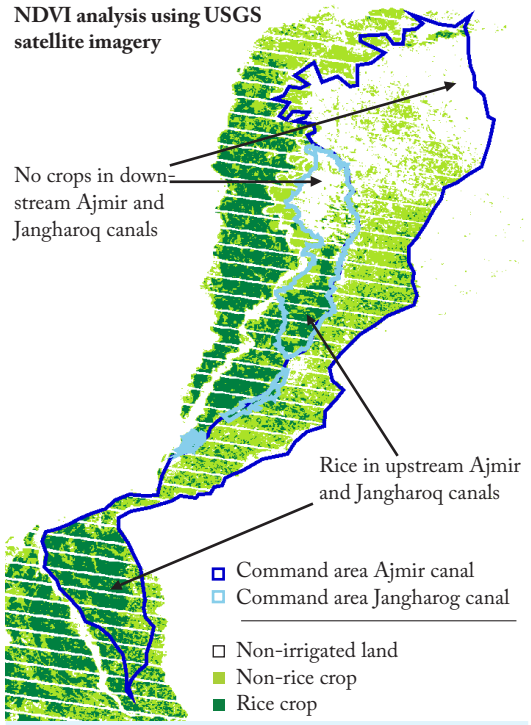
Table 4 **. . . has led to a reduction by a factor of five in the size of the average landholding**

Average size of irrigated landholding (jeribs)	**1966**	**2007**
Taloqan Province	25–30	5.2–6.9
Kunduz Province	15–20	not available
Baghlan Province	14.5–27	5.9
Afghanistan	not available	6.7

Sources: Column 1: based on Sogreah (1966), vol. 2, chap. 6 and vol. 3, appendix chap. 6; column 2: based on MRRD and CSO (2009).

The spread of water demanding crops in upstream areas has had negative consequences on downstream areas water availability

Figure 24 **Since the 1980s, rice cultivation has spread in upstream canal areas at the expense of downstream farmers**



Source: AKF (forthcoming b).

late 1960s and the 1970s. Even during the 2008 drought, rice cultivation stayed within the same range and may even have increased relative to the average estimated in the 1960s (table 5). In the 1960s, the largest rice areas were in the middle and downstream reaches of the sub-basins in Kunduz Province. The spread of rice cultivation along river basins over the last four decades has been concentrated in the upper reaches, with inevitable consequences on downstream water availability.

The closing of local cotton and sugar beet processing factories and the decline in the influence and field presence of the departments of agriculture have been key factors in the loss of the control that, in the 1970s, was effective in limiting the cultivation of crops that consume significant amounts of water.

Similarly, in the Northern river basin, studies suggest that the decrease in water availability in the Hazhda Nahr system in recent decades may have been triggered by uncontrolled rice cultivation in the Sholgara Valley located upstream.[62] Although poor management and infrastructure degradation, which is partly due to poor management, are also important contributors to the inequity in water sharing in the basin, the impact of the shift from a crop that requires less water to rice and cotton in the Sholgara Valley may account for the estimated 11 percent reduction in the river flow through the Hazhda Nahr system during the critical month of August.[63]

The intensity of irrigation has risen in the upstream areas of many canal systems. In the Northern basin, cultivators used to leave some land fallow, thus ensuring the restoration of soil fertility without compromising home consumption and economic returns. This is no longer so. The pressure on land has pushed farmers to seek maximum profits from shrinking resources. This has fostered the shift in upstream areas to cash crops, such as cotton, that consume more water at the expense of the needs of communities downstream.

Table 5 **Rice cultivation in the Kunduz river basin has increased over the past four decades**

	1966	2007	2008	2009
Estimated rice coverage (ha)	Average	Normal year	Drought year	Wet year
Taloqan and Lower-Kunduz river basins	44,700[a]	97,500	55,780	113,954

Sources: Column 1: Sogreah (1966), vol. 2, chap. VI; column 2: CSO (2008) for Baghlan, Takhar and Kunduz; columns 3 and 4: normalized difference vegetation index analysis, PMIS project report (forthcoming).
a. An average that does not apply to a specific year, though the data report was issued in 1966.

New demand patterns

Other water use patterns have emerged or intensified in recent decades and are competing with irrigation systems for water. Together, they serve to deepen the upstream-downstream divide. Integrated water uses along canals represent a new collective water management challenge.

- **Mills and micro-hydropower**

Mills and micro-hydropower units installed along irrigation canals are a source of income and energy for their owners and for

communities. In theory, they do not consume water and do not impinge on other water uses. Yet, because of bad design, poor location, the absence of appropriate regulation, or mismanagement, such structures may raise competition and reduce the water available for irrigation. The impacts are felt almost exclusively by downstream communities.[64]

While the construction and use of such structures were regulated in the 1970s with the assistance of the agriculture departments, the collapse of local government support in the 1980s led to an uncontrolled expansion of poorly designed and poorly located structures.[65] On the left bank of the Taloqan river, in the Panj-Amu basin, an estimated 69 structures may be found along seven canals that cover approximately 7,700 hectares. The majority of these structures were built during periods when there was no regulation or control and when there was also unregulated expansion of rice cultivation. In the Northern basin, the unregulated construction of poorly designed mills along the canal network, especially in upstream areas, has been identified as a factor in the emergence of head-tail inequities. The structures have, moreover, created opportunities for the mill owners and other farmers to acquire additional volumes of water for irrigation.[66] In most cases, the structures were built by relatively powerful individuals.

Similar cases have been described in Kapisa Province, with dramatic consequences. The construction of micro-hydropower units in upstream and midstream villages, combined with the narrowing of the canal (due to a decline in the efficiency and frequency of collective maintenance), has led to a dramatic drop-off in water access in downstream areas, where, as a result, agricultural land has been abandoned and villagers have moved away.[67] A few years ago, in the same location, a downstream farmer was killed for breaking the wheel of a micro-hydropower unit upstream along the canal.[68] The problem has been addressed in the Water Law, which has established a requirement that permits be obtained for the construction of such structures. Yet, the enforceability of the requirement has been questioned. This issue only affects equity in water distribution along canals, not basins, because the water used by mills and micro-hydropower units ultimately drains back to the rivers.

New water use patterns have emerged or intensified in recent decades and are competing with irrigation systems for water

- **Industrial and urban demand: an emerging challenge**

Demand in urban areas does not generally represent significant competition for irrigation water. Yet, there are signs that urban demand, including industrial demand, may be diverting water from irrigation canal systems. Major cities such as Kunduz, Herat, Pul-e-Khumri and Mazar-i-Sharif are traversed by irrigation canals, which help meet urban water supply needs. In the Northern basin, the operation of the Nahr-e-Shahi weir and the headwork along the main canal—which were constructed in the late 1960s to ensure that there is a reliable supply of water to the city of Mazar-i-Sharif and the fertilizer industry located in the area—have been documented as a factor in the overuse of water and as a failure of compliance with water rights.[69] For now, the volume withdrawn by industry is not significant.[70] However, the weir and the head work represent opportunities for abuse. As Berkoff states: "farmers (many living in the city), in association with the fertilizer factory and city interests, are known to bring pressure to bear on the MEW [Ministry of Energy and Water] staff, a pressure that is almost impossible to resist . . . under current conditions."[71] Thus, farmers have taken advantage of the fact that water control is much easier at the weir site than through other means of diversion and that they are able to extract significantly greater flows. The weir and the head work exemplify the way the relationships among various factors, including technology, management and lack of accountability, may lead to abuses in water sharing. The weir and head work require a "strong, non-

Inequitable water access between head and tail reaches of canals has been aggravated by the non-negotiated and unauthorized introduction of new offtakes especially in upstream areas

corrupt and fair central authority" if they are to be operated according to agreed rights.[72] How likely is this under the prevailing conditions? Control over operations and conflict resolution should have been the responsibility of representatives of water users, including in the case of the nine canals affected because of the Nahr-e-Shahi structure, though this is no guarantee of fairness (see the recommendations elsewhere below).

The increase in unauthorized offtakes and hydraulic infrastructure

Inequitable water access between head and tail reaches of canals has been aggravated by the non-negotiated and unauthorized introduction of new offtakes especially in upstream areas. Such structures are sometimes justified by upstream farmers as a mean to obtain independent access to water from a main canal. However, they facilitate tampering, the creation of ad hoc cross-regulators and the construction of new tertiary channels, all of which are aimed at extracting water flows in excess of entitlements. This practice has been well documented especially in the Northern river basin, as well as in the Kunduz river basin, but is likely to be common across most canal systems. It has been spreading since the 1980s, encouraged by the same *laissez-faire* attitude within local governments that has allowed rice cultivation and the construction of mills and micro-hydropower units. Canal rehabilitation projects need to reflect an awareness of the existence of both legal and unauthorized offtakes to promote the appropriate use of shared water resources and avoid conflicts with long-term development plans.

"In the past, one offtake was providing water for the land of one or two households, but, today,10 households would have to manage this same amount of water. To avoid disputes among households or between brothers, some people have made their own offtakes and increased the amount of water taken from the canal.

We have the same problem with finding jobs. It becomes more and more difficult because there are more and more people looking for wage work."

Haji Ubaidullah, Uruzgan Province, November 2009

Source: CPHD focus group discussion, November (2009).

Insecurity: another factor impacting downstream water users

Downstream farmers often have no alternative but to irrigate their fields at night because this is often the only time when upstream farmers allow the water to flow towards the tail reaches of canal systems. However, in unsecured areas, this practice is dangerous: farmers walking in their fields at night may be perceived as combatants by international forces, the national army, or the insurgents (box 11).

Low irrigation efficiency

Irrigation efficiency is a measure of the amount of water supplied by an irrigation system and effectively used by crops. Indeed, not all water from a source, whether river or well, reaches the roots of plants. Part of the water is lost during transport through canals and in the fields. In the case of earthen canals and surface irrigation practices on individual plots, a scheme irrigation efficiency of 50–60 percent is considered good, and 40 percent is reasonable, while 20–30 percent is poor.[73] In Afghanistan, given the high average on-farm delivery losses because of excessive irrigation and the poorly levelled land, estimates of irrigation efficiency have been in the range of 25–30 percent.[74] This adds to the inequitable distribution of water because the demand of upstream farmers is much greater than it should normally be so as to compensate for the associated losses. However, the low efficiency also means there is more water percolation, which recharges and improves the groundwater. This positive outcome should not be neglected in the implementation of an integrated approach to water management.

Fractured institutions

- **The erosion of social capital in communities**

The success of collective water management in ensuring equitable water sharing depends on the existence of substantial social capital, including trust and solidarity, the ability of people to work together through robust collective actions to resolve community issues,

Box 11 Insecurity affects water access

"We can only try to get water at night because, during the day, the upstream farmers won't let us. At night, it is also a bit easier to patrol along the canal to close or adjust upstream offtakes. But, with the fighting and the volatile security situation,this has become difficult. The international forces and the army think we are Taliban setting improvised explosive devices when we walk along the canals."

A farmer representative in Nimroz Province

Source: CPHD focus group discussion, November 2009.

"They have a sort of timeshare for water: that's the problem. I told him you can do what you like in your field, but once you get close to the road, you can't do that as soon as the sun is down. He wasn't happy."

Master Corporal (Canadian Army), summarizing his discussion following an argument with a young farmer

Source: France 24, 2010.

"I tried to close several upstream offtakes at night to let water pass for downstream farmers, but some Taliban pointed guns at me, asking who I was. Luckily, I had my mirab registration letter with the stamp from the water management department. So, they asked me simply to hurry up, go back home and avoid coming back to the area at night."

A Baghlan mirab

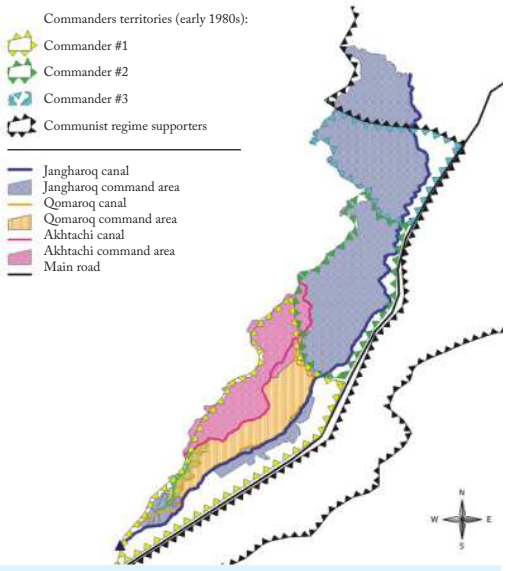
Source: Interview,Participatory Management of Irrigation Systems (PMIS) project, August (2009).

social cohesion to reduce the risk of conflict and to promote equitable access to water, and communication.[75] Tensions among villages and degraded social capital within canal command areas are often associated with poor performance in collective water management and inequitable water sharing practices.

In the 1980s and 1990s, canal command areas in the Northern basin were fragmented into territories under the control of various commanders. These mini-states were divided along complex, dynamic ethno-political lines, making it extremely difficult for mirabs and chakbâshis to enforce rules along the entire length of canals (figure 25).[76] This tended to favour abuses in upstream areas because the local commanders and rich landlords who held sway generally sought to prevent any intervention that threatened the status quo.

Case studies found that, in Baghlan in the 1980s and 1990s, rivalries among local commanders sharing control over canals directly impacted water distribution: upstream commanders would deliberately limit the flow towards downstream canal areas. Research along Said and Zargar canals in Takhar found that the movement of mirabs and farmers from one territory to another

Figure 25 **During periods of turmoil, canal command areas have been divided according to the influence of commanders**



Source: Thomas and Ahmad (2009).

was difficult, and this especially hampered efforts to organize communication, decision-making and resource mobilization. Because of the lack of integrated regulation and enforcement, illegal practices were becoming more common, including the construction of mills, micro-hydropower units and hydraulic infrastructure such as offtakes.[77]

"The injustice in our area, in Kuz Kunar district, is complete. There are two main villages in the district. In the upstream one, there are mostly wealthy people. The village farther downstream belongs to another group. When communities located upstream along the canal irrigate their crops, they divert much more water than needed from the main canal. They use only part of the water for their crops, and the rest runs as waste back to the river. Even during the water turns of downstream farmers, they [the upstream irrigators] open their offtakes and let the water flow towards the river. They do this intentionally; they want to have an effect on the land of other villages. This often causes lots of conflict between these villages."

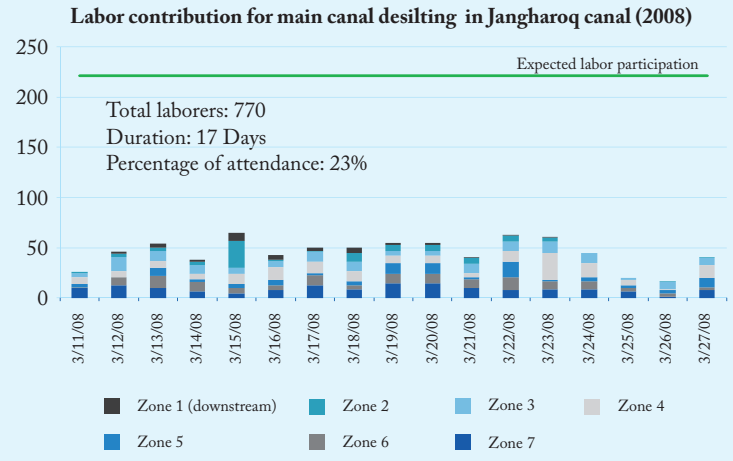
A farmer representative in Kunar Province

Source: CPHD focus group discussion, November (2009).

- **The decline in collective maintenance**

Traditional canal systems in Afghanistan are subject to significant siltation because of the silt load in rivers. The constraints on water sharing are more serious if canal infrastructure, including the conveyance capacity of main canals, is degraded. Every year, organized community labour (*hashar*) must be used to desilt canals and maintain optimal canal conveyance capacity. Partly as a result of the deterioration in social bonds, this collective maintenance has often been diminished in recent decades. Research on collective water management practices in Takhar and Baghlan suggests that, while the rules on collective maintenance are usually not questioned, performance has suffered. The contribution of labour across canal communities has become uneven, often to the disadvantage of downstream areas (figure 26). Studies in Ghazni Province in the Helmand river basin show that collective maintenance is highly inequitable.[78] Upstream farmers were failing to participate in maintenance, and, so, downstream farmers had no choice but to raise their own contribution. The average annual contribution of the downstream farmers was close to twice the contribution of the upstream farmers. However, this was not always sufficient to ensure proper maintenance.

Figure 26 **The labour available for maintenance is often insufficient**



Source: PMIS project report (2009).

Some have suggested that the direct impact of war on canal infrastructure has not been as significant as the impact of the exodus of farmers who have left behind unmaintained canal schemes.[79] Despite the return of refugees, many canals have inadequate conveyance capacity. Similar observations have been reported in a study covering canals across more than nine provinces.[80] In Helmand, most canals have been built using modern concrete infrastructure. Yet, as in other places, degradation and lack of maintenance are still regarded as key limiting factors.

"Due to the revolution and war in Afghanistan the canals have been destroyed, and now the water can't go from one place to another. Thus, conflicts have arisen among people. In my opinion, there is a need to reconstruct the canals in Helmand. Helmand Province is completely self-sufficient in water. It has a large amount of water from the Helmand and Arghandab rivers. But, as mentioned by other participants, this water cannot reach all people because of inadequate infrastructure."

A farmer in Helmand Province

Source: CPHD focus group discussion, November (2009).

- **The collapse of local government and the lack of legal support**

Prior to the 1980s, the role played by local governments, especially agriculture departments and irrigation departments, was significant at many levels, including in water sharing.[81] The rather rapid collapse of government support has contributed to the decline in the performance of local water management institutions, and downstream farmers have tended to suffer more.

Under Amir Amanuallah Khan (1919–1929), Nadir Shah (1930–1933) and King Zahir Khan (1933–1973), the allocation of individual water rights, the publication of the Law on Irrigation (Qanun-i-Abyari) and the establishment of the department of irrigation (Riyasat-i-Abyari) in Balkh laid the foundations for improving the management of the Hazhda Nahr system.[82] However, in late 1978, the control and support exercised by the central government over the canal network faded away as armed clashes became more frequent in many parts of the country and it grew less safe for governors, local water management personnel and agriculture department staff to monitor water distribution in the field regularly. [83]

In the Kunduz river basin, local government support was strongly motivated by a vested interest in many canal systems. Sugar beet and cotton processing factories were providing incomes at the local and national levels, which motivated the agriculture department to employ a mix of coercive measures and incentives to encourage farmers to grow industrial crops and limit rice cultivation whenever this threatened water access. For similar reasons, the agriculture department supported mirabs and communities in regulating the construction and use of mills and other structures to harness water.[84] Soon after the collapse of the agriculture department in the early 1980s, dramatic changes in water access began to occur in many places (box 12).

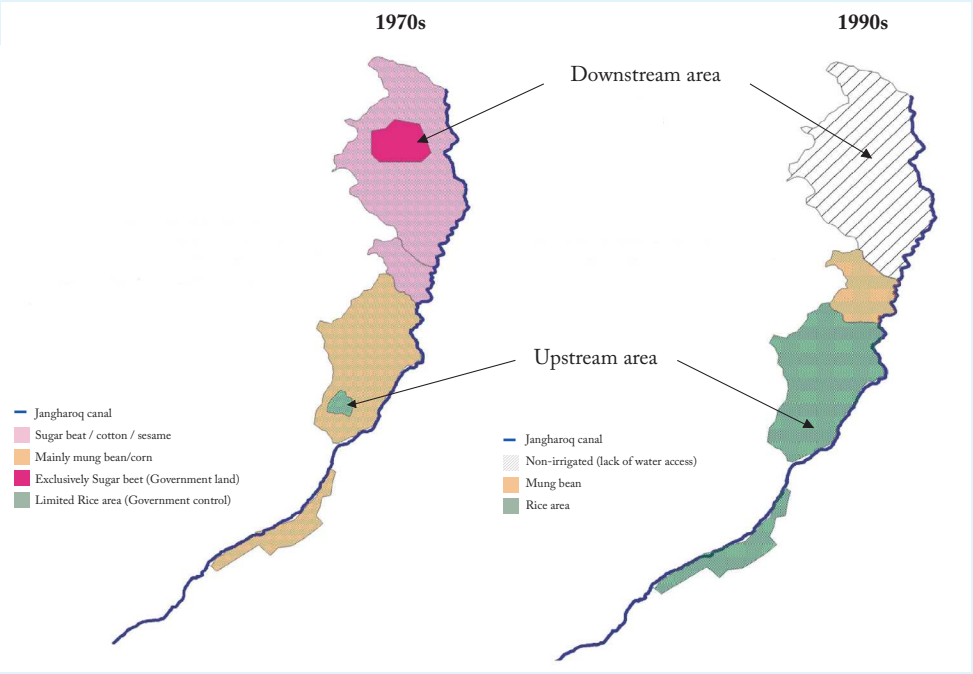
Dealing with conflict and inducing compliance with rules are key governance requirements for the management of any property resource held in common, such as canal irrigation water.[85] A CPHD survey in five river basins found that a majority of water users believe mirabs need more support in their efforts to improve water distribution along canals (figure 27).

The technical, financial and legal support of local governments for effective canal man-

The rather rapid collapse of government support has contributed to the decline in the performance of local water management institutions, including for equitable water sharing

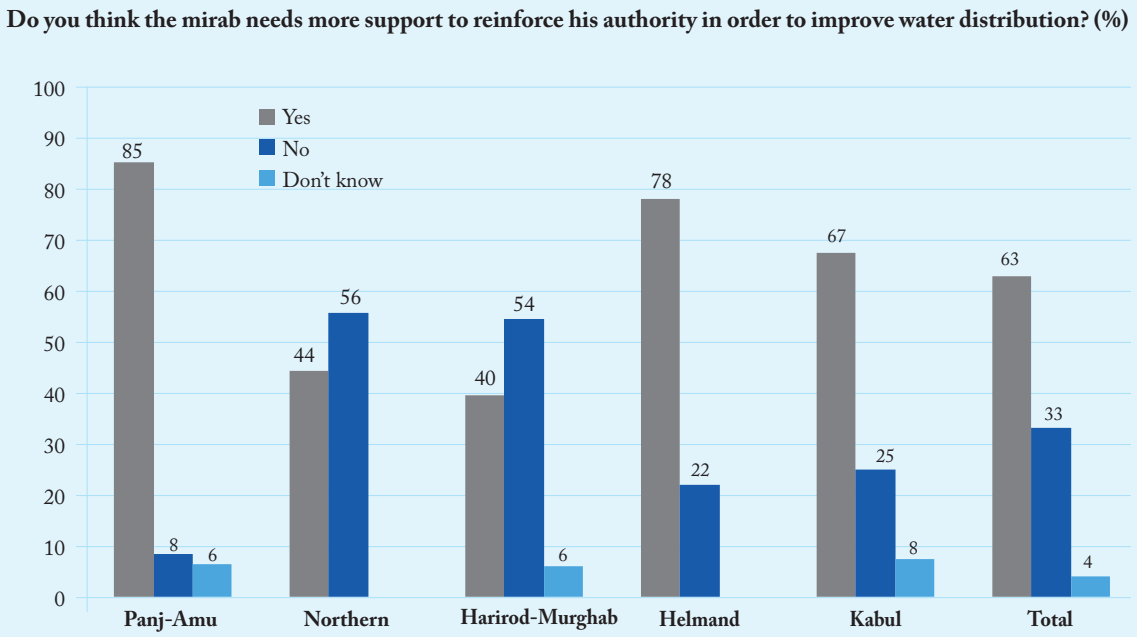
Box 12 Changes in water access because of the collapse of local government

Along the Jangharoq canal in the late 1970s, because the department of agriculture had a vested interest in the cultivation of sugar beets, it supported the mirab in ensuring that water reached downstream areas, including by using coercive measures to limit rice cultivation upstream. Water allocation favoured downstream farmers,who were growing industrial crops (left-hand map). From the 1990s to 2005, in the absence of local government support and the closure of local industrial crop processing factories, upstream farmers switched to rice cultivation, leaving downstream areas without water (right-hand map).



Source: Adapted from Thomas and Ahmad (2009).

Figure 27 **Many call for the reinforcement of the authority of the mirabs**



Note: Data based on a sample of 1,252 water users in 15 canals equally distributed over 5 river basins.
Source: CPDH survey, (2010).

agement is still limited. Enforcement capacity is also deficient in addressing the problems in irrigation water sharing on a larger scale, such as the river or sub-river basin. In the Panj-Amu river basin, the 2008 drought offered an illustration of the limitations of government intervention in support of equitable water sharing. Although five meetings on conflict resolution were organized among higher level officials, there was no sign of any effective cooperation between upstream and downstream provinces (box 13).

Similarly, in the Harirod-Murghab river basin, studies have highlighted the limited government capacity to support local institutions in enforcing water rights against defaulters and free-riders.[86]

If canal water stress is relatively low, interventions to resolve minor issues may be successful, but even this often appears to come at a cost (box 14).

Such trends may be particularly problematic in a context in which the insurgency is able to capitalize on the frustration of local populations because of the insufficient government support in tackling issues as critical as the equitable sharing of water resources sharing (see elsewhere above).

The latest water sector reform measures are promoting the establishment of new institutions such as WUAs and irrigation associations, but these institutions will need support, especially initially, in seeking to improve collective water management. Unfortunately, in their efforts to enforce rules and improve water management, newly formed WUAs in the pilot Panj-Amu River Basin Programme are facing obstacles raised by local governments rather than benefiting from government support (box 15).

Failing to adapt in a changing environment

The practices undertaken by local institutions to share irrigation water clearly involve inequities between head and tail reaches of irrigation water systems. This translates into unequal opportunities to enhance livelihoods, particularly among downstream communities.

The dynamics of the inequity in water sharing may be understood more clearly through an historical approach that explains

Box 13 Government interventions to advance conflict resolution have shown only limited results

During the drought of 2008 in the Taloqan and lower Kunduz sub-basins, farmers in the downstream province of Kunduz saw water availability at the river plummet, while the upstream provinces of Takhar and Baghlan managed to benefit from steady water access. As a mitigation mechanism, delegations of downstream farmers have been periodically seeking external assistance ever since. Five meetings on conflict resolution have so far been organized. The meetings have involved provincial governors, provincial water management directors and ministry officials, in addition to farmer delegations and mirabs. At the meetings, possible agreements on water sharing among the three provinces have been discussed. The meetings have systematically failed to achieve any significant change.

Summary of meetings

1. 11 May 2008: Agreement between the water management departments of two sub-basins for a partial closure of upstream canals (in Taloqan) for 10 days. Result: Not implemented due to the lack of enforcement capacity.
2. 29 May 2008: Kunduz farmers asked the water management department director and provincial governor to define the water rights along Kunduz canals with respect to upstream canals in both sub-basins. Result: Failed to reach agreement on water rights. Complaints were presented at the ministry in Kabul by Kunduz water users.
3. 21 June 2008: Ministry official facilitated an agreement among the directors of the water management departments in the three provinces to allow 30 percent of the upstream river flow to reach Kunduz. An official letter of agreement was drafted, and a monitoring procedure was endorsed. Result: Not implemented due to the lack of enforcement capacity.
4. 16 July 2008:The governor of Kunduz officially cited the newly constructed headwork on the Sharawan canal (Taloqan) as the cause of water scarcity in Kunduz.
5. 14 August 2008: A water distribution plan was designed under the leadership of ministry officials,the participation of directors of water management departments and the technical assistance of the Panj-Amu River Basin Programme. Result: Unsuccessful implementation until the end of the irrigation season due to the lack of enforcement capacity.

Source: Adapted from a presentation of Panj-Amu River Basin Programme technical assistance, October (2008).

Box 14 A high cost for little support

"The government should help us obtain water in accordance with the size of the lands we own. At the moment, some people who have only 5 jeribs of land take all the water for themselves, while a village with 50 to 100 jeribs of land receives only enough to irrigate 1 jerib. This injustice in water distribution causes conflicts. But, when we ask the government to do something for us, the most they do is write it all down on paper; no practical steps are ever taken. The other problem is that they don't have professionals and specialists on their staffs."

A farmer in Kandahar Province

"Whenever a person goes to a government department to have his problem solved, the officials say: 'Today is Monday; we should have some meat. Give us AFN 200.' Of course, the person at the entrance also takes AFN 50 from us on our way out. I swear, whenever a person returns from a government department, you can be sure he doesn't have any money left with him. Anyway, the government can't solve any conflicts among people unless they seek the involvement of the elders."

A farmer in Nangarhar Province

Source: CPHD focus group discussion, November (2009).

how contextual changes have come to shape the structure and the practices of local institutions. Figure 28 describes the environment within which any irrigation activity takes place. It breaks this environment down into three areas, as follows: (a) agro-ecological systems and technological infrastructure: climate, weather, vegetation, soil, topography, and technologies other than the irrigation system; (b) agrarian structures: ethnic and kinship relationships at the household, community and village levels and the markets for labour, land, technology, credit, inputs and outputs; and (c) the state, institutions and

Box 15 Lack of legal support hampers WUA progress in rules enforcement

In 2009, along a canal in the Kunduz river basin, the local WUA committee took the decision to draft and agree on a by-law regarding rice cultivation. Although rice was forbidden in the entire canal command area, upstream farmers had been cultivating the crop illegally over the last 30 years. Thus, the WUA calculated that,because of the sensitive nature of the issue, it would not be possible to end the cultivation of rice upstream. The transaction costs would be too high. However, a pragmatic by-law was agreed by a working group representing all areas along the canal. It provided for a halt to the spread of the crop to new areas, anticipating that this might occur after a few years if water access improved downstream.

In 2010, because of improved water access in the middle and downstream areas of the canal, some farmers started preparing for rice cultivation on land on which they had previously cultivated non-rice crops. The WUA committee decided to write a letter referring to the by-law forbidding rice cultivation in new areas. It therefore asked the local governor and the local water management department to help enforce the by-law. In response, the governor argued that the committee would be bothering two of his relatives to whom he had given permission to grow rice. However, he said he had no objection if action was taken against other farmers. The committee explained that the by-law could not be applied only to people who did not have political connections. If that were to happen, the credibility of the committee would be lost. A committee member added that "if we enforce the rule, but do not touch the powerful farmers who currently have political support, the Taliban will take this as an example of injustice and will make us pay one day or another."

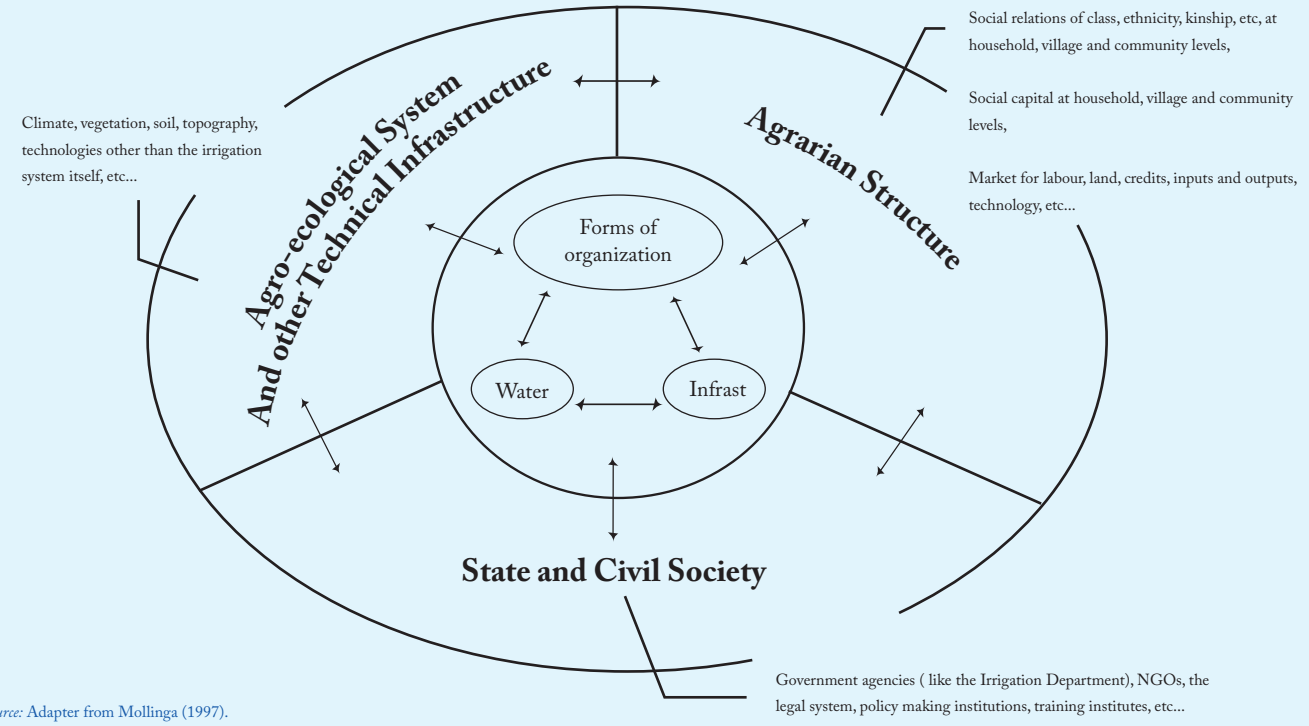
In the end, lack of political support prevented the WUA committee from taking any action.

Source: Based on an interview with a Social Water Management Project manager in the Kunduz river basin, (2010).

civil society: government agencies such as irrigation departments, the legal system and policy-making institutions, non-governmental organizations, and training institutes.

Recent generations have witnessed the emergence of major constraints and challenges in all three areas. The state and civil society have eroded because of the collapse of support from local government agencies. Failing legal support has been particularly harmful to the efforts of mirabs and other local actors to ensure fair water distribution. In the agro-ecological system, there has been a relatively rapid shift in the upstream areas of many canals to crops that consume significant amounts of water at the expense of downstream communities. Within

Figure 28 Irrigation activities and forms of organizations have affected by rapid change



Source: Adapter from Mollinga (1997).

the agrarian structure, the collapse of industrial crop markets in the 1980s and severe erosion in community social capital have been key elements influencing the degradation of collective water sharing practices.

There is now a large gap between the conditions necessary for the effective governance of the commons, such as irrigation canals, and the conditions within which most of the irrigation systems in Afghanistan have been evolving recently (table 6).

Despite apparent signs of resilience in the mirab system, local institutions have not generally managed to adapt successfully to the new challenges during this period of conflict and a rapidly changing political and institutional environment. The performance of local institutions in providing water resources to all farmers is inadequate and is now a source of contention in numerous canals.

Few settings in the world meet all the proper conditions shown in table 6. The challenge is to facilitate "institutional arrangements that help to establish such conditions or meet the main challenges of governance in the absence of ideal conditions." [87]

Despite apparent signs of resilience in the mirab system, local institutions have not generally managed to adapt successfully to the new challenges during this period of conflict and a rapidly changing political and institutional environment

Table 6 **Most of the conditions for the effective governance of irrigation systems can no longer be met in Afghanistan**

Conditions for effective governance of the commons	Conditions and challenges in current irrigation systems
The amounts and the use of resources can be monitored, and the information can be verified and understood at relatively low cost.	Transparent monitoring based on verifiable information on river and canal flows has not been available locally or at central level for the past four decades.
Rates of change in resources, user populations, technology, and economic and social conditions are moderate.	The rate of change in the user population and the related rapidly increasing pressure on land and the economic and social context have been high, and this has affected the conditions for managing irrigation canal systems.
Communities maintain frequent face-to-face communication and dense social networks—social capital—that increase the potential for trust, allow people to express and see emotional reactions to distrust, and lower the cost of monitoring behavior and inducing rule compliance.	Communication among user groups and with external support agencies (such as local governments) has been disturbed in some canals because of socio-political tensions. Social capital has been eroding for the last 30 years.
Outsiders can be excluded at relatively low cost from using the resource. (New entrants add to the harvesting pressure and typically lack understanding of the rules.)	Though not well researched, the issue of returnees and the difficulties faced in abiding by rules and principles developed and enforced in the past might have played a role in impeding equitable collective water sharing.
Users support effective monitoring and rule enforcement.	Rule enforcement capacity has severely declined, except perhaps under relatively mild water shortage conditions and along isolated canals that are buffered from external influences.
Differentials in power within user groups or across areas are limited. Otherwise, some may ignore the rules on the use of the commons or reshape the rules in their own interest, such as when global markets reshape demand for local resources in ways that swamp the ability of locally evolved institutions to regulate local resource use.	The collapse of the local markets for industrial crops (especially in the north) and the increasing differentials in power relations (driven by the divide in head-tail reaches) since the 1980s has led to unregulated changes in resource use (that is, intensive irrigation for crops that are heavy consumers of water) that cannot be mitigated by local institutions.

Source: Adapted from Dietz et al. (2003).

Reducing Inequity through an Integrated Approach

Any attempt to tackle the complex and sensitive issue of inequity in irrigation water sharing will have to follow an integrated approach evolving around three interrelated components: the reduction in the demand for water, infrastructure rehabilitation, and improvement in governance and collective water management practices.

The management aspect includes the creation of WUAs. The focus should be on the process rather than on specific models of organizational structure. To be effective and sustainable, WUAs require the legal, technical and financial support of the government. Although improving equity is essentially a management-oriented task, reducing water

demand at the plot level is critical. This helps create a better enabling environment so that the WUAs and the government are able to address inequity because it reduces pressure on the demand for natural resources. The same applies to infrastructure. Equity may not be fully resolved through extra construction, but construction creates more favourable conditions for controlling water, assuming that infrastructure is designed through a participatory, consultative process that involves farmers meaningfully in decision-making on design, operation and maintenance.

Reducing water demand and improving use efficiency in plots and canals

Inequity in water sharing is more difficult to ensure if irrigation water demand is high and increasing, upsetting the overall balance with water availability. Thus, a key component of an approach aimed at improving equity is the reduction of the pressure on the system so as to make collective water management easier for local institutions. Water conservation methods and enhanced on-farm delivery techniques can play a central role in the overall reduction of water demand. This may be accomplished through more extensive use of the water resource and without compromising crop production. Successful water conservation methods are also critical in taking maximum advantage of infrastructure rehabilitation and upgrades.

Water conservation methods for water-intensive rice cultivation

In the Panj-Amu and Northern basins,part of the upstream-downstream inequity problem in water access has been the increase in rice cultivation. A shift from rice to another crop could have a significant impact on the inequity patterns. Yet, such a shift is unlikely to occur through the use of coercive measures, and any attempt in this sense might exacerbate tensions between farmers and local governments.[88] Fortunately, alternatives exist. In some cases, substitute high-value crops, including horticulture, could appeal to farmers as preferred cash crops. For farmers who do not wish to switch to alternative crops or who simply cannot because of unsuitable soil conditions (such as water-logging issues), alternative rice cultivation methods such as the system of rice intensification (SRI) could be promoted on a large scale. SRI was developed as a set of insights and practices that change the management of the plants, soil, water and nutrients used in growing irrigated rice. By promoting the growth of more productive and robust plants, SRI methods lead to higher yields, require less seed and less water, do not require the purchase of external inputs and do not require the purchase of new seeds. Successful trials have been carried out in Afghanistan and have generated a reduction in irrigation requirements by 20 to 50 percent, while increasing yields by 50 to 100 percent.[89]

Improving on-farm water delivery through low-cost technologies and practices

In addition to SRI, but also in areas in which rice is not being cultivated, on-farm water management and soil and water conservation measures to reduce on-farm delivery losses might be an entry point for mitigating inequities along the head and tail reaches of canals or, at least, for bringing more land under cultivation in downstream areas. For example, drip irrigation could boost field application efficiency and yields, typically among high-value crops. Studies in India have shown that drip techniques can lead to a 30 to 60 percent savings in water, but can also improve yields by 5 to 50 percent. [90] The key limitation in promoting these techniques is that they require investments. This is a challenge for farmers who mainly grow crops for subsistence. It is also unlikely to appeal to upstream farmers who can acquire free surface water with impunity in volumes that are currently sufficient. Yet, there is probably

room for manoeuvre in the case of upstream farmers who are resorting to costly pumping for complementary irrigation needs. Farther downstream along canals, where water is already insufficient, leading to under irrigation and yield reduction, on-farm water-saving techniques might be more appealing as well. In any case, government support through subsidies would certainly be required to reach the poorest farmers. Besides drip irrigation for high-value crops, on-farm water-saving methods might also include better basin and furrow irrigation in cereal cropping systems, land levelling, or mulching. However, detailed technical and socio-economic feasibility studies should be undertaken to assess where such approaches might work, especially from a pro-poor perspective. Relevant on-farm water management programmes are currently being promoted by the Ministry of Agriculture, Irrigation and Livestock as part of the draft irrigation sector strategy to develop the ministry's sectoral programmes, but a major scale-up is now required.[91] Donors are currently working with the ministry to develop the required capacity to implement this task successfully.

Supporting in-canal rehabilitation and developing maintenance financing

In-canal rehabilitation to improve control over water distribution

In addition to promoting water demand control methods, an integrated approach should focus on in-canal technical rehabilitation and upgrading to improve the control over water distribution. It has been shown that, in numerous canals (such as in the Panj-Amu river basin), there is room for reducing water use in upstream areas to ensure better water access to tail zones without compromising the irrigation requirements of upstream water users. However, though part of the overuse could be tackled through SRI or the promotion of economically viable alternative crops that consume less water, a key remaining issue is the low level of technical control over water in traditional infrastructure in the majority of farmer-managed systems.[92] Any attempts to limit the overuse of water through improved, socially acceptable rules and regulations on water sharing would have to be supported by technological improvements that facilitate the application of the rules and regulations. Whether it is proportional dividers or adjustable gated offtakes, the safer, more rapid and more practical operation of in-canal infrastructure should be provided to regulate water distribution.

The Northern river basin would be a much bigger challenge than the Panj-Amu basin in terms of room for manoeuvre in reducing water losses along canals. In the canals in the Northern basin, it is evident that reducing water use in upstream areas to supply downstream farmers is going to occur at the expense of the upstream farmers, who have become more powerful in recent decades. This would make the negotiation rather difficult, especially if there is no compensation. In this context of tension and low enforcement capacity, the emphasis might initially be on canal rehabilitation that limits water losses and, thereafter, on water division structures.

There are potential risks to be avoided in investing in technical rehabilitation. The first danger arises in promoting the rehabilitation of intakes or other structures as a way to increase water availability along canals, especially if these canals are located in the upstream parts of a river basin.[93] The effects on canals farther downstream can be negative. Even if intakes and head works are not designed to increase canal flows (but rather to regulate excess, mitigate flow impacts and control acquisition more effectively), rehabilitating them can lead to tensions in a river basin. The 2008 irrigation season provided an example. Because Kunduz was facing the consequences of inequitable water distribution during the summer, local government officials complained about the recent con-

struction of several head works and placed responsibility for the lack of water in Kunduz on internationally funded projects. Though there was sufficient evidence that this claim was mistaken and despite the fact that the issue was eventually resolved through interventions at the ministry level, the false rumours added to the tensions that were already elevated owing to the drought. The example of the Nahr-e-Shahi weir (see elsewhere above) and gated head works is also a reminder that there is a risk that inequities in water distribution will become worse if a strong, fair and uncorrupted authority is required to ensure the fair water distribution.

In any case, infrastructure rehabilitation, including the rehabilitation of in-canal hydraulic structures, will not resolve all issues of water distribution though it may provide better opportunities to reach resolution. Rather, infrastructure rehabilitation should be viewed as an entry point to a participatory process that aims at improving collective water management practices among water users (including water allocation and distribution rules, procedures and monitoring) where and if this is felt to be necessary.[94] The extent to which water users want to change their current collective water management practices could eventually lead to changes in organizational structure in local institutions, justifying the formation of WUAs.

The equitable financing of maintenance costs

Important investment efforts have been undertaken in the rehabilitation of irrigation infrastructure, though it is questionable whether the efforts are sufficient (see chapter 5). The Emergency Irrigation Rehabilitation Project supported by the World Bank has been one of the main contributors to canal rehabilitation since June 2004.[95] The European Union has been funding the Panj-Amu River Basin Programme for more than five years, including important investments in canal rehabilitation. Yet, long-term infrastructure maintenance capacity, whether at the government level or among local users, is usually overlooked or assigned lower priority. It has been estimated that approximately 3 percent of the value of the capital stock should be spent yearly for maintenance.[96] In neighbouring countries such as India or Pakistan, the financing for maintenance is less than 50 and 10 percent of this benchmark, respectively. If such under investment is practised in Afghanistan, there is no doubt that short-term improvements in equity in water sharing would eventually be affected.

Financing the maintenance and operation of rehabilitated or upgraded systems needs to be given more attention, preferably during the design of infrastructure projects to avoid implementing projects that cannot be sustained. In the short term, awarding maintenance contracts for major infrastructure is a possibility. Ultimately, however, water users should bear at least part of the cost of maintenance. If maintenance is carried out by users, the fees for maintenance must be carefully defined, taking into account the ability to pay, the level of service provided and the logistical capacity to collect, record and manage the incoming funds. Designing a system for fee collection for maintenance should be part of a broader agenda of promoting local water governance, including the establishment and empowerment of WUAs. Complementary assistance from the government through loans for WUAs may be required.

Improving governance for equitable water sharing along canals

Background: a new institutional environment

The Government of Afghanistan is implementing water sector reform through the adoption of the integrated water resources management concept, as well as a river basin management approach (see chapter 5). This strategy is defined in the new Water Law, the aim of which is to promote water distribution that is efficient and fair.

Two levels of governance may be distin-

guished in the reform. At the basin level, the reform promotes the formation of multi-stakeholder platforms through the creation of two agencies. A river basin council (RBC) would represent water users, including water users in agriculture upstream and downstream in a river basin, while a river basin agency (RBA) would be composed of line ministry staff, including departments of agriculture, irrigation and livestock and water management departments. RBAs would provide technical advisory services. RBCs would have the key decision-making role within the overall framework of the Water Law. At the local level, an emphasis of the policy is on the formation of WUAs and irrigation associations. The first goal is to establish legally defined organizations that may obtain access to and be represented on the mesolevel RBCs so as to be involved in decision-making regarding water allocation in river basins and operation and maintenance arrangements, as well as budgeting. The second goal is to make WUAs and irrigation associations responsible for water management along canals. This change in governance structure is expected to be a key step in improving the equity of water sharing.

In theory, this structure represents a relevant framework for more participatory water resources management and more equitable water sharing. Yet, the implementation of integrated water resources management and the river basin approach is a formidable challenge.

The establishment and empowerment of canal WUAs

- **Creating WUAs: balancing traditions, customary practices and calls for change**

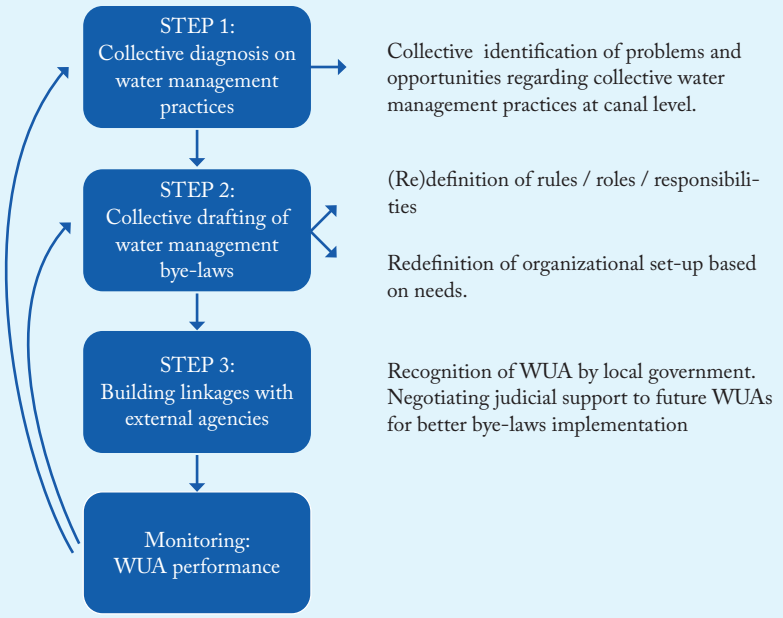
Guidelines for the formation of WUAs within a context in which local institutions such as the mirab system already exist are not set out in the Water Law or any implementing regulations. Statements associated with past irrigation policies and drafts of the Water Law reflect sometimes unclear and contradictory positions on the mirab system and the need to establish WUAs. They range from "preserving the mirab culture" and "effective traditional rules" to replacing traditional governance mechanisms that have become "dysfunctional" and "ineffective".[97]

Despite the apparent advantages, there are risks involved in formally establishing the current mirab system. Indeed, adopting a system characterized by acute inequities in water sharing is to run the risk of perpetuating the inequities.[98] Reviving a system that used to function, but has been disrupted many times over the past 25 years is not realistic. Thus, the mirab system in place in the 1970s cannot be compared to the current system because of the significant changes in context, including in the agrarian structure and the agro-ecological and political dimensions.

The challenge in establishing and developing the new WUAs to improve collective water management along canals will be to maintain the positive and well-accepted elements of the mirab system, while adding new elements that foster equitable water sharing.[99] A comprehensive and collective diagnosis of the current system should be undertaken to identify appropriate foundations for WUAs. Rules, regulations and agreements on collective water management where these may be considered necessary by water users should then be introduced. The internal regulations should be aimed at solving specific local problems highlighted by the diagnosis and take into account the environment. Some of the regulations may be existing by-laws that have been ignored, while others may be new and address more recent issues. Finally, roles and responsibilities should be defined or redefined, and, eventually, institutional reorganization should be initiated where this may be considered necessary by water users (box 16).

Considering that a whole range of management issues must be confronted, from canal systems in which disputes and problems in operation and performance are acute to canal systems in which management problems are minor and rules are well accepted and recognized, such a process is likely to yield various WUA organizational structures and by-laws that are tailored to needs.

Box 16 Illustration of the essential steps of an open-ended WUA formation process



Source: Adapted from Thomas et al. (2009c).

- **. . . and focusing on process rather than blueprints or output-oriented models**

Bureaucratic approaches requiring lots of red-tape have no chance of yielding positive results in the establishment of WUAs in Afghanistan. International experience shows that there is scope for interventions in support of collective action and the organization of water users only if conditions favour collective action; however, in Afghanistan, such action is not present or is less than optimal.[100] The mirab system is based on collective action, but it is not currently performing particularly well. Focusing efforts on helping farmers resolve specific local issues is a key to effectiveness. The creation of WUAs might follow the approach promoted by Ostrom, for whom the process involves "rule making, implementation and adaptation".[101] The emphasis is on the process and on the underlying principles rather than on the observable characteristics of organizations. The process promotes a situation-specific approach to the organization of irrigation, wherein the goal is matching rules to local circumstances. Thus, establishing or strengthening WUAs is a process of crafting institutions rather than replicating a single model everywhere. A similar approach is being piloted within the Kunduz River Basin Programme through social water management projects; if the pilot is promising, the approach may then be replicated in other river basins following adjustments to fit local conditions. Combined with technical rehabilitation, such an approach has produced encouraging results in reducing inequity and increasing water access in downstream areas (box 17). However, it is clear that the head-tail divide remains critical and that additional initiatives are required.

- **Providing legal support as an overarching priority**

A key lesson of the annual monitoring of the WUA formation process in the Panj-Amu river basin over the last four or five years is that, despite encouraging signs of progress towards more equity in water sharing, the long-term positive impact of WUAs on performance is unlikely without external support to enable regulatory enforcement.[102] The use of internal WUA by-laws as a legal foundation for regulation needs to be facilitated through negotiations with local government agencies or newly instituted river basin authorities. This would require that WUAs be officially recognized and registered as legal entities. This issue has been pending at the Ministry of Energy and Water for some time. The ministry would have to instruct local governments in the sub-basins to support WUA committees in their efforts to enforce decisions based on WUA by-laws established through a participatory process.

Challenges in reducing inequity along river basins

Contradictory objectives in equitable water sharing along canals and river basins

The integrated approach (see elsewhere above) has limitations in the effort to establish equity in water sharing along river basins. For example, between 13 and 65 percent of

the cultivable land in the tail reaches of some large canals in the Baghlan sub-basin was not irrigated in 2008.[103] However, there was sufficient water available at the main canals to cultivate any crop other than rice within the entire command area provided that water was equitably shared from the heads to the tails of the canals. Thus, if water at the canal head works were efficiently used within the canals to bring more of the currently non-irrigated land into cultivation,there would be less water wastage returned from these canals to the river to be used by canals farther downstream. The more efficient use of water in canals in the upstream parts of the river basin could actually translate into less water at the downstream parts of the basin. Low efficiency in water use within upstream canals currently represents a boon for canals in the lower basin. Yet, calls for better management and investment by various donors in intakes, head works and in-canal infrastructure are always associated with references to the potential amount of land that could be put under irrigation because of the improvements. There is clearly a trade-off in water use and water sharing between greater efficiency along canals and greater efficiency in river basins. The identification of the relevant priorities should, ideally, be addressed by RBAs and RBCs.

Permits, formally recognized water rights and infrastructure rehabilitation

From a management perspective and to promote equity in water distribution in river basins, the Water Law promotes the progressive recognition of water rights through permits for water acquisition at main canal head works.[104] The responsibility would then be assigned to RBCs to impose limitations on water use in upstream canals, for example, in case of drought, so that a fairer distribution becomes possible among canals. RBAs could play a technical advisory role.

The needs of equitable water sharing provide a strong basis for justifying more effort to improve water distribution performance in river basins. The issue is whether permits would be feasible and whether they would achieve the desired improvements.

Box 17 Early positive results among new WUAs in the Panj-Amu river basin

Since 2005, the social water management component of the Panj-Amu River Basin Programme has been focusing on the establishment of WUAs, in combination with technical rehabilitation and on-farm water management. In recent years, some encouraging results have been recorded, including in water sharing, as follows:

- During 2007, the Jangharoq canal community in the lower Kunduz sub-basin was involved in the creation of a WUA. A WUA committee was elected and began its work during the 2008 irrigation season. During the first two years, the committee has been particularly active. The share of irrigated area downstream along the Jangharoq canal rose from 19 percent in 2007 to 50 percent in 2009. In 2008, despite the drought, the downstream area managed to obtain a water flow increase from 0.14 to 0.43 litres per second per hectare. While downstream farmers could barely irrigate their crops of mung beans more than twice during the summer of 2007, they managed to irrigate the crops four times, on average, during the summer of 2008. A post-irrigation survey found that, in the downstream area, 100 percent of the respondents mentioned that the improvement in water access was due to a new water turn system defined by the WUA committee, along with better control over upstream water use. Among the respondents, 35 percent said that the intake infrastructure rehabilitation played a role. In contrast, only 3 percent said that external support from the local government contributed to improving water access.
- In the Zargar canal in Takhar Province, the 2008 drought led to a decrease by 30 percent in water availability at the intake in August relative to a normal year such as 2007. Despite the constraint, the newly formed WUA committee was able to ensure that water users in the downstream section of the command area were affected less (–19 percent) by water shortages at the intake than water users upstream (–24 percent) and in the central section (–34 percent) of the command area. Water users estimated that weekly meetings to monitor water distribution and stronger support for the mirabs in controlling upstream offtakes helped prevent serious conflict. The meetings were part of new management practices introduced during the WUA formation process.
- Along Asqalan canal, the WUA committee anticipated the consequences of the drought and successfully adopted measures to mitigate inequities. They agreed to prevent any farmers from growing rice in any part of the canal, including upstream. This limited the critical impact of the water shortages on downstream farmers because the upstream farmers cultivated crops that consumed less water.

Sources: Thomas et al. (2009b); Welthungerhilfe (2009).

- The financial feasibility of infrastructure rehabilitation to realize water control in river basins

Imposing reductions on water acquisition along some canals through the implementation of water turns and ensuring transparent monitoring through flow measurements are technically feasible if modern headwork structures with easily adjustable gates and flow measurement devices are in place. In large river basins such as the Panj-Amu river basin, it is questionable whether the provision of infrastructure will be sufficient for such operations. Although some canals are currently equipped with such structures, most of the 213 canals in the Panj-Amu basin are not and probably never will be so equipped considering the high costs. Yet, adjusting traditional intakes on a regular basis is a highly labour-intensive activity, which clearly puts a heavy and unfair burden on the farmers charged with the task relative to the farmers provided with modern infrastructure.[105] Without important investments in the headworks for the large majority of 213 canals, some communities will have to pay more for operations and maintenance to comply with the distribution rules of RBCs. This might exacerbate tensions rather than ensuring equity. The magnitude of the problem may not be so great in other river basins. For example, the Northern basin has only 11 canals, which represents a lower investment.

- **Solving the problem or simply passing the problem on?**

If intracanal water sharing among upstream canals is not equitable, a reduction in the flow at the main canal head is less likely to affect upstream farmers along upstream canals and more likely to affect the farmers at the tail reaches of these canals, thus reinforcing an already high level of head-tail inequity. [106]

Figure 29 illustrates this through a comparison of water access along a canal during a good hydrological year and during a drought. A drought leads to reductions in the water availability at the heads of main canals. The result would be similar if limitations were imposed by RBCs on water acquisition. Yet, during a drought, the head and middle areas are not as significantly affected as they would be in a wet year, while the tail areas bear the consequences of the lower water availability along main canals in all situations. Thus, if poor collective water management appears to be a key driver of water shortages in the downstream areas of irrigation canals, the idea of controlling the water acquisition of upstream canals in a context of inequitable distribution within these canals to ensure equity within a basin might end up relocating the problem rather than resolving it. Indeed, reducing the flow at the main canals would deprive farmer sat the tail reaches of upstream canals so as to provide more water most probably only to upstream farmers along downstream canals.

This phenomenon has triggered the nullification of agreements in 2006 between farmers in the downstream province of Kunduz and farmers in the upstream province of Baghlan (box 18).[107] Thus, unless upstream canal communities are successfully enabled to handle equitable water sharing under low flow conditions, the permit approach in basin areas may not bear the expected fruit and may even encourage regional tensions and conflicts. Though some progress has been made in social water management projects in recent years, more needs to be achieved before an ambitious plan can be implemented in basin areas. The timing of such a management approach is key. Support from empowered RBCs and RBAs will also be required.

The challenges of forming RBAs and RBCs to achieve equity in water sharing

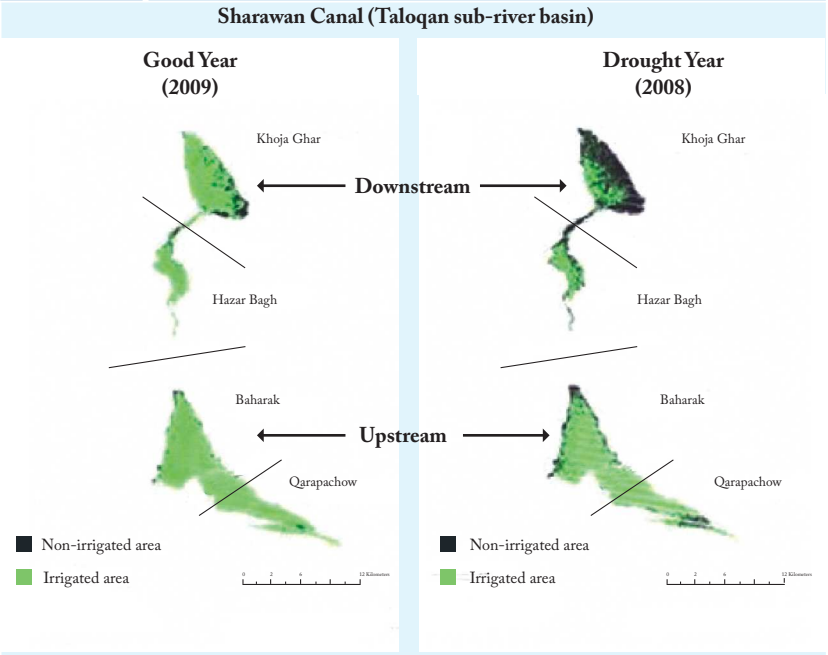
Stakeholder participation in decision-making on water allocation issues, including among canals in a river basin, is advisable from a human development perspective. A more inclusive and transparent decision-making procedure has the potential to promote par-

ticipation and empowerment as core principles of a human development approach. However, there are numerous challenges.

The 2008 draft of the government's water sector strategy warned that the implementation of the water sector reform, including river basin management, would be challenging and would revolve primarily around overcoming capacity limitations in three areas: financial, technical and managerial.[108] In 2010, five years after the launch of the pilot Panj-Amu River Basin Programme, the challenges remain substantial. No RBCs or RBAs have yet been established, although, for the past five years, two sub-basin working groups composed of representatives of water users and the staffs of line ministries have been meeting. Studies have demonstrated some of the challenges, as follows: (a) The topics presented and discussed during monthly sub-basin working group meetings do not always match the expectations and immediate concerns of the participants. Mirabs and representatives of water users therefore attend the meetings mainly to voice their concerns about issues such as the status and quality of on-canal construction by international donors. (b) The lack of tangible, practical results have sometimes caused participants to question whether the meetings should be held. (c) The significantly uneven attendance among water users and line ministry staff means that little learning and capacity-building are achieved through the meetings.[109]

Of greater concern is the fact that, from April to September 2008, none of the Taloqan and Baghlan sub-basin working groups held any meetings. Thus, four years after their first meeting, during one of the worst droughts ever experienced in the country, when water sharing among canals along the Taloqan and Baghlan rivers was raising tensions across three provinces, the probable members of future sub-basin agencies and councils had made no collective effort to explore ways to mitigate the effects of the drought or ease the tensions. Separate negotiations were held in the traditional manner, through informal *ad hoc* meetings, but without leading to a realizable solution (see box 13).

Figure 29 **In a context of poor collective water management, the downstream areas of canals are the most affected in times of drought**



Source: Fiddes (2009).

Box 18 **Sub-basin head-tail agreements: who benefits?**

In the summer of 2006, the downstream province of Kunduz located in the lower Kunduz sub-basin was facing water shortages. Farmers therefore sent a delegation to request the partial closing of canals in the upstream province of Baghlan for one week per month to allow the river flow to reach Kunduz. Baghlan representatives initially refused, but finally agreed on a partial closure of two days every two weeks or four days per month. However, it was soon discovered that the water that was now reaching Kunduz Province was benefiting primarily farmers growing rice, thereby creating inequity in water sharing within Kunduz. Meanwhile, Baghlan farmers in the downstream section of their canals were struggling to obtain even a little water. Thus, the Baghlan farmers decided to cancel the agreement because they felt it was unacceptable that a few Kunduz farmers would gain more benefit from the agreement than many Baghlan farmers living at the tail reaches of their canals. Two weeks later, another delegation arrived from Kunduz, but to no avail. Thus, the mitigation agreement lasted only two days.

Now that the Water Law has been enacted, capacity-building programmes need to become more comprehensive and more well focused on the practical resolution of prob-

lems. This implies the deeper involvement of WUAs in defining the agendas of RBA and RBC meetings, for instance. On-the-job training is the most appropriate method for enabling staff, including RBA staff, to carry out their new tasks. In parallel, practical approaches that support decision-making on water sharing issues should be developed, introduced and taught so as to enhance governance in river basins. Current programmes that support water sector reform have now increased their emphasis on capacity building and the definition of curricula for river basin actors.

The water flow measurement infrastructure along river basins is now becoming operational and should start providing the information required for planning and to monitor water sharing, including within the pilot Panj-Amu River Basin Programme area. Nevertheless, monitoring water sharing arrangements along the 360 kilometres of the Baghlan and Taloqan rivers calls for more personnel and much greater transportation and technical capacity. Local governments currently rely primarily on the logistical capacity of non-governmental organizations to carry out these tasks.

5

The need for governance in the water sector

"We are nowhere near on pace to achieve that Goal [of basic sanitation] . . . and the biggest culprit: a lack of political will."
—*United Nations Secretary-General Ban Ki-moon*

"Water flows in your streams by the grace of God.
I applaud your elbow grease and toil."
—*A poem of Maulana Jalalludin Balkhi Rumi*

CHAPTER 5

The need for governance in the water sector

Authors: Mustafa Aria Amarkhail, Khwaga Kakar

The water shortage in Afghanistan is primarily driven by inefficient services rather than insufficient resources

The water sector in Afghanistan has suffered from inefficiencies associated with political and socio-economic disruption. The new Water Law and Water Sector Strategy reflect modern concepts of integrated water resources management. However, numerous problems remain, including the dislocation between an ambitious vision and shortcomings in infrastructure, institutions, management capacity,regulations and enforcement, and information. Progress is hindered because of the lack of adequate, predictable and sustained investment and the absence of mechanisms and processes to foster aid effectiveness. The challenge is to ensure that the relatively small share of development aid earmarked for the water sector is used efficiently in pursuit of goals that are sustainable and that help advance human development.

The water shortage in Afghanistan is primarily driven by inefficient services rather than insufficient resources, particularly with respect to drinking water and sanitation. How individuals, communities and institutions choose to govern their water resources has a profound impact on people's livelihoods and human development potential, as well as on environmental sustainability. Thus, the water crisis in Afghanistan is mainly a governance issue.

This chapter explores the state of water reform and the challenges facing reformin Afghanistan. It offers insights into the overarching concept of integrated water resources management (IWRM), which guides the recently adopted Water Law and makes decentralization and the participation of stakeholders in water resources management a priority. It shows that transforming IWRM into a practical reality is a difficult process, which is not yet fully supported in river basins by stakeholders. Another barrier is a general lack of capacity. This barrier will need to be overcome to move Afghanistan towards a more water secure future. Moreover, improvement in the water sector will not be possible, at least in the short to medium term, without international aid. The water sector remains severely underfunded. Greater commitment is critical, but so is dedication to ensuring that aid is effective and in line with the five principles of the Paris Declaration on Aid Effectiveness.

Water Governance and Human Development

Water governance refers to the range of political, socio-economic and administrative systems designed to develop, manage and distribute water resources. It is supported by

Governance requires open communication and strong cooperation both horizontally across sectors and between urban and rural areas and vertically from the local level to the international level

the mechanisms, processes and institutions through which all stakeholders, including interest groups and all residents, articulate priorities, exercise legal rights, meet obligations and mediate differences. Governance systems determine who obtains what, when, where and how; they arbitrate the right to water and the related services and benefits.

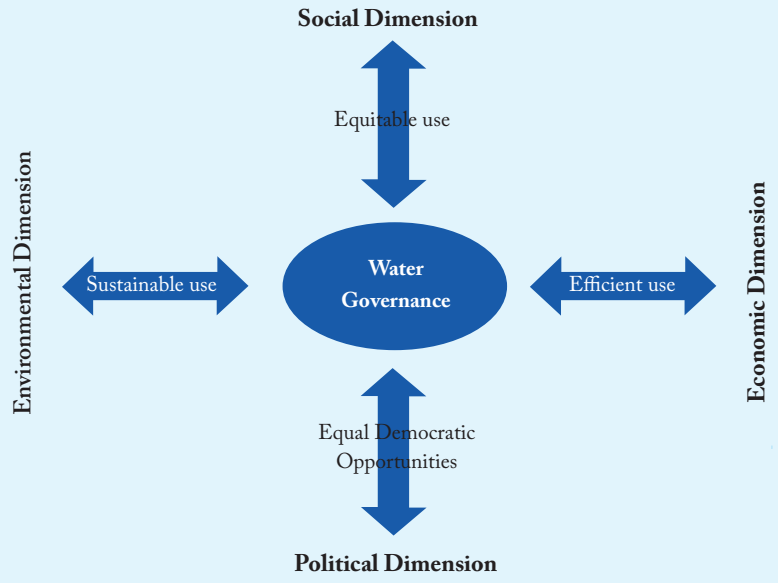
Thus, governance is centred on making choices, decisions and trade-offs. Water sector governance is complex and requires the representation of various decision-making interests. The actors may be local or central governments, sectoral agencies, river basin authorities, representatives of indigenous peoples, consumer bodies, private companies and others. Governance is therefore not limited to government, but includes the private sector and civil society.

Governance requires open communication and strong cooperation both horizontally across sectors and between urban and rural areas and vertically from the local level to the international level. This cooperation is facilitated by an appropriate legislative and regulatory framework. Decisions about water are anchored in governance systems that span three areas: government, civil society and the private sector. Facilitating dynamic interactions among all three is critical for developed and developing countries alike.

Establishing good water governance depends on pillars of human development. This is clear from the four dimensions of water governance, as follows (see figure 1):

- The social dimension revolves around a focus on the equitable use of water resources and thus represents one of the pillars of human development. Equity in water use, particularly with respect to irrigation, is problematic in Afghanistan (see chapter 4).
- The economic dimension involves the efficient use of water resources and the role of water in overall economic growth. Water use is inefficient in the urban and rural areas of Afghanistan, particularly with respect to irrigation. Improving water distribution and management would also improve efficiency.
- The political dimension centres on empowering stakeholders and citizens by assigning them the equal opportunity to influence the political process and monitor outcomes. This dimension represents the heart of human development because it involves providing all users with the chance to manage water and enjoy the benefits of water. Thus, the water sector reform in Afghanistan emphasizes the decentralization of water resources management with the aim of placing decision-making with water users.
- The environmental dimension revolves around ensuring that water governance allows for the enhanced and sustainable use of water resources, while preserving the integrity of ecosystems.

Figure 1 **The four dimensions of water governance are linked with human development concerns such as equity and equal democratic opportunities**



Source : Adapted from Tropp (2005).

The Water Sector Strategy

During the 1970s, three principal line agencies undertook the development and management of water resources, as follows:

- The Ministry of Energy and Water (MEW), responsible for irrigation and water power
- The Central Authority for Housing and Town Planning, responsible for urban water supply and sanitation
- The Rural Development Department, responsible for rural water supply and small-scale irrigation systems

From the 1980s to 2001, the sectoral management through line agencies collapsed because of war and civil unrest. During this period, non-governmental organizations (NGOs) and United Nations agencies provided limited support, primarily in rural communities. In 2002, an international conference in Kabul, known as the Kabul Understanding, laid the foundation for the development of the water sector in Afghanistan, which, beginning in 2004, was guided by the Strategic Policy Framework for the Water Sector.[1] This framework described the way forward and defined the specific policies, laws, regulations and procedures to be formulated, as follows:

- Revision of the Water Law of 1991
- A water resources management policy and related regulations
- The institutional structure for water resources management
- An irrigation policy and related regulations
- Regulations for water user associations (WUAs)
- National urban and rural water supply and sanitation policies and institutional development
- A groundwater policy
- A hydropower development policy
- An environment law

It was realized that, without substantial improvement in the management of water resources, including reform and the building of technical and management capacity at the local and national levels, the country would be unable to reach the targets in water and sanitation that are related to the Millennium Development Goals. To address this gap, the Afghanistan National Development Strategy (ANDS), within the pillar of social and economic development, includes a strategy for the water sector.[2] Water also features prominently in other sectoral strategies such as in agriculture, energy, the environment, rural development and urban development. This highlights the importance of adopting water resources management as an integrating approach.

Water sector reform is aimed at tackling the challenges highlighted in the Water Sector Strategy, as follows:[3]

- A lack of the institutional, human and financial resources necessary to deliver water services properly to the population
- A lack of mechanisms to regulate water use for irrigation, domestic supply, sanitation and hydropower generation
- A lack of integrated water sector governance
- A lack of reliable hydrological and metrological data and data on water quality
- Inadequate infrastructure and poor coordination among water sector projects

The Water Sector Strategy: vision and goals

The Water Sector Strategy consolidates priority policy issues, as well as recommendations for the sector. Covering a period of five years, it aims to facilitate the management of the nation's water resources so as

The Water Sector Strategy outlines no specific objective in sanitation

to reduce poverty, increase sustainable economic and social development, improve the quality of the lives of Afghans and ensure an adequate supply of water now and in the future.[4] An associated goal of the strategy is to improve the livelihoods of Afghans through the following:[5]

- Improved access to safe drinking water
- Enhanced household food security
- Protection from the negative effects of water shocks, drought and floods
- Sustainable development and the proper management of water resources
- Effective water user participation
- Poverty reduction and private sector development
- Effective services for efficient water use in all sectors so as to facilitate economic growth and social development

The Water Sector Strategy details specific objectives, which are identified as short (2007–10), medium (2007–13) and long term (2023 and beyond), as follows:

- The reform and development of legal and governance structures at the subnational and national levels, including the division of responsibilities among government agencies, the development of policies and regulations and the establishment of new water resources management and capacity-building institutions
- The development of sustainable water resources management policies and structures through the progressive implementation of IWRM
- The rehabilitation of existing water infrastructure and the expansion and construction of new structures in accordance with the National Water Resources Development Plan, including dams, canals, water supply networks, flood protection structures and wells for drinking water
- Capacity-building for information collection and analysis through the rehabilitation of hydro-meteorological and geo-morphological networks

The Water Sector Strategy outlines no specific objective in sanitation. It proposes a few benchmarks, but lacks a comprehensive situation analysis, established goals, a vision and a strategy to address the sanitation crisis in the country.

Progress and achievements: overly ambitious targets and inadequate commitment

The targets of the Water Sector Strategy represent a framework for accountability and the commitment of water sector agencies to collaborate to reach sector wide objectives. Most of these targets have not been achieved and are unlikely to be achieved on time (table 1). It thus appears that the targets are too optimistic and are based on faulty analysis and that the related efforts and investments are

Table 1 **ANDS water targets are not being achieved**

Target	Progress
Water resources management: Provide 30 percent of irrigation water from large water works by establishing river basin organizations (for example, river basin councils, sub-basin councils and related agencies) in Balkh, Kunduz and the western region by the end of 2010.	Not achieved. No river basin agency or river basin council has been established. WUAs have been established, but only informally;they lack legal status.
Urban development: In conformity with the Millennium Development Goals, greater investment in water supply and sanitation will ensure that 50 percent of households in Kabul and 30 percent of households in other major urban areas will have access to piped water and improved sanitation by the end of 2010.	Herat (85%), Kunduz (50%) and Mazar-i-Sharif (70%) have met the target. Kabul, Kandahar and Nangarhar have not.
Rural development: By the end of 2010, access to safe drinking water will be extended to 90 percent of villages, and access to sanitation to 50 percent of villages.	Current rural access to safe drinking water sources is 20 percent (see chapter 3). The current rate of progress of 1 percent per year means that the target will not be reached within the next few decades.

Sources: Government of Afghanistan (2008), MRRD and CSO (2009), data of the Ministry of Economy.

falling short. For example, ensuring by 2013 that 90 percent of the population would have access to safe drinking water is most definitely an overly ambitious target. Indeed, at the current rate of progress, the Millennium Development Goals for Afghanistan will only be achieved in 2042, more than two decades after the 2020 objective. The slow pace is evidence of a lack of commitment, particularly among the international community, to ensuring the delivery of basic services in Afghanistan.

Most targets have not been achieved and are unlikely to be achieved on time. It appears that the targets are too optimistic and are based on faulty analysis

IWRM: The Key Guidance Principle for Water Sector Reform

IWRM is a key concept for the planning and development of water resources and is central to the Water Law, which the National Assembly passed in 2009. Today, the Government of Afghanistan has adopted IWRM to implement the vision statement for the water sector. The main components of the IWRM concept are discussed hereafter.

The definition of IWRM

The Global Water Partnership provides a definition of IWRM that is widely quoted. According to this definition, "IWRM is a process which promotes the coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."[6] There is however, no unique definition of IWRM.

Known as the Dublin Principles, guidelines on water resources management were drafted and adopted at the International Conference on Water and the Environment, in Dublin in January 1992, a prelude to the United Nations Conference on Environment and Development, in Rio de Janeiro in June of the same year.[7] The guidelines are based on an understanding of water as a finite, vulnerable resource essential to sustain life (see box 1).

Box 1 The Dublin principles

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
2. Water development and management should be based on a participatory approach involving users, planners and policy makers at all levels.
3. Women play a central part in the provision, management and safeguarding of water.
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

Source: WWAP (2003).

The river basin approach, decentralization and stakeholder participation

IWRM rarely involves a single concept, and it is often associated with water governance principles. In the case of Afghanistan, IWRM is most often linked with two other components, namely, stakeholder participation and decentralization through a focus on river basins.

River basin management and decentralization: changing boundaries from administrative to hydrological

IWRM promotes a shift from administration to resource-based management. In the river basin approach, natural river boundaries are used to define the units for the management of water resources and the related institutional structures.

Decentralization is centred on ensuring that decision-making in water resources management occurs within a locally specific context

Decentralization is centred on ensuring that decision-making in water resources management occurs within a locally specific context. This is particularly relevant in a country such as Afghanistan, which contains five river basins and 34 sub-river basins, all of which are characterized by different profiles with respect to water availability, water use, land use and population density (see chapter 2). Management regulations, including water rights and water sharing practices, therefore vary significantly from one basin to another (see chapter 4), which also means that the potential for development differs.

Indeed, management and governance structures often depend on the level of development of a river basin (table 2). Initially, if water resources are abundant and if the various water uses do not conflict, the priority is usually to increase access to water supply services (the development stage). The utilization stage usually begins after the supply of water has been developed and is in use. This phase is often characterized by sharply increasing consumption as improved supply meets growing demand.

If demand rises and water resources become scarce relative to demand, reallocation begins. During this phase, excess resources remain largely unavailable. This means that providing more water for one user requires the reallocation of resources from another user. If the rising demand can no longer be met by simply creating more supply, a river basin is said to be closing. As opportunities to expand water supply decrease, the competition over current supply escalates, creating the need for improved governance. Governance has traditionally not received as much attention as technical issues.

The challenge for management institutions is to transition successfully from the requirements of the utilization stage to the requirements of the reallocation stage, during which allocation is necessary. However, the increased analysis and coordination across users and uses needed during the reallocation stage have major cost implications and are only justified if the natural ability of the system to satisfy the range of uses is exceeded.

The IWRM model has typically been developed and applied within the context of river basins that are closing. In Afghanistan, the adoption of the model, in tandem with a river basin approach, will have different characteristics and unique institutional requirements in each of the five river basins. Based on approximate flows already allocated (see chapter 2), the Panj-Amu and the Kabul river basins may be in the development stage. The Harirod-Murghab and Helmand river basins may be in the utilization stage, while the Northern basin, which is closed, typically fits the characteristics of the reallocation stage.

Table 2 **The development of river basins in Afghanistan**

	Stage 1: development	Stage 2: utilization	Stage 3: reallocation
Allocated flow, %	Low 0 - 40	Medium 40 - 70	High 70 - 100
Dominant activity	Construction: supply and storage infrastructure	Managing supply	Managing demand
Value of water	Low	Increasing	High
Groundwater	Development	Conjunctive use	Regulation
Conflicts	Few	Within the subsector	Cross-sectoral
Typical institutional tasks	Construction: planning and implementation	Operation, maintenance, expansion and rehabilitation	Intersectoral planning
Based by allocated flow	Panj-Amu Kabul Indus	Harirod-Murghab Helmand	Northern

Source: Adapted from Molden (2005).

The adoption of a river basin management approach and the decentralization of decision-making are necessary in Afghanistan given the differences across river basins. This also means that institutional development and capacity-building will vary across the basins. Prioritizing the implementation of IWRM in river basins in or close to the reallocation stage would be logical;however, over the last five years, the Panj-Amu River Basin Programme has received the most attention. The limitations of IWRM in this pilot case site are discussed in the section later.

Participation through multistakeholder platforms

Multistakeholder platforms such as river basin agencies and river basin councils facilitate inclusive participation in water resources management in river basins. Participation is often promoted alongside the notion that the governance of water resources and services is effective only if decision-making involves all stakeholders, including civil society. Participatory water governance models are usually adopted in response to poorly performing centralized state-managed systems, while water management policies are shaped by a trend towards less direct government involvement, but greater local participation in governance, management and financing.[8] In Afghanistan, this does not apply, however, because there has never been a strong centralized government operating state-managed systems, although the government did wield significant influence over local water management practices during the 1970s (see chapter 4). The influence of government has been practically nonexistent since then.

Decentralization poses important challenges, chief of which is the issue of how decentralization might lead to substantial improvement in local water governance. Participatory processes must allow local water users to control decision-making, while ensuring that key groups are not excluded. Typically, one of three generic models for water management through institutions is dominant in river basins, as follows:

- The hydrological model, whereby river basin organizations, cutting across administrative boundaries, take overall charge of water resources management
- The administrative model, whereby water management is the responsibility of organizations with interests unrelated to hydrological boundaries
- A model that implements coordination and facilitating mechanisms through existing administrative organizations with the aim of integrating and aligning planning and management objectives and activities[9]

The hydrological model, which is currently being piloted in the Panj-Amu river basin, should be appropriate for dealing with the upstream-downstream issues that administrative models usually fail to address. However, hydrological organizations typically require important investments of time and effort, but have had only limited demonstrable success world wide.[10] Experience also shows that river basin organizations often lack significant authority and usually reach only solutions that are based on the lowest common denominator.[11]

Coordinating mechanisms have the advantage of working well with and building on existing institutions rather than requiring major institutional change. Nonetheless, institutions in Afghanistan, including the mirab system, are not performing as well as they used to, which means that the challenge of coordination is greater than it might be in other contexts.[12]

In principle, multi-stakeholder platforms can ensure the participation of various interests that would normally have less chance to be heard. However, experience shows that strong stakeholders who prefer to maintain the status quo may undermine coordinating mechanisms, while existing institutions may not feel comfortable with the resulting decisions and will thus be reluctant to implement them.[13]

Participatory processes must allow local water users to control decision-making, while ensuring that key groups are not excluded

The Water Law

Passed in 2009, the new Water Law is based on article 9 of the Constitution of Afghanistan. It focuses on the reform of the water sector through extensive regulatory and institutional reorganization to provide the legal framework for implementing IWRM. It includes provisions aimed at the following:

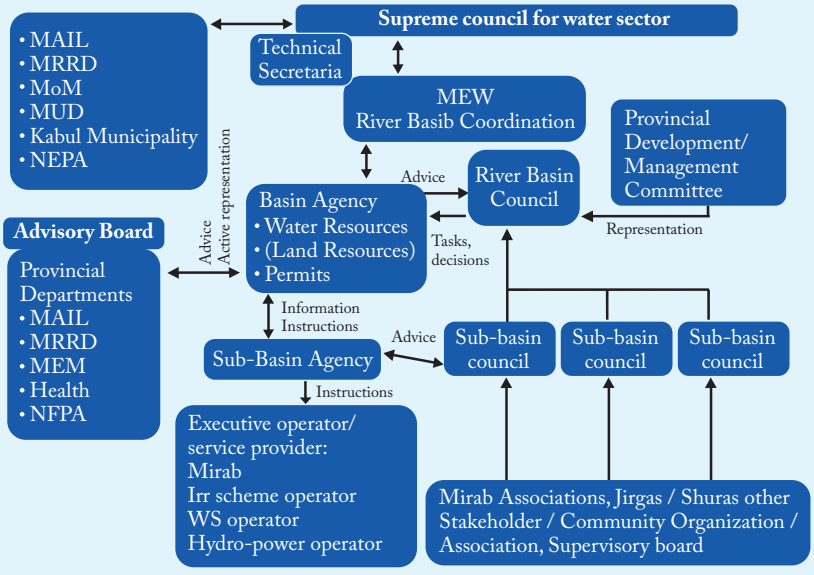
- Establishing an institutional structure for the implementation of IWRM
- Developing a system of water use permits and infrastructure licensing to formalize water rights and the diversion of surface water and groundwater for all uses except domestic uses
- A system of water pricing to recover the cost of water infrastructure, services and maintenance such as drinking water supply, treatment and operations
- Environmental protection

The Afghanistan Water Sector Strategy and Water Law reflect the hydrological model, which functions at three levels:

- The legal and policy functions of ministries
- The organizational functions of river basin management
- The operational functions of operators (for example, the outsourcing of operations and monitoring) and service providers

The organizational structure is illustrated in figure 2. The main agencies identified in figure 2 are described hereafter.

Figure 2 **The organizational structure for implementing IWRM in Afghanistan**



Note: MAIL = Ministry of Agriculture, Irrigation and Livestock. MM = Ministry of Mines. MRRD = Ministry of Rural Rehabilitation and Development. MUD = Ministry of Urban Development. NEPA = National Environmental Protection Agency.
Source: PARBP Inception Report (2010).

The Supreme Council for Water Affairs Management

Established in 2005 and chaired by the vice president of Afghanistan, the Supreme Council for Water Affairs Management is responsible for the following:

- Coordinating the activities of all governmental agencies involved in the water sector and monitoring the implementation of the Water Sector Strategy
- Recommending any newly drafted legislation and regulations for approval
- Monitoring the implementation of the relevant development plans by individual member ministries and agencies
- Functioning as a dispute resolution body for ministries or agencies that are in conflict over issues related to water
- Ensuring that member ministries and agencies comply with the Water Law

The mayor of Kabul, the minister of agriculture, irrigation and livestock, the minister of economy, the minister of energy and water, the minister of health, the minister of mines, the minister of rural rehabilitation and development and the minister of urban development are members of the Supreme Council for Water Affairs Management.

River basin councils

River basin councils and sub-river basin councils represent water users through WUAs, relevant local and national agen-

cies and other stakeholder groups, including women's groups. The idea is to encourage a high degree of community participation, particularly in water allocation.

River basin organizations should help clarify and realize the roles and responsibilities of the various interest groups existing within each basin, while facilitating conflict resolution and user coordination. MEW is charged with establishing the councils. The Water Law states that MEW "can delegate, after improving the required working capacity and capability through technical trainings, some of its authority to the river basin council in accordance with the water law, when appropriate."

River basin agencies

River basin agencies are composed of line ministry staff and are responsible for providing technical support and expertise in water resources management to river basin councils.

Thus far, not a single river basin agency or council has been established. Within the Panj-Amu River Basin Programme, however, working groups have been meeting since March 2008.

WUAs and irrigation associations

WUAs and irrigation associations are the least well defined organizations in the Water Law (see next section). Only one article (18) mentions WUAs. However, it does propose that future regulations should clearly define the functions, responsibilities and power of WUAs.

Over the past five years, despite this gap, various NGOs have been engaged in establishing WUAs, particularly through the government-led Panj-Amu River Basin Programme. A number of these WUAs are currently engaged in capacity-building programmes.

Over the past five years, positive results have been recorded in the expansion of irrigation in the downstream areas of canals, the reduction of inequities in water access between the head and tail reaches of canals and the reduction of the occurrence of conflicts (see chapter 4). Nonetheless, these WUAs are informal; they have not yet obtained legal status, pending the publication of regulations by MEW. This lack of formal status, combined with the deficiency of judicial, technical and financial support, is hampering development.

The reform of any governance system is a long-term, costly process

Challenges and Limitations in Implementing Water Sector Reform

Practical limitations in implementing IWRM in river basins

The reform of any governance system is a long-term, costly process. Yet, in Afghanistan, water sector reform has been undertaken without the aid of comprehensive studies detailing the weaknesses and failures of the existing arrangements and the differences across the five river basins. Analysis of water sharing issues within the agricultural sector in the river basins indicates that there has been no clear model for the approach to water management issues in Afghanistan (see chapter 4). The Water Sector Strategy only states that Afghanistan faces the following challenges:[14]

- Lack of institutional, human, and financial resources to deliver adequate water services to the population

The absence of a sound case for reform is frequently perceived as a serious barrier in implementing IWRM

- Lack of mechanisms to regulate water use for irrigation, water supply, sanitation and hydropower generation
- Lack of integrated water sector governance

The absence of a sound case for reform is frequently perceived as a serious barrier to implementation.[15] As long as stakeholders are not convinced that IWRM is going to succeed precisely where previous governance arrangements have failed, there might be little buy-in.

Furthermore, it appears from evidence around the world that there is often a major disconnect between the IWRM concept and existing systems of water governance. Intricate socio-economic realities, traditional practices and beliefs and conflicting, irresolvable demands present an insurmountable hurdle.[16] Experience with the pilot Panj-Amu programme reveals the extent of the difficulty in establishing river basin organizations and implementing IWRM. A lack of interest in prioritizing institutional changes in river basins, the shortages in data and measurement infrastructure, the limitations in the enforcement of rules and issues of representativeness stand in the way of transforming IWRM into a practical and realistic alternative (box 2). Stakeholders have little faith in new governance because of the lack of results after five years of discussions. Problems in capacity continue to undermine the smooth implementation of regulations. Indeed, legislation and additional regulations on implementation will have no impact unless water authorities are able to carry them out and administer them.

Box 2 The difficulties in making IWRM a reality: the case of the Panj-Amu river basin

Five years after the start of the IWRM process, there are still no functioning sub-river basin agencies and councils in the pilot Panj-Amu river basin. The only outcome has been the regular meetings of two working groups (one per sub-river basin) consisting of water users and line ministry staff. The following points highlight some of the limitations in making IWRM and river basin management a reality:

Institutional change: low interest and priority

Over the last five years, working group participants have remained largely disinterested in the topics proposed by facilitators and discussed during monthly working group meetings. Instead, they raise their own grievances and priority concerns during meetings. These are not generally related to management issues; they focus almost exclusively on construction projects. Because communities in the Kunduz basin experience scarcity almost exclusively during periods of drought, the incentive to attend meetings regularly at other times is not strong.

Within the government, drought mitigation is invariably associated with large-scale infrastructure development. Among farmers, however, the rehabilitation of canal infrastructure, whether head works or offtakes, is the main interest. This does not necessarily mean that there is no awareness among farmers of management issues, but being involved in a time-consuming, long-term process of discussion and negotiation ranks low on the scale of priorities relative to quick technical fixes.

There are other indications that actors have not yet embraced the importance of river basin management. Symptomatic evidence of this is the fact, highlighted in chapter 4, that, during the summer of 2008, the approach to conflict mitigation was based on past practices rather than on the newly established river basin organizational structure.

Lack of data and measurement infrastructure

The ability to make and implement sound decisions based on reliable data involves having the infrastructure available to measure and monitor water flows. Without data and monitoring, water authorities are unable to design credible plans or provide evidence for enforcement once defaulters have been identified. The relevant infrastructure is still not in full operation five years after the new governance framework was established. Relegating decision-making power to stakeholders in the allocation of water without also providing them with clear information about the amounts of water available cannot have the expected impact on efficiency. This has contributed to the reluctance of users to discuss water allocation issues.

(continued on next page)

Box 2 The difficulties in making IWRM a reality: the case of the Panj-Amu river basin

Lack of enforcement

There is a large gap between water rights and practice along canals and in river basins (see chapter 4). The lack of enforcement capacity is a primary reason. The success of the adoption of any new institutional framework by local actors depends to a large extent on the transaction costs of enforcement. Considering the high costs of enforcement in the Panj-Amu river basin, for example, there is a risk that the new institutions will exist only on paper. This became glaringly apparent during the 2008 drought (see chapter 4). Thus, enforcement and the ability to finance it need to be considered a key priority in efforts to improve water resources management.

Representativeness

A 2008 study revealed that stakeholders participating in the Panj-Amu river basin working group are not representative of all users. For example, invited mirabs or elders only represent the canals where the Panj-Amu River Basin Programme and the affiliated project are under way. Furthermore, there is a higher participation rate among line ministry staff than water users. Stakeholders will need to be appropriately represented so that important issues, including water management, that are of particular concern to water users may be addressed.

Sources: Authors compilation; Varzi and Wegerich (2008).

Instead of focusing on making sure the blueprint for institutional arrangements is perfect, more attention and resources might be spent on the development of pragmatic tools and the capacity of actors, including local institutions, to resolve issues, particularly the enforcement of regulations. This 'IWRM-light' would involve supporting and working with existing organizations. Meanwhile, this would be accompanied by policy and legislative initiatives to establish new hydrologically based institutional structures.[17] Once practical progress has been made and acknowledged on the ground, actors might become more inclined to shift progressively towards institutional structures that would fall within the framework of the Water Law. This might be appropriate in Afghanistan, where the implementation of legislation is time-consuming and where policies have relatively little impact at the local level. Plans must therefore be modified to adapt to situations as they become apparent.

The over arching issue of capacity

Institutional capacity

Law-making is often a painstaking process. In Afghanistan, it is more challenging because of weak implementation and enforcement capacity. Despite the adoption of IWRM, together with the river basin management approach and the creation of multistakeholder platforms, the Water Law contains gaps and contradictions, and the definitions it puts forward lack clarity. The legislation requires improvement.

It will take years, if not decades, for the law to be implemented and enforced. Nonetheless, some provisions need to be revisited and improved. The law has flaws; yet, this may not be a problem because the process of clarification offers an opportunity for greater participation and more inclusive discussion about the issues. Two areas that require additional attention are discussed hereafter.

Overlapping functions among irrigation associations and WUAs: The Water Law attempts to distinguish the functions of MEW and the functions of the Ministry of Agriculture, Irrigation and Livestock (MAIL). There are, however, overlapping functions in the formation and support of water management associations and infrastructure projects along major canals.

The Water Law makes a distinction between two types of local associations: the WUAs and the irrigation associations. These are related to two separate ministries, namely, MEW (for WUAs) and MAIL (for irriga-

Regulations will have to be enacted to provide guidance in the interpretation of the water law

tion associations). The distinction between WUAs and irrigation associations remains vague and does not seem to conform to imperatives on the ground, but, rather, to disagreements between ministries attempting to determine the institution under which such associations should fall.[18]

In the case of the pilot programme in the Panj-Amu river basin, associations are formed at the canal level. Canal water is used for numerous purposes, such as irrigation, domestic uses and productive uses, including the generation of electricity. Most contentious issues are linked to water sharing for irrigation. If separate canal associations were to fall under the responsibility of different ministries, this would likely lead to greater confusion, especially in resolving intercanal disputes.

In the Panj-Amu river basin, water users seek the resolution of grievances through the water management department, while the agriculture department has tended to remain less involved. The NGOs that have helped establish various associations during the past five years usually coordinate with MEW.

The Water Law states that MEW is ultimately responsible for settling disputes should local institutions fail to do so. Thus, irrigation associations that are under the authority of MAIL may have to resort to MEW to resolve conflicts.

Ideally, water users should be able to make their own decisions in establishing associations. Unnecessarily complicated relationships between associations and a ministry need to be carefully examined, and pragmatic solutions prioritized.

The rehabilitation of water structures: In specific functions, such as the rehabilitation of water infrastructure, the Water Law also lacks clarity on the distinct roles of MEW and MAIL (table 3). Thus, while the rehabilitation of infrastructure, including main canals, is assigned to MEW (article 10, paragraph 6), MAIL oversees the rehabilitation of irrigation networks (article 11, paragraph 1). Because each irrigation network is expected to include a main canal, there is overlap and confusion between the ministries.

Its use of the term traditional main canals represents another example of the way the law sows confusion with respect to the overlapping responsibilities of MEW and MAIL. Because the term has yet to be defined, MEW's responsibility to upgrade traditional main canals (article 10, paragraph 9) potentially overlaps with other provisions (article 11, paragraph 7) that assign MAIL the responsibility of modernizing irrigation networks. A ministry's responsibility for the rehabilitation of infrastructure ultimately leads to control over significant resources. Thus, any attempt to clarify responsibilities is likely to spark turf wars among ministries at the expense of water users. Yet, regulations will have to be enacted to provide guidance in the interpretation of the law.

Table 3 **Table 3: The responsibility for the rehabilitation of water infrastructure sometimes overlaps between MEW and MAIL**

Responsibilities for Rehabilitation of water infrastructures	
Ministry of Energy and Water	*Ministry of Agriculture, Irrigation and Livestock*
Building and rehabilitating dams, head works, main canals and oversee their safety and sustainability.	Rehabilitating, developing and protecting irrigation networks.
Establishing water user associations.	Establishing irrigation associations that will be assist in the decision making related to planning, the utilization of water resources and the maintenance of irrigation networks.
Modernizing traditional main canals.	Promote appropriate irrigation technology to improve quality and mitigate water wastage.
	Maintaining irrigation networks together with water users associations and fair distribution of water rights within existing networks.

Source: Adapted from Water Law (2009).

Human resource capacity

Individuals are key players in the establishment and operation of effective institutions. In the water sector, a lack of sufficiently skilled personnel is a barrier to the reform of government water agencies and the implementation of subnational and national policies. Of 1,050 staff in one agency, for example, only 30 are qualified and possess expertise related to their area of work.[19] Similarly, at the subnational level, experts continue to migrate from provincial water departments to the private sector and NGOs, where the work benefits and the opportunities for personal advancement are greater.

Individual technical capacity should be developed through higher education and training programmes. This aspect of capacity-building has featured strongly in the Water Sector Strategy, which also includes the longer-term objective of developing the local university and technical college curricula related to the water sector. [20] Despite this emphasis, the educational institutions responsible for training water professionals must overcome numerous obstacles that greatly reduce the ability to meet the ANDS water capacity goals (box 3).

Even where there is collaboration between NGOs and the ministries, language barriers and the lack of available staff hinder the transfer of skills from donor-driven projects to local agency staff. A capacity assessment conducted by the Asian Development Bank at MEW found that, while most donor-funded projects require that national ministry staff work alongside international experts, an insufficient number of suitably qualified staff are available to fill the positions.[21]

Gaps in the knowledge base

A lack of reliable data is another major barrier to water resource development and management in Afghanistan. The physical, technical, social and economic information required for the development, implementation and monitoring involved in water-related projects is limited. Policies and plans are constructed and adopted largely on the basis of historical data that are often inaccurate and usually out of date.

Efforts to improve the knowledge base are currently under way. There is investment in hydrological data networks, but progress is slow. Remote sensing technology, for example, is being used to collect data on the physical and technical aspects of water. European Union–funded social water management projects have relied on this technology to produce maps and images of canals, thereby facilitating decision-making among

A lack of reliable data is a major barrier to water resource development and management in Afghanistan

Box 3 Kabul Polytechnic University neglected: the challenges of capacity-building

Established with the support of the former Soviet Union in 1966, Kabul Polytechnic University was designed to train engineers skilled in a variety of disciplines. Though considered in Afghanistan as a leading institution responsible for training future engineers, it is still unable to produce engineers sufficiently skilled to implement modern concepts of river basin management and to oversee water projects.

Kabul Polytechnic University has five departments, which offer degrees in civil, electrical, mechanical, geological, mining, hydrological, water, environmental and computer engineering. A new department of water supply and environmental engineering was established in 2010. Of the 190 lecturers and professors teaching 2,500 students,only a handful hold postgraduate degrees. Each year, 50 to 60 students graduate with degrees in electrical and hydrological engineering.

Kabul Polytechnic University has experienced many successes and failures in the 44 years since its founding. During the war, the university lost many experienced professors. Some were killed; many others left Afghanistan and have never returned. Most of the lecture notes date from 1970, and many library books are in Russian. The university cannot provide Internet services to staff, professors, or students and now faces a budget shortfall, although it also desperately requires new equipment, including a computer laboratory, library, books and technical equipment. Professors report that wages are too low to cope with the high living costs in Kabul.

Source: Centre for Policy and Human Development interviews.

stakeholders, including at the local level. With reasonable effort, remote sensing thus offers the potential to increase the information available.

Efforts are also needed to improve and consolidate knowledge systems and to supplement these with other sources of information such as research, assessments and feasibility studies.

The knowledge gap among government water agencies, donors and local water organizations is being exacerbated by the lack of mechanisms to facilitate information sharing and distribution. Project progress reports are not widely distributed to the relevant stakeholders, but are retained instead for donors and first-level implementing agencies. A sector wide monitoring and evaluation mechanism is also not available. The information such a mechanism would gather would be crucial in ensuring that a wide range of stakeholders and beneficiary communities are involved in decision-making, that desired outcomes are delivered and that any deviations from stated goals are accounted for.

The inexperienced local private sector

The problem of inadequate capacity is not limited to the government sector. NGOs and private sector agencies are also plagued by insufficient capacity.

Although the number of private companies has multiplied significantly in the face of a growing demand for services, few of these companies have experience with irrigation works. It is therefore crucial that the private sector be supported so as to play an integral role in all capacity-building programmes and policies. For projects directly contracted by donor agencies, appropriate policy will involve working with relevant local contractors. Some projects, such as the European Union–funded Panj-Amu River Basin Programme, have adopted such practices.

Weak enforcement capacity

Legislation requires vigorous enforcement and systematic monitoring. Monitoring should be based on indicators that assess the effectiveness of new arrangements and help improve system performance. Unless the judiciary can adjudicate disputes in an effective, expeditious and transparent manner, there is little chance that rules will be respected and enforced beyond the status quo. Ample evidence on river basins and canals indicates that judicial support for newly formed organizations will be required to bring about effective change (box 4).[22]

Box 4 A customary water institution for conflict resolution

The Tribunal de Aguas de Valencia is a long-standing, customary water institution that meets every Thursday at Valencia Cathedral, Valencia, Spain. The aim of the tribunal, which was established by James I of Aragon in the 13th Century, is to regulate the distribution of irrigation water from the Turia River.

The water tribunal is recognized in Spanish law with authority to render decisions concerning conflicts among users of the Valencian irrigation network and with powers of enforcement. Although criticized for disregarding the tenet of centralized jurisdiction in Spanish law, the tribunal has earned the trust of water users. Its application of accepted principles, its upholding of guarantees, its speed and its efficiency have made the tribunal world famous.

Administered from within the Ministry of Public Works, the tribunal is independent; the judges are eight workers who are elected to office for two-year terms. The eight judges also represent a variety of irrigation networks or comunidades de regantes. The judges wear traditional smocks and hand down their sentences orally. The court is a civil tribunal, and its decisions can be enforced through fines or other sanctions. If voluntary compliance does not occur, then the tribunal can enforce its decisions through the elimination or confiscation of the water right. There is no right of appeal, and the tribunal is a model of efficiency because cases are solved rapidly.

Source: Iza and Stein (2009).

Financing the Water Sector: Beyond the Rhetoric

Developing and implementing water-related activities require funds, whether for infrastructural projects or planning, data collection, regulation and so on. Even if all the necessary policies and laws are in place, lack of funding will halt efforts to improve water access and supply.

Three broad functions define water sector management, as follows.

- Water resources management and development, including river basin development, storage and flood and drought management
- Water service delivery for agriculture, municipalities and households, including operation, maintenance, infrastructure rehabilitation and wastewater treatment
- Integrative functions, such as water sector policy development, research, monitoring and judicial support for compliance and enforcement[23]

Each of these functions is associated with investments and recurrent costs. Recovering these costs must be undertaken through government taxes, water service revenues, or external aid, on which Afghanistan still greatly depends.

An underfunded water sector

Donor contributions are vital to achieving the country's vision for the water sector, including the targets and benchmarks in water set through the Afghanistan Compact and the Millennium Development Goals for Afghanistan.[24] From 2001 to 2009, international bilateral and multilateral development aid to Afghanistan reached $24 billion (table 4). While largely project based, this assistance has been structured to support ANDS priority sectors, particularly over the past two years.

However, water does not feature as a core ANDS development sector in the allocation of aid. Instead, the water sector cuts across three ANDS development sectors, namely, infrastructure and natural resources, agriculture and rural development, and health. These three sectors comprise 48 percent ($11.7 billion) of the total development aid to the country (figure 3). Of this, the water sector has been the recipient of only $1.2 billion, or 5 percent of total development aid (figure 4).

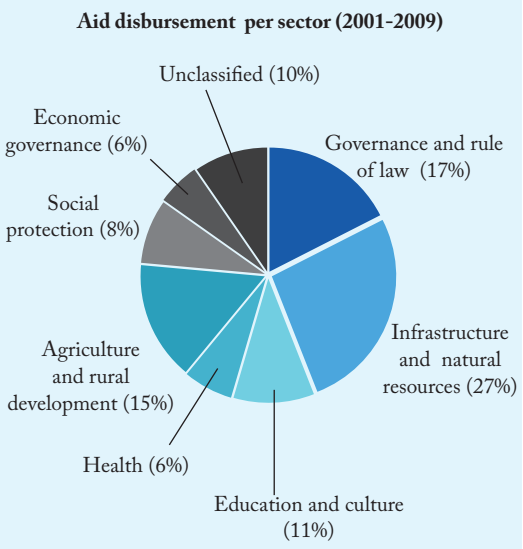
Worldwide, aid to the water sector has been relatively constant, at around 5.4–6.2

Table 4 **Sectoral allocation of overseas development assistance ($) to Afghanistan (2001-2009)**

ANDS Developmental Sectors	Committed, $ million	Disbursed, $ million
Governance and rule of law	4,229	2,132
Infrastructure and natural resources	6,421	4,060
Education and culture	2,542	1,636
Health	1,560	987
Agriculture and rural development	3,740	2,974
Social protection	2,025	1,705
Economic governance	1,352	1,748
Unclassified	2,322	2,065
Total	$24,191	$17,307

Source: Data of the Ministry of Finance (2010).

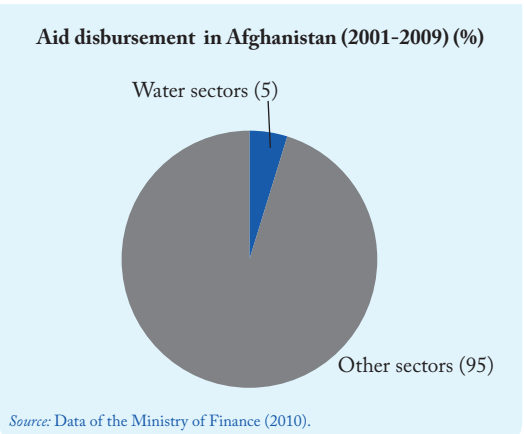
Figure 3 **Water does not feature as a core developmental sector in the ANDS as far as the allocation of aid is concerned**



Source: Data of the Ministry of Finance (2010)

Long-term initiatives such as dam construction become almost impossible under current budget conditions

Figure 4 **The under-funded water sector as percentage of total developmental aid**

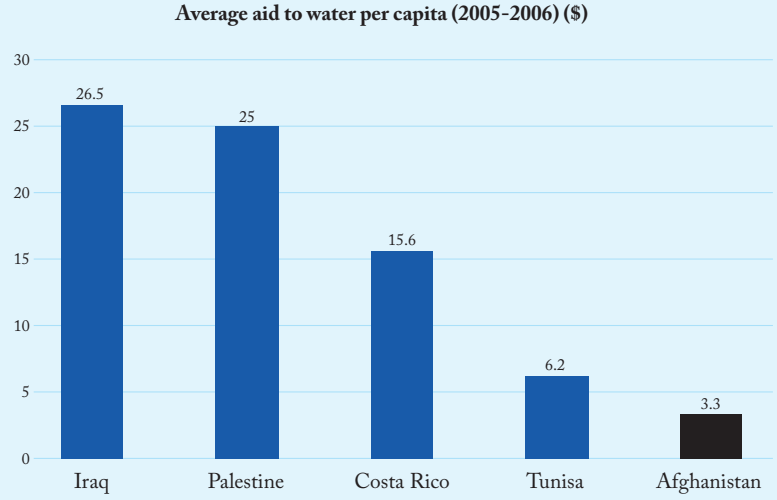


Source: Data of the Ministry of Finance (2010).

percent of total aid.[25] In Afghanistan, aid to the water sector is proportionally similar to or somewhat lower than the corresponding aid provided to other developing countries. However, in per capita water sector allocation, Afghanistan receives one of the lowest shares. While Iraq, Palestine and Tunisia received $26.50, $25.00, and $6.20 per capita, respectively, in 2005–2006, for example, Afghanistan received only $3.30 (figure 5). Because Afghanistan is lagging well behind the rest of the world in access to improved water sources and sanitation facilities (see chapter 3), infrastructure, storage facilities for irrigation and drought mitigation, and overall capacity and skills (see chapter 2), the low share of aid to the water sector in Afghanistan raises serious questions about the extent to which water is considered a priority in the country's recovery and development.

As a former United Nations special representative to Afghanistan stated in 2009, "Whether we look at poverty, food security, health, or economic development, there is no issue more important for this country at this time than the development of Afghanistan's water resources."[26] It appears that the numbers do not match the rhetoric.

Figure 5 **Despite its water crisis, Afghanistan received negligible funding for its water sector**



Sources: OECD and World Water Council (2008) for Iraq, Palestine, Costa Rica and Tunisa. Ministry of Finance for Afghanistan (2010).

Inconsistent trends in aid to the water sector, 2003–2009

International development assistance for the water sector in Afghanistan has increased dramatically since 2003. From 2003 to 2009, donor commitments to the sector rose by 38 percent, to reach a total of $456.8 million over the period. In 2004 alone, aid commitments jumped to $251 million, a 168 percent rise over 2003 (figure 6). This corresponded with the launch of important projects and national priority programmes such as the Afghanistan Urban Water Supply and Sanitation Project, phase II of the Kabul Water Supply Project, the Emergency Irrigation Rehabilitation Programme and the National Rural Water Supply and Sanitation Programme.

There was a temporary decline, to $89 million, in 2005, but, for the remainder of the period, aid to the water sector grew at an average annual rate of 8 percent. In 2009, the total aid committed to the sector was $160 million, an increase of 70 percent relative to the corresponding amount in 2003.

Figure 6 reveals that, although overall allocations for the water sector increased, they were unsteady. This type of erratic financial support inhibits long-term planning; planners and project designers require a predictable budget stream. Long-term initiatives such as dam construction become almost impossible under such budget conditions.

The poor performance of aid in the water sector

From 2003 to 2009, of the $1.2 billion in donor funds committed to the water sector, only 48 percent ($579 million) was disbursed for water projects.[27] Because data on aid expenditures are largely unavailable and in most cases unreliable, disbursement data are used as a measure of the performance of aid delivery. The 2009 'Donor Financial Review' states that, during 2003–2009, about 78 percent of the aid committed to various development sectors was effectively disbursed.[28] For the same period, only 33 percent of the aid earmarked for the water sector and channelled through the government budget was disbursed; donor agencies fared only slightly better, at 54 percent (figure 7).

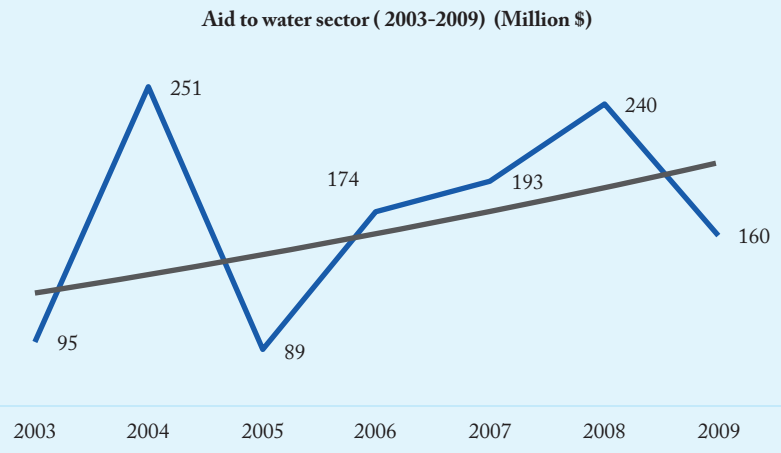
Given that the corresponding disbursement rate is 48 percent in the water sector, it is clear that government agencies and donors active in the water sector are not performing well. The issue of the low disbursement rate becomes more critical because of the growing need for improved water sources and the huge share of the population without access to safe, reliable water and improved sanitation facilities.

However, this is not true across the board. Donors such as the United Kingdom and the United States show a higher disbursement rate, at 77 and 67 percent, respectively. Meanwhile, the government performance is also poor: only 3 percent of discretionary resources are disbursed to the water sector.

The distribution of aid by water subsectors

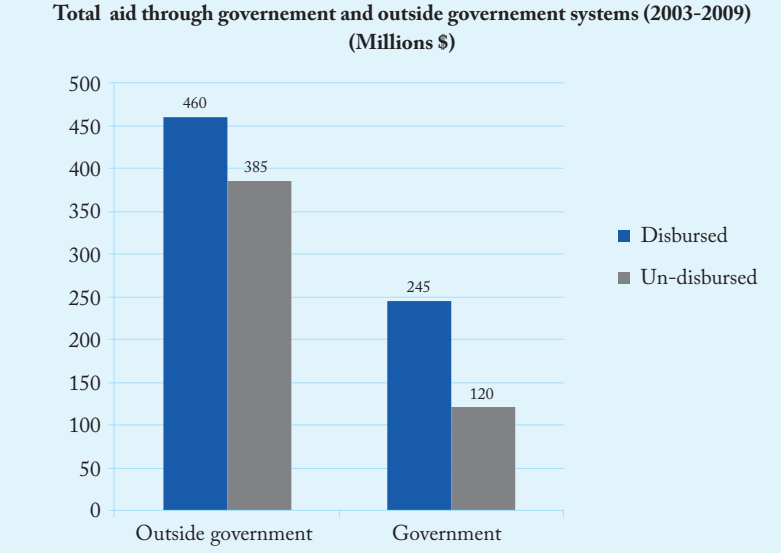
Activities funded under the category of aid range from support for water policy and planning to the construction of water infrastructure and capacity-building. The Development Assistance Committee of the Organisation for Economic Co-operation and Development divides water-related activities into six broad categories. These are also applicable to the water sector in Afghanistan (table 5).

Figure 6 **Increasing but unsteady trends in aid to water sector (2003-2009)**



Source: Data of the Ministry of Finance (2010).

Figure 7 **Low aid disbursement rates through government and donor agencies**



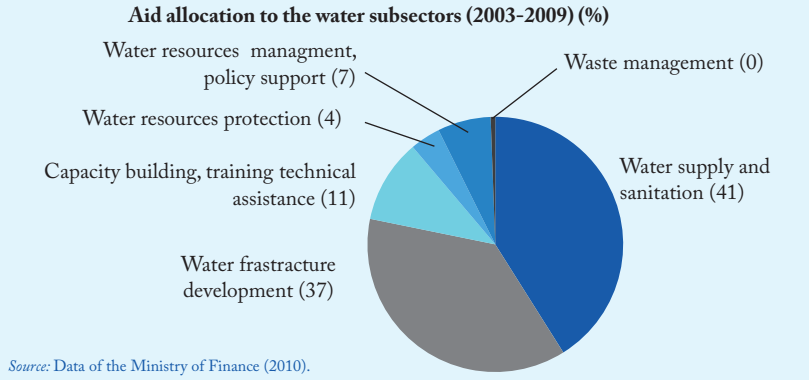
Source: Data of the Ministry of Finance (2010).

Table 5 **Distribution of aid by water subsectors (2003-09) ($)**

Water subsectors	Committed	Disbursed
Water supply and sanitation	494.5	294.6
Water infrastructure and development	447.1	191.8
Capacity building and training	127.8	37.1
Water resources protection	46.3	25.9
Water resources management, policy and administration	81.2	24.0
Waste management	7.0	5.5
Total	$1,204	$579

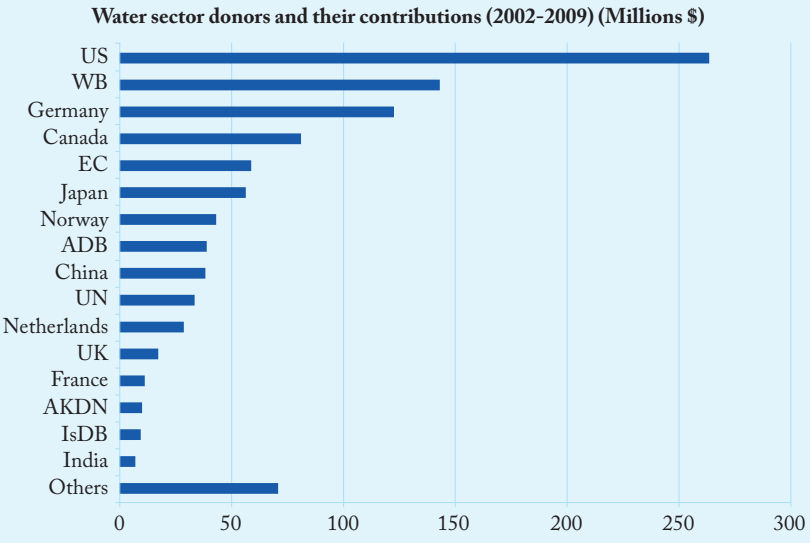
Note: Aid to projects that are primarily for hydropower is not included.
Source: Data of the Ministry of Finance (2010).

Figure 8 **WATSAN and infrastructure development take the highest share of aid to the water sector**



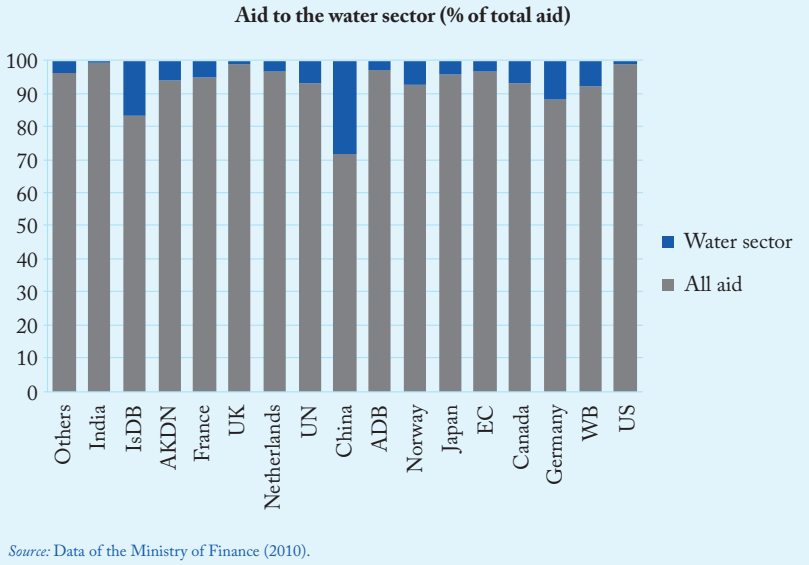
Source: Data of the Ministry of Finance (2010).

Figure 9 **The United States is ranked the top donor of aid to the water sector**



Source: Data of the Ministry of Finance (2010).

Figure 10 **The United States contributes the lowest proportion of its aid to the water sector**



Source: Data of the Ministry of Finance (2010).

Table 5 and figure 8 show that development aid in the water sector mainly supports water supply and sanitation, as well as the development of infrastructure, accounting for 41 and 37 percent ($495 million and $447 million), respectively, of the total aid commitment in the sector. Although water and sanitation also cover interventions that aim at improving hygiene, most of the aid commitments in the water sector are, in fact, aimed at infrastructure development. This reflects the focus of the government and its international partners on enhancing the foundations that ensure economic development and improvements in the socio-economic well-being of the Afghan people.

Allocation of aid by agency

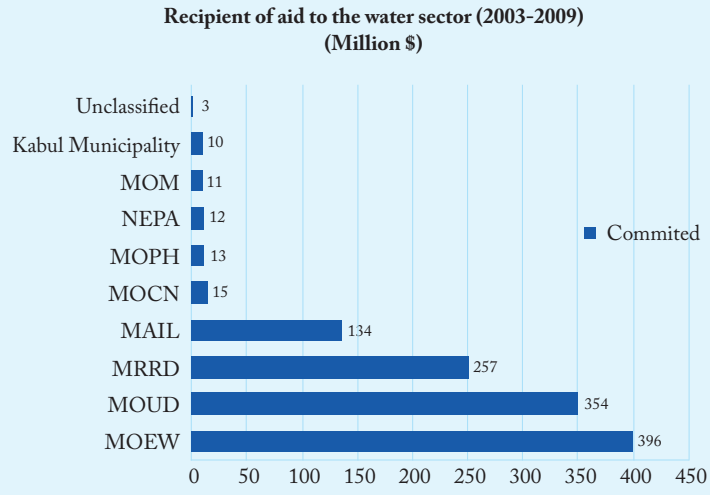
With approximately $264 million in aid commitments, the United States is the largest donor in the water sector. Its contributions accounted for 22 percent of the total aid committed to water projects in 2003–2009. It is followed by the World Bank, at 14 percent ($144 million); Germany, at 12 percent ($123 million); and Canada, at 8 percent ($81 million) (figure 9).

Water sector donors differ significantly in terms of the share of their total aid contributions that they assign to water projects. Figure 10 presents the paradoxical relationship that exists between water as a priority intervention and the share of total donor aid dedicated to water projects in 2003–2009. The donors that assign the largest shares of their aid contributions to the water sector are China (28 percent), the Islamic Development Bank (16 percent) and Germany (12 percent). Major water sector donors that contribute the smallest shares of their aid contributions to the water sector are the United States (1 percent), Canada (7 percent) and the World Bank (8 percent).

Main recipients

The four core water-related ministries—MEW, the Ministry of Urban Development, the Ministry of Rural Rehabilitation and Development, and MAIL—were the main recipients of water sector aid from 2003 to 2009, accounting for almost 95 percent of the total aid in the sector. Other agencies had to compete for the remaining 5 percent. Figure 11 ranks the top aid recipients relative to the total aid distribution. There are serious caveats, however. World Bank data suggest that as much as two thirds of development assistance is spent outside the government budget and thus outside governmental control and ownership.

Figure 11 **Four ministeries were the main recipients of water sector aid from 2003 to 2009**



Source: Data of the Ministry of Finance (2010).

Aid Effectiveness in the Water Sector

Financing should go hand-in-hand with the effective delivery of aid. In Afghanistan, a picture of aid emerges that is characterized by fragmentation, unpredictability and distortions in allocation and delivery. A plethora of factors influences this outcome, including a lack of well-developed policies; the absence of coherent, prioritized and needs-based programmes; poor capacity; and a complex governance environment, in addition to a lack of effective mechanisms for dialogue and coordination and limited data on water sector development.

All of these issues may be addressed through the five principles of the Paris Declaration on Aid Effectiveness (box 5). Because individual indicators on aid effectiveness are not available, we use the principles of ownership, alignment, harmonization, management for results and mutual accountability as the framework for our review of the situation.

The 2006 and 2008 surveys on monitoring the Paris Declaration provide an aggregate baseline for Afghanistan for each of the five principles of aid effectiveness. Because not all indicators are applicable, we use only those that will enable us to assess the progress in the water sector. Table 6 tabulates the principles against the relevant indicators and the baseline performance.

Box 5 **The five Paris principles**

In the Paris Declaration on Aid Effectiveness (2005), donors and governments together laid out the following five operating principles:

- Ownership: Partner countries exercise effective leadership over their development policies and strategies and coordinate development actions.
- Alignment: Donors base their overall support on the partner countries' national development strategies, institutions and procedures.
- Harmonization: Donors' actions are more harmonized, transparent and collectively effective.
- Managing for results: Managing resources and improving decision-making for results.
- Mutual accountability: Donors and partners are accountable for development results.

Source: Development Assistance Committee, Organisation for Economic Co-operation and Development.

Table 6 **Aid Effectiveness principles, indicators and baseline**

Principles of aid effectiveness	Indicators	Base line, 2008
Ownership	Operational development strategy that shapes public expenditure	D (rating)*
Alignment	Use of country systems (public finance management and Procurement)	48 percent of aid channelled through the government budget
Harmonization	Use of Program Based Approaches (PBA)	40 percent of aid provided in support of PBAs
Managing for Results	Results oriented reporting and assessment systems	D (rating)*
Mutual Accountability	Mechanism to assess progress with respect to implementing agreed commitments	Joint Coordination and Monitoring Board

Note: * A (strong) to E (weak).
Source: OECD (2007, 2008).

Ownership is defined as the ability of the government to lead the national development process by conceiving of credible and well-prioritized sector strategies and programmes that donors can align with their development assistance. The 2008 aid effectiveness study gave Afghanistan low marks for ownership because of the length of time required to implement ANDS. There are many reasons behind the delay. Although there is a stand-alone national water strategy in ANDS, stakeholders do not share the same vision for the development of the sector. Implementation is based on the plans and policies of individual ministries, and these, in most cases, diverge from ANDS priorities. The sector is similarly not well reflected in the national budget. Mechanisms for linking the policy and programme priorities of the Water Sector Strategy with the budget process are largely non-existent.

The challenge in future will be to synchronize individual policies with ANDS and the budget process so as to place an even stronger emphasis on linking aid and public expenditures to sector priorities. The hurdles are even greater at the subnational level, where planning and monitoring capacity is weak (box 6). The ability of the government to lead the development process is handicapped in the provinces.

Provincial development plans have been drafted in all provinces. These plans could enable local governments to take ownership and practise leadership. However, the capacity challenges are too great.

The extent to which there is alignment between development aid and national development plans and priorities is best measured by the recipient government. According to the 2008 aid effectiveness study, using the institutions and systems of partner countries increases aid effectiveness by strengthening the sustainable capacity to develop, implement and account for policies to citizens and to national representative bodies such as parliaments. In this sense, the alignment in the water sector is weak.

Only approximately 30 percent of the total aid in the water sector is delivered using the government public finance management systems, including the procurement system. This is considerably lower than the corresponding level of 48 percent in the case of total aid. In both cases, the remainder is managed and delivered directly by donors, with little or no engagement of government systems.

Aid harmonization primarily revolves around improving the coordination among agencies and streamlining procedures so that the duplication of effort is reduced and transaction costs are minimized. In the water sector in Afghanistan, harmonization is moderate. Although the Afghanistan Supreme Council for Water Affairs Management was established to coordinate and direct the development of parameters for investments in national water resources, its effectiveness has not yet been demonstrated.

The Water Sector Strategy identifies eight national programmes for the water sector. To

Box 6 The ownership of aid is challenged by weak state capacity in Faryab Province

Faryab Province is located in the north-western region of Afghanistan. Only 25 percent of the population uses a protected water source. Moreover, a large segment of the population has severe problems because of saline water. The Water, Sanitation and Irrigation Programme and the National Solidarity Programme, two large-scale rural development programmes, have spent more than $6.1 million on water, sanitation and hygiene projects in Faryab.

In 2007, the local government developed a provincial development plan through a consultative process. The plan sought to identify priority projects for a period of five years. It was expected to serve as a tool to promote the ownership of development by the government and facilitate the alignment of donor-funded projects in Faryab. Currently, a Norwegian provincial reconstruction team is requesting that NGOs consult with and obtain approval from the appropriate local government department before submitting a project proposal. This represents a positive step towards enhancing aid effectiveness. However, the application of the provincial development plan in Faryab is challenged by obstacles in the ownership, alignment and harmonization dimensions of aid effectiveness.

For example, the local government generally lacks the capacity to engage with local communities, design strategies and develop plans beyond a simple wish list. Donors and NGOs therefore fill the void by conducting their own surveys, identifying development needs as they see fit and making their own plans.

Moreover, because NGOs are the main project organizers and offer higher salaries, they attract the few qualified staff away from government offices. This translates into a vicious cycle: government capacity is not developed, and adequate overall development plans are not formulated. This damages the credibility of the government because local residents understand that NGOs are delivering the services that would normally be provided by the government.

Nonetheless, the government could play a stronger role by ensuring that the projects are delivering results efficiently. However, state institutions are unable to perform this monitoring and regulatory role. For instance, the most well equipped provincial institution is the Faryab rural rehabilitation and development department. This department includes a water and sanitation unit, but the unit is staffed by only three water engineers and one health officer, who handles hygiene education for the entire province.

There is clearly a shortage of human resources to coordinate water, sanitation and hygiene interventions, survey the NGO projects being implemented, monitor projects and certify progress through the Ministry of Rural Rehabilitation and Development and the United Nations Development Programme. Without transparent monitoring, suspicion about the real cost of water projects is raised. Indeed, per capita project expenditure distributions in Faryab are uneven: the highest spending occurs in Maymana, the provincial capital, at $11.4 per person, and the lowest spending occurs in the district of Belchiragh, at $0.28 per person.

In terms of harmonization, there are mechanisms that would allow for greater cooperation among actors. However, there are problems in implementation. NGO staff usually meet with local government authorities and other local actors to sign memoranda of understanding so as to persuade all the main players to participate in particular projects. Yet, this usually takes place only after the projects have been negotiated with and approved by the donors, thus effectively limiting the meaningful input of local inhabitants and the local government during project planning. The memoranda therefore tend to have little practical significance.

In terms of managing for results, the situation is mixed. A number of NGOs have established mechanisms for monitoring and evaluation in their own projects, but there is no government-controlled or standardized monitoring and evaluation.

Sources: Ibrekk et al. (2006), CPAU (2010).

achieve aid harmonization, all ministries and agencies are required to align their ongoing and planned projects with the national water programmes. For example, projects and activity components that focus on capacity-building are supposed to be clustered within the Capacity-Building and Institutional Development Programme. Similarly, projects and activities concerned with the rehabilitation of infrastructure and the planning and implementation of new infrastructure are to be undertaken within the Water Resources Development Programme. Projects focused specifically on the rehabilitation and development of traditional irrigation systems and emergency irrigation infrastructure are to be

Effective water governance is almost impossible in the absence of reliable and timely information about water availability, demand and access

joined under the Irrigation Rehabilitation Programme. Similarly, water resources management activities are to be bundled under the River Basin Management Programme, which is to facilitate the transition to IWRM.

Managing for results in the water sector is weak. For example, water sector information systems have been developed by various water agencies in complete isolation from each other. The quality and coverage of the information are poor, and access tends to be limited to the organization that manages the system. Likewise, there is no clear framework for monitoring or for reviews to report on progress and contribute to the national policy and budgeting processes.

Mechanisms for mutual accountability in the water sector are almost non-existent. Through the joint coordination and monitoring board, water sector benchmarks, particularly those in the Afghanistan Compact, are assessed and reported on to a high-level meeting of the government and international partners. This process is ad hoc, however, and the benchmark analysis is general and has little impact on policy decisions in the government and the donor community. A joint performance assessment framework needs to be developed and supported through the use of specific, quantifiable indicators. This would facilitate a stronger partnership among agencies and provide a reasonable basis for expanding aid to the water sector.

Improving Governance and Aid in the Water Sector

Water governance is a means to an end, which is effective water management. However, the end is also better human development outcomes among individuals, households and communities,which, as a result,are able to access water more equitably and sustainably and in a way that fosters empowerment, especially among the most vulnerable and marginalized, including women, Kuchis (nomadic pastoralists), children and the elderly.

Effective water management can be characterized as follows:

- Efficient: Water management maximizes the use of water resources within rationalized patterns of consumption that benefit most consumers and take into account not only water, but also other resources, including social and human capital.
- Equitable: Benefits and costs are both shared within a transparent process designed to promote sound water management decisions.
- Sustainable: Water management supports the well-being of society without undermining the integrity of the hydrological cycle or the ecosystems that depend on this cycle.

Experience in seeking to improve water governance shows that development cannot be charted in advance, but rather it must be navigated through process of learning and adaptation. Navigating such a journey requires new approaches to public management, policy-making and natural resources management, approaches that embrace the inherent uncertainty and complexity of our inter-related economic, social and environmental systems. In water governance reform in Afghanistan, similar new approaches will have to be followed in certain areas. These areas are outlined in the next subsections.

Filling the information gap and sharing knowledge

Effective water governance is almost impossible in the absence of reliable and timely in-

formation about water availability, demand and access. To ensure effective and inclusive participation,this information must be made accessible to the needs of stakeholders with diverse backgrounds and differing levels of educational attainment. The establishment of an appropriate infrastructure and environment for monitoring and evaluation will be an important step in the effort to gather information and reduce the transaction costs associated with tracking progress in decision-making and the implementation of plans.

Providing infrastructure

Infrastructure development is not yet sufficient to support changes in management. Infrastructure must therefore be built to improve supply and reduce inter seasonal variations in water availability. This should represent an opportunity to control water flows more effectively and contribute to more efficient management and operations. It should also advance ties of trust with external actors. Planning infrastructure development through collaboration with river basin agencies and river basin councils or working groups should be viewed as a team-building effort. Infrastructure planning attracts stakeholder interest and is a good entry point for discussions on water allocation and other key issues.

Developing skills and enhancing capacity

In the water sector, investment in infrastructure alone will not produce the desired development outcomes. Investment in human and institutional capacity is equally important. The immediate objectives can only be realized through the deployment of skilled personnel and effective institutions. Achievement of the long-term goal of establishing reliable, safe and sustainable water services is directly dependent upon the achievement of short-term goals.

Collecting, analysing and disseminating water information require expertise that has not yet become developed in Afghanistan. Education initiatives and awareness campaigns that target all actors and institutions must be emphasized if water resources are to be utilized responsibly and equitably. This could be undertaken through on-the-job training and a process of guided learning. The Water Sector Strategy emphasizes the potential role of universities in training present and future generations of water managers. It is evident that such a capacity is not now available. The international community therefore has a responsibility to provide this capacity.

In the meantime, Afghan experts within the country and in the diaspora must be engaged in the effort. Few local professional engineers possess the skills and knowledge necessary to undertake national water development, including addressing irrigation and water storage deficiencies, but the same is not true of Afghan engineers residing outside the country. Because of the poor state of capacity, the government must persuade these expatriate engineers to return at least for short periods.

A serious shortcoming is the lack of a listing source of resident engineers at the Afghanistan Engineers Association. Although the association is open to membership by postgraduate engineering students at approved institutions, it focuses only on the publication of engineering manuals in Dari, English and Pashto. It is not active in professional development,and it does not seek to facilitate the entry of qualified Afghans into water sector projects. Therein lies a paradox: the need for qualified personnel is desperate; yet, most graduates of engineering faculties across the country are unemployed and enjoy little opportunity to acquire new skills and knowledge in water resources management.

Focusing on conflict resolution and the enforcement of regulations

The sustainable operations of newly formed organizations such as WUAs require the following:

- Rules must be straightforward, easy to understand and include locally devised access and management regulations.
- The enforcement of rules must be facilitated.
- Adjudication must be accessible and affordable.
- Directors of monitoring services and other officials must be accountable to users.

Over the last five years, several social water management projects have been focusing on WUA formation and have managed to ensure that the first two points above are being met through a participatory process. However, the last two points are hardly being addressed and appear to be a major hurdle in the long-term sustainability of newly formed WUAs. Thus, in parallel with WUA capacity-building, the government, through MEW and MAIL, should focus on providing judicial support for the local enforcement of by-laws. The availability of affordable adjudication will be a key factor in ensuring the sustainability of the newly formed WUAs.

The Water Law does not refer to possible support for WUAs as part of the responsibilities of river basin agencies. According to article 34, however, if WUAs are unable to resolve water conflicts internally within seven days, it is the responsibility of river basin councils and river basin agencies to intervene to seek resolution. If unsuccessful after a month, water users should seek the assistance of the courts for resolution. In the agricultural sector, conflicts related to water access must be resolved locally within a short time-frame. An interval longer than 10 days to two weeks in summer between turns among irrigators in the use of irrigation water is most likely to lead to crop failure. Yet, most sub-river basin councils and agencies are too distant and thus not practical for conflict resolution among most farmers. Relying on the courts to resolve water-related issues is not a traditional practice. Overall, the transaction costs of such procedures are most likely to discourage water users from becoming allies of governance reform.

Developing self-financing procedures

The development and maintenance of a new governance system require financing. Capacity-building and communication and information management are particularly costly. There have been discussions at river basin councils about setting water user fees to cover the cost of running water systems, but no other steps have been taken. It is unrealistic to consider self-financing in the first years of such an important institutional change. Users will not be interested in financing a new and unfamiliar system that has yet to prove its worth. This means that costs will have to continue to be borne by the international community, at least until water users can become convinced that the new system brings benefits that will outstrip their expenditures.

Priority Actions for Improving Aid Effectiveness in the Water Sector

Progress in the water sector is being hindered not only because of the lack of adequate, predictable and sustained investment and problems in the delivery of aid, but also because of the absence of mechanisms, instruments and processes to foster aid effectiveness. The challenge is to ensure that the relatively small share of development aid earmarked for the water sector is used as efficiently as possible and in pursuit of goals that are sustainable

and help advance human development.

Ownership could be promoted at the subnational level by clarifying the roles and responsibilities of state entities, decentralizing line ministries, building institutional and systems capacity at the local level, decentralizing budgetary and planning responsibilities and expanding the participation of communities and civil society in the design, implementation, management and monitoring of development activities (see table 6).

Without public finance management and budget execution capacity, the donor community is unlikely to increase direct aid to government budgets. Alignment between donor support and government strategies and development initiatives is difficult in the context of widespread allegations of government corruption. There must be a genuine effort to implement the government's anti-corruption strategy, enhance the transparency of government operations (especially tax, procurement and expenditure activities), build effective mechanisms for monitoring and auditing and overhaul the anti-corruption commission to ensure its integrity.

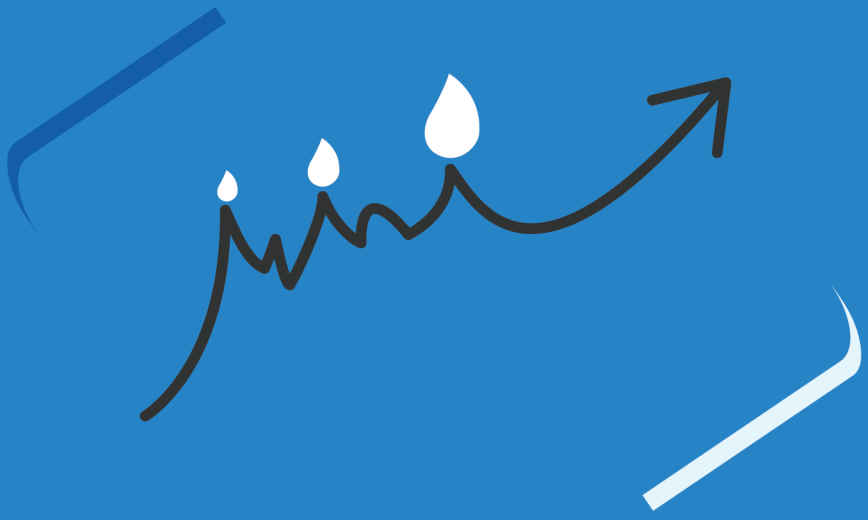
The human and financial resources of the joint coordination and monitoring board and the United Nations in Afghanistan must be strengthened. The government's harmonized reporting format should be the basis for donor commitments to providing the government with timely, comprehensive and accurate information on aid flows. Overall, Afghanistan's local and national development priorities, including ANDS, should remain the measure through which donors assess the consistency of aid programmes.

Harmonization requires that pooled funding arrangements be enhanced. However, this poses a dilemma for donors because of the lack of government capacity. Another serious barrier to harmonization is the fact that major donors tend to concentrate funds within the areas of operations of their co-national military units and provincial reconstruction teams rather than channelling funds to the government so they can be distributed throughout the country.

Managing for results means that the lack of reliable data and information must be addressed. However, the international assistance effort is motivated by a variety of international and domestic political and security objectives beyond humanitarian concerns. It may therefore be questioned whether the provision of development assistance is the primary aim of the international community and, thus, whether managing for results is a significant priority.

Mutual accountability should build on the joint coordination and monitoring board. To accomplish this, the government and donors must establish effective watchdog organizations that possess the specialized skills to assess the quality of the information being distributed.

Priority recommendations



Priority recommendations

Improving access to water for drinking, agriculture and sanitation is an integral part of reconstruction and stability of Afghanistan.

Engaging in the water sector offers an opportunity in supporting the improvement of health, education, and economic opportunities.

As this report indicates, sufficient and reliable access to safe water is the most important issue for communities across the country. Thus, in order to respond to the needs of Afghans, water should become a top priority on the agenda of government and donors. Stronger political will and long-term commitment are a paramount importance as a pre-requisite to introduce governance changes.

An overarching requirement is to provide, analyse and share more data on water resources as a basis for better project planning and monitoring. The development of water resources is required to effectively reduce vulnerabilities of Afghans to water shocks and climate change. A strong focus should be given to developing the institutional and professional capacity of government, NGOs, newly established water institutions, the private sector, and educational Institutions. To be sustainable, engagement in the water sector must emphasize on the participation of the water users in decision-making as well as long-term and continuous awareness raising at all levels.

Overall, the financial aid to the water sector must be significantly increased to support efforts in the water sector. Yet, financial efforts will provide meaningful results only if aid effectiveness is also enhanced.

Detailed recommendations are outlined hereafter for improving water access for human development.

Filling the data and information gap

Reliable high-quality data are not available on the water sector in Afghanistan. Accurate information is a prerequisite for effective project planning, management and monitoring and the reduction of risks and vulnerability against climate shocks. Accountability and transparency mean that more detailed information is also needed on the work of national and international institutions.

Data should be developed on water quality, groundwater extraction, water balance, water resources and so on. Remote sensing and forecasting technologies should be applied, particularly to monitor floods and drought.

Many actors are collecting data and information on the water sector to support specific interventions, including non-governmental organizations, governmental entities, provincial reconstruction teams and donors. The amount and quality of the data vary by region and by institution. Some institutions

are reluctant to share information. The data are often contradictory. A system of data harmonization and centralization should therefore be established with the support of the Central Statistics Organization.

Stimulating public awareness and developing the capacity for action

The awareness and capacity of the communities and groups affected by water policy are important in water sector development. These communities and groups are the focus of projects. The success of future service delivery systems will depend on them.

Developing community awareness and capacity

Developing hygiene awareness and raising the demand for improved sanitation facilities are critical in the effort to scaleup development efforts so as to reach the Millennium Development Goals.

Promoting water conservation in households and communities is required to improve the access to water in areas with limited supplies of water.

Developing maintenance and cost recovery capacity is essential to the long-term sustainability of any infrastructure development effort.

Communities must become involved in risk alleviation, efforts aimed at disaster preparedness and water resources management so as to reduceoverall vulnerability to climate shocks.

Supporting water user associations and other local institutions

The establishment of water user associations is promoted in the new Water Law. The process will involve maintaining traditional approaches such as the mirab system, while introducing new management systems that are able to foster equitable water sharing.

The development of a cost recovery capacity is required to enhance the sustainability of rehabilitated infrastructure.

The provision of financial support through small grants for project development is required to encourage water user associations to upgrade canal and other water infrastructure and develop skills in collective project management.

Developing the capacity of government staff

The development of the technical capacity of government staff is needed in all areas of water resources management. This includes, for example, transboundary management, water resources planning and development, infrastructure design and maintenance, river basin management, water sector coordination, regulation, monitoring and enforcement capacity.

Developing capacity in the private sector

Small and medium enterprises that can carry out local operations, supply repair and maintenance expertise and offer technical capacity must be nurtured. These enterprises could rely on Afghan technicians. Local technical skills in water resources development and the construction of hydraulic infrastructure must be encouraged. Non-governmental organizations could be the focus of training.

Developing capacity in higher education

The capacity in technical engineering must be enhanced to ensure that the country can be weaned from its dependence on external expertise in the development of water resources and supply infrastructure.

Promoting and supporting independent research and monitoring are essential to the effort to create national expertise and critical skills in water sector reform. The establishment of an independent water institute could facilitate the drafting of appropriate policies, progress monitoring and the identification of shortcomings in the effort to reach the Millennium Development Goals through development projects. It could also support professional training in the water sector.

Improving supply and promoting soil and water conservation

Addressing the threat of water scarcity means that the supply of water must be increased, including through soil and water conservation. In many sub-river basins, the infrastructure is inadequate to supply users with safe domestic water and sufficient water for irrigation. Scarcity can also be mitigated by reducing the demand for water, especially for irrigation, without compromising crop production.

Filling the infrastructure gap

Eliminating the infrastructure gap requires a variety of approaches so that all population groups in all parts of the country can benefit from equitably shared water resources.

Small, medium and large storage infrastructure must be developed to tap into the potential of the country's water resources. This will ensure better control over these resources and help compensate for the significant seasonal variability in the availability of water.

Restoring and improving traditional water infrastructure are also necessary to improve supply. This infrastructure is usually simple, based on indigenous local knowledge and less likely to raise tensions with downstream countries.

Irrigation infrastructure rehabilitation is critical to reviving irrigation productivity and, ultimately, enhancing food security. It will support water user associations in the effort to ensure equitable water sharing.

Upgrading traditional latrines is a priority considering the poor access to improved sanitation facilities. The development of this infrastructure must be accompanied by hygiene awareness campaigns.

Better coverage among the poor in the provision of drinking water must be a high priority. Water supply systems serving informal settlements in the capital city should, for instance, be a major focus in urban development plans.

Laboratories should be established to monitor water quality. This will ensure that better data are available to build awareness about the need for safe water and in drafting relevant development plans.

Ensuring community participation in the infrastructure design process should be an over arching goal. Not only would this help empower water users in decision-making on water supply issues, but it would also encourage water users to take responsibility for the operation and maintenance of infrastructure.

Adopting soil and water conservation measures

The application of soil and water conservation measures would help mitigate the impact of water scarcity during periods of drought. Thus, the promotion of less water-intensive crops and cultivation methods would reduce the demand for water for irrigation. The system of rice intensification is an example of a successful method that requires less water, while increasing yields. In general, drought-resistant crops that do not compromise on economic returns should be encouraged, particularly in water-scarce sub-river basins.

Improving efficiency through on-farm water delivery would also reduce the demand for irrigation water. Techniques such as land levelling, improved basin and furrow irrigation, or mulching should be fostered, especially in water-scarce areas.

Promoting the conservation of watershed, forest and rangeland would enhance the conditions for biomass regeneration and erosion control. Vulnerability to floods and drought would be reduced in the long term through the adoption of these and other practices on a large scale.

Supporting water governance reform

Institutional change is needed to meet the critical challenges in the distribution of improved water sources and sanitation facilities.

The recognition of the right to water and sanitation as a human right and the establishment of a ministry focusing exclusively on ensuring access to improved water and sanitation should be two components of the change. While integrated water resources management has wisely been adopted as the core principle of water resources management in the new Water Law, this principle must now be made a practical reality. This would involve support for water user associations and the development of river basin management plans through multi stakeholder platforms. Additional regulations must also be drafted to guide the practical implementation of the law. Ensuring that water users participate actively and meaningfully in decision-making on project development is essential to achieving progress and long-term sustainability.

Introducing institutional change and increasing international aid

Institutional change and the support of international aid are necessary to the effort to scaleup coverage and establish equity in the access to water and sanitation. The recognition of the right to water as a human right represents a powerful moral claim and would help create policy tools to exert pressure so that improved water and sanitation become priorities. It would also motivate public awareness and encourage the shared responsibility of water users.

The coverage rate of improved water and sanitation in Afghanistan is among the lowest in the world. The establishment of a dedicated ministry of water and sanitation led by a senior minister would send a clear signal across the government and among the public that water and sanitation rank among primary national policy priorities. It would also create a structure capable of overcoming the fragmentation in policy and enhancing the coordination in interventions.

Halving the gap in water and sanitation coverage rates between urban and rural areas and between well-covered and poorly covered provinces should supplement the goal of expanding coverage.

Transforming integrated water resources management into a practical reality

Enforcing rules and regulations and resolving conflicts would support water user associations in challenging the status quo in the inequitable application of water rights and water sharing agreements.

River basin management plans must be drawn up based on resource development priorities. As the demand for improved water increases, priorities will have to be established across water user needs, particularly as a hedge against the rise in demand during periods of drought. The creation of multi stakeholder platforms to ensure the representation of all categories of water users will provide a basis to ensure that management plans are owned by representatives of all beneficiaries and stakeholders.

Developing regulations to support the implementation of the Water Law

Rules and regulations should be adopted and enforced to support the practical implementation of the new Water Law. A first step would be the passage of regulations to promote the establishment of water user associations and irrigation associations and the use of enforceable water use permits.

Ensuring community participation in design, implementation and monitoring

Community participation is critical to ensuring that the choice of infrastructure is relevant to local needs, but also adapted to local capacity in operations and maintenance.

Operations and maintenance

The government should play an enabling role by fostering an environment for effective and efficient operations and maintenance. A national strategy for operations and maintenance should be drafted, and the relevant capacity created.

Enhancing aid to the water sector

A lack of adequate funding for the water sector is partly to blame for the poor coverage of improved water and sanitation and the poor performance of the irrigation sector. A significant increase in funding is therefore required to achieve the Millennium Development Goals related to water and to achieve greater food security. This is an over arching requirement for harvesting the human development benefits of improved access to water and sanitation.

Aid effectiveness also needs to be enhanced to render the increased financial support meaningful. This might be accomplished through greater budget support, more predictability in aid flows and lower transaction costs through improved harmonization and coordination. It would also include independent evaluation of aid programmes against the targets in the water sector set out in the Millennium Development Goals and in national strategies so as to improve the understanding of donors and aid recipients about programme effectiveness.

For sustainable financing of the water sector, partnership opportunities, such as public-private and public–civil society partnerships, should be investigated.

While generating sufficient revenues to cover recurrent costs is ultimately the goal, pro-poor pricing and subsidy policies for drinking water and sanitation should be included to reach those segments of the population most in need, including the poorest urban users and users in remote rural areas. By transferring resources from higher-income to lower-income households through utility pricing and cross-subsidies, for example, the negative impacts on health and development can be reduced.

Capitalizing on the funds assigned to address climate change is one way to channel financial support to adapt to the incidence of water scarcity and to reduce the vulnerability to climate shocks such as floods and drought.

Endnotes

Chapter 1

1. UNDP (1990).
2. Fukuda-Parr and Kumar (2003).
3. UNDP (2004).
4. CPHD (2007).
5. UNDP (2009).
6. Rahim (2009).
7. MRRD and CSO (2009).
8. MRRD and CSO (2009).
9. The Afghanistan Ministry of Public Health reported a higher number for the under-5 mortality rate, 191 per 1,000 live births in the public health survey (MOPH 2008), while the MRRD and CSO (2009) reported the rate at 161. The discrepancy is due to differences in methodology and sampling. See MRRD and CSO (2009) for details.
10. MRRD and CSO (2009).
11. MRRD and CSO (2009).
12. UNICEF (2006), MOPH (2008).
13. UNICEF (2006), MOPH (2008).
14. Ministry of Public Health of Afghanistan, Health Maintenance Information System Database (accessed 2010).
15. Hogan et al. (2010).
16. MRRD and CSO (2009).
17. United Nations Population Division, 'World Population Prospects: The 2008 Revision Population Database', Department of Economic and Social Affairs, United Nations, http://esa.un.org/UNPP/ (accessed June 2010).
18. Fukuda-Parr and Kumar (2003).
19. According to the Ministry of Education database, total enrolment among all students was 6.7 million in 2009. See also MOE (2007, 2008).
20. MRRD and CSO (2009).
21. MOE (2008).
22. MRRD and CSO (2009).
23. MOE (2007).
24. MOE (2007).
25. Government of Afghanistan (2008).
26. There is significant geographical variation. Nearly 64 percent of school teachers in Kabul are women. However, in the provinces of Khost, Kunar, Paktika and Uruzgan, the share is less than 5 percent. Only 15.3 percent of the teaching staff at the university level are women. Khost, Paktia and Takhar have no female university teaching staff at all. The proportion of female teachers at the tertiary level is also low in Kandahar (6.9 percent) and Nangarhar (3.0 percent). In Alberoni in Kapisa Province, it is only 2.2 percent.
27. See MRRD and CSO (2009). The basic subsistence basket covers the cost of maintaining a diet of 2,100 calories per person per day, as well as the cost of basic non-food items.
28. UNDP (2009).
29. Alkire and Santos (2010).
30. See the statistical notes for a more detailed analysis of deprivation in each province.
31. MRRD and CSO (2009).
32. ACBAR (2008).
33. UNDP (2009). See also the statistical notes.
34. Wordsworth (2007).
35. Wordsworth (2007).
36. Prokop (2009).
37. Prokop (2009).
38. Rennie et al. (2008).
39. UNDP (2006, 2007).
40. WWAP (2003, 2006), UNDP (2006).
41. UNDP (2006), page 3.
42. UNDP (1994).
43. Safe drinking water refers to water that is supplied through a protected source. This definition does not cover issues of reliability and the adequate amount of water that each person should have available and consume. See chapter 3. See also MRRD and CSO (2009).
44. MOPH (2008), UNICEF (2009).
45. MRRD and CSO (2009).
46. ADB (2003).
47. MRRD and CSO (2009).

Chapter 2

1. Rijsberman (2005).
2. Rijsberman (2005).
3. See the reader's guide. Though not entirely satisfactory in general, the Falkenmark indicator may be readily applied in the case of Afghanistan, where reliable data are limited. See Falkenmark et al. (1989).
4. According to Favre and Kamal (2004), the Kunar River has an average flow of 15.3 billion cubic metres of water per year, while the Kabul basin has an estimated mean annual availability of 22 billion cubic metres.
5. Beekma and Fiddes (2010).
6. Personal communication with W. Klemm and S. S. Shobair (July 2010). The deputy minister of energy and water estimates the current reservoir storage capacity at 40

to 60 cubic metres per capita per year.
7. Assuming a requirement of 50 litres per capita per day.
8. Rijsberman (2005).
9. Vörösmarty et al. (2000).
10. Rijsberman (2005).
11. Houben and Tünnermeier (2005).
12. Houben and Tünnermeier (2005).
13. Government of Afghanistan (2008).
14. Population database, Central Statistics Organization, Kabul, http://www.cso.gov.af/demography/population.html (accessed May 2009).
15. Mack et al. (2010).
16. Mack et al. (2010).
17. Sasabe (2009).
18. UNDP (2006).
19. Mack et al. (2010).
20. ICARDA (2002) estimates the area irrigated using groundwater at 16 percent of the total, while estimates based on Uhl (2003) and Favre and Kamal (2004) indicate 22 percent.
21. Klemm (1996), Uhl (2003).
22. Uhl (2003).
23. Unconsolidated aquifer systems are found along major river systems and within basins among mountains. These locations include the most productive aquifers in Afghanistan. Most of the irrigation from groundwater sources (springs, karezes, open wells and drilled wells) is derived from these aquifer systems (Uhl 2003).
24. Banks and Soldal (2002).
25. De Jong (2006).
26. UNDP (2006).
27. Banks and Soldal (2002).
28. ADB (2007).
29. Houben and Tünnermeier (2005)
30. WWAP (2003).
31. Coe and Foley (2001) cited in UNDP (2006).
32. UNDP (2006).
33. Alizadeh and Keshavarz (2005), WWAP (2006).
34. World Bank (2005).
35. In 1993, power generation capacity was estimated at around 454 megawatts. The impact of 30 years of turmoil has reduced the capacity to 250 megawatts (Government of Afghanistan 2008).
36. Government of Afghanistan (2008).
37. WWAP (2003).
38. The Indus Waters Treaty took 10 years to negotiate; the Ganges Water Sharing Treaty, 30; and the Jordan River water agreements, 40 (WWAP 2003).
39. Horsman (2008).
40. King and Sturtewagen (2010).
41. Personal communication of S. S. Shobair, Food and Agriculture Organization of the United Nations, Kabul, October 2009.
42. Relative to Pakistan, India has a superior riparian position. It also had a relatively stronger central government in the 1950s. See Alam (2002).
43. Pereira et al. (2002), 6.
44. Cancelliere et al. (2007).
45. Azimi and McCauley (2002).
46. Afghanistan Imperial Gazetteer, 1908.
1970–1972 is called the Bangladesh year because the newly independent country of Bangladesh provided food support to Afghanistan.
47. Many Afghans refer to the 2008 drought as the most severe in living memory (Savage et al. 2009).
48. The two shares are provided by MAIL (2009) and USDA (2008), respectively.
49. The normalized difference vegetation index is a method relying on remote sensing to analyse biomass.
50. FEWS NET (2008).
51. USDA (2008).
52. FEWS NET (2008).
53. USDA (2008).
54. FAO and WFP (2004).
55. MRRD (2004) Food insecure indicates a per capita daily energy consumption below 2,100 calories.
56. Lautze et al. (2002).
57. FAO (2003).
58. Roe (2010).
59. MRRD and CSO (2009).
60. In the study, extremely debt insecure households were defined as follows: Debt is a source of shame and/or deep anxiety (men unable to leave house, people who don't know how they can repay debt); people unwilling to lend to individual/household; daughters given to money lenders in marriage because debt can't be paid, borrowed money for business and then business failed, large debts with employers or shopkeepers, any debt with interest, debt of more than 20 lak (1 lak = 100,000 Afghanis) for illness or funeral, in debt with family more than 20 lak (1 lak = 100,000 Afghanis), shopkeepers going into debt to keep store going, inherited debt." Lautze et al. (2002), 15
61. MRRD and CSO (2009).
62. Lautze et al. (2002).
63. World Bank (2005).
64. Lautze et al. (2002).
65. Lautze et al. (2002).
66. Lautze et al. (2002).
67. CPAU (2010).
68. CPAU (2010).
69. See MRRD and CSO (2009). The United Nations Environment Programme (UNEP 2006) estimates that, in 2006, the share of agriculture in gross domestic product was 32 percent. See also IMF (2008).
70. UNEP (2006); see also IMF (2008).
71. UNDP (2006).
72. Eriyagama et al. (2009).
73. MRRD and CSO (2009), Eriyagama et al. (2009).
74. Eriyagama et al. (2009).
75. Eriyagama et al. (2009).
76. O'Brien et al. (2004).
77. Beekma and Fiddes (2010).
78. Afghanistan Information Management Services, http://www.aims.org.af/ (accessed 12 May 2010).
79. Dartmouth Flood Observatory Database, University of Colorado, Boulder, CO, http://floodobservatory.colorado.edu/index.html (accessed 10 May 2010).

80. Beekma and Fiddes (2010).
81. UNDP (2004).
82. ICIMOD (2008).
83. ICIMOD (2008).
84. UNEP (2006).
85. UNEP (2006).
86. UNEP (2006).
87. Government of Afghanistan (2008).
88. UNDP (2006).
89. Savage et al. (2009).
90. Rycroft and Wegerich (2009).
91. Beekma and Fiddes (2010).
92. Beekma and Fiddes (2010).
93. Eriyagama et al. (2009).
94. Snow fences are made of natural materials and disposed along hill contours. They are used to concentrate or collect snow so as to provide a supplemental source of water when the snow melts. See Thompson et al. (2009).
95. Banks (2001).
96. Roe (2010).
97. Narain et al. (2005).
98. ICIMOD (2008).
99. ICIMOD (2008).
100. Banks (2001).
101. Beekma and Fiddes (2010).
102. Beekma and Fiddes (2010).
103. Revenga et al. (2000) and Bhattacharrya et al. (2004), cited in Beekma and Fiddes (2010).
104. UNDP (2007).
105. King and Sturtewagen (2010).

Chapter 3

1. Improved water sources supply water that is less likely to contain harmful bacteria, toxic materials, or chemicals and is more likely to be safe to drink. Improved sanitation facilities include hygienic toilets connected to sewerage or proper septic tanks so as to isolate faeces from human contact and keep insects away.
2. MOEC et al. (2006), UNICEF (2009).
3. See WaterAid (2007), which relies on estimates that are higher than those presented in the National Risk and Vulnerability Assessment (MRRD and CSO 2007, 2009).
4. MRRD and CSO (2007, 2009).
5. MOPH (2006).
6. MOPH (2006).
7. Summer is the peak season for the onset of diarrhoeal diseases; so, if the survey were conducted in summer, the number of cases would be higher.
8. MOEC et al. (2006).
9. MOPH (2006).
10. Gabrielli et al. (2005).
11. MRRD and CSO (2009).
12. Data of KfW Entwicklungsbank, Kabul.
13. MRRD (2010).
14. The share of people accessing multiple water sources has been calculated based on the 2007/08 population estimate in MRRD (2010). The share of people accessing multiple improved sources has been calculated based on MRRD and CSO (2009).
15. MRRD and CSO (2009), MRRD (2004).
16. MRRD and CSO (2009).
17. CPAU (2010a).
18. MRRD and CSO (2009).
19. Data of KfW Entwicklungsbank, Kabul.
20. Houben and Tünnermeier (2003).
21. UNHCR (2009).
22. The exact number of IDPs is 296,000 (IRIN 2010). See also IRIN (2008). In 2008, 9,000 people were displaced from Balkh because of drought (IRIN 2008).
23. CPAU (2010a).
24. World Bank (2006).
25. UNHCR (2010).
26. CPAU (2010a).
27. IRIN (2009).
28. Roe, A. (2010).
29. MRRD and CSO (2009).
30. Roe, A. (2010).
31. WHO and UNICEF (2010).
32. Beller Consult and Kocks Consult (2004).
33. Kalbermatten et al. (1982).
34. UNEP (2003).
35. Opryszko et al. (2007).
36. MRRD (2010).
37. CPAU (2010b).
38. Personal communication of Engineer Baheer of the Afghan Urban Water Supply and Sewerage Corporation, Kabul 2010.
39. MRRD (2010).
40. CPHD interview with the Danish Committee for Aid to Afghan Refugees, Kabul, 4 August 2010.
41. CPAU (2010b).
42. Information gathered by CPHD through meetings, in Kabul in 2010, with stakeholders and actors, including UNICEF (in February and, with the UNICEF chief of water and sanitation, on 1 May); the Water, Sanitation and Hygiene cluster (UNICEF, the Danish Committee for Aid to Afghan Refugees and the Office of the United Nations High Commissioner for Refugees, among others); the Ministry of Rural Rehabilitation and Development (Rural Water Supply and Sanitation Programme, 4 September), the Ministry of Urban Development and others.
43. CPHD interview with the Danish Committee for Aid to Afghan Refugees, Kabul, 4 August 2010.
44. Strand and Olesen (2005).
45. UNDP (2006).
46. MRRD and CSO (2007, 2009).
47. UNCESCR (2003).
48. UNDP (2006).
49. MRRD (2010).
50. UNCESCR (2003).
51. Government of Afghanistan (2005).
52. Bold et al. (2009).
53. CPHD interview with the head of the Afghan Urban Water Supply and Sewerage Cooperation, 17 April

2010.
54. MRRD (2010).
55. MRRD (2010).
56. Sulabh (2010).
57. Sulabh (2010).

Chapter 4

1. Hussain and Hanjra (2003).
2. Such consequences have already been observed in Afghanistan. The malaria threat, mainly significant in the Kunduz River basin in the 19th Century, is reflected in the proverb, "If you want to die, go to Kunduz". Salinization of the soil affected irrigation systems in Helmand in 1973–1990, when around 14,000 hectares were irreversibly lost (Development Alternatives Inc. 1993).
3. Dudu and Chumi (2008).
4. BGD = Bangladesh, CHN = China, IDN = Indonesia, IND = India, LAO = Lao People's Democratic Republic, LKA = Sri Lanka, MMR = Myanmar, MNG = Mongolia, MYS = Malaysia, NPL = Nepal, PNG = Papua New Guinea, THA = Thailand, TUR = Turkey, VNM = Viet Nam.
5. See WWAP (2003) for numerous examples.
6. ICON-Institute (2009).
7. Chabot and Dorosh (2007).
8. Chabot and Dorosh (2007.
9. ICARDA (2002).
10. Bhattarai et al. (2002).
11. ADB (2003).
12. The data vary on a yearly basis depending on water availability. Favre and Kamal (2004) estimate that 1.56 million hectares are intensely irrigated, while 1.65 million hectares are intermittently irrigated.
13. Bhattarai et al. (2002); Sharma et al. (2008); Gautam and Uprety (2002); Lind (1995); Mukherjee (2002); Korten (1990); Pradhan (1989).
14. Bhattarai et al. (2002).
15. ICON-Institute (2009).
16. There are regional differences. Karezes are used more widely in the southern and southeastern provinces than in the northern provinces.
17. Rout (2008).
18. ICON-Institute (2009).
19. Klemm (1996).
20. Gardin and Gentelle (1976) cited in Pasquet (2007).
21. Favre and Kamal (2004) cited in Pasquet (2007).
22. Lee (2003); SMEC (2006).
23. Caponera (1952).
24. Pasquet (2007).
25. Thomas and Ahmad (2009).
26. Lee (2006).
27. Lee (2006).
28. Lee (2006).
29. Lee (2003, 2006, 2007); Thomas et al. (2009).
30. Thomas et al (2009); Thomas et al. (forthcoming).
31. Bird et al. (2009).
32. In general, a paikal is relational measure of water flow or volume to area.
33. These are units of measure of water flow, water volume, or water turns used to allocate water rights or distribute irrigation water.
34. Lee (2007).
35. Lee (2003); Berkoff (2004).
36. Sogreah (1966), vol. 2, chap. 3, p. 69.
37. Thomas and Ahmad (2009).
38. Lee (2003); Berkoff (2004); Thomas and Ahmad (2009); Chokkakula (2009).
39. The non-irrigated areas include roads, paths and settlements, which means that the shares are slightly overestimated. This does not alter the relative proportions in the incidence of non-irrigated land in upstream and downstream areas. See PMIS project report (forthcoming).
40. Similar results were found in July and September.
41. Proportional dividers are structures designed to ensure a proportional division of the canal or river flow, without relying on the operation of gated dividers. However, they are not tamperproof.
42. Wegerich (2009).
43. Roe (2009).
44. Similar limitations on irrigated land may be expected in Fayzabad and Aqcha districts in the neighbouring province of Jowzjan because they cover the majority of the downstream canals in the system. However, no data are available.
45. Proximity to roads and urban centres, overall accessibility, and soil type and other agronomic characteristics are among the other factors that may influence land price fluctuations.
46. Pain (2008), reports a more than threefold increase in wheat prices and a twofold increase in rice and oil prices from 2006/07 to 2008.
47. Based on Pain (2008).
48. Thomas and Ahmad (2009).
49. Lee (2003).
50. http://www.tradingeconomics.com/afghanistan/pump-price-for-diesel-fuel-us-dollar-per-liter-wb-data.html (accessed 20 August 2010).
51. Ashworth (2005).
52. Lee (2003).
53. Pain (2006).
54. Pain (2007).
55. Pain (2008).
56. Pain (2006, 2007).
57. See Sogreah (1966), vol. 2, chap. VI, p. 29.. The PMIS project listings of water users show, for example, that only 0.1 to 0.3 percent of the farmers along canals in Taloqan own more than 100 jeribs. The largest recorded holding along covered canals in Baghlan was 500 jeribs.
58. Pasquet (2007).
59. Lee (2006, 2007); Thomas and Ahmad (2009); Wegerich (2009); minutes of the meetings of the Kunduz River basin working group.
60. Pasquet (2007).
61. See Thomas and Ahmad (2009); Pasquet (2007).
62. Estimates indicate that rice cultivation currently covers

50 percent of the Sholgara Valley; see ADB (2004).

63. Two independent studies have estimated the irrigable area in Sholgara Valley at around 5,000 hectares, which represents less than 1.2 percent of the total command area of the 11 canals downstream on the lower Balkh River or about 6 percent of the average amount of irrigated land (estimated at 20 percent of the total command area in a normal year). Assuming a scenario involving a shift on the 5,000 hectares from a crop with a low water requirement such as mung beans to 50 percent rice cultivation and 50 percent cotton cultivation and considering a 60 percent efficiency rate due to the relatively high return flow expected in the favourable configuration of the Sholgara Valley (Berkoff 2004), such a change in cropping patterns would lead to an estimated decrease of 4 and 11 percent in July and August, respectively, with respect to the river flow in the same months in a normal year.
64. Thomas et al. (2009). Thomas et al. (forthcoming).
65. Article 13 of the 1981 Water Law clearly assigns the departments of agriculture the responsibility for regulations on mill construction and use.
66. Lee (2003).
67. Wegerich (2009).
68. Wegerich (2009).
69. Berkoff (2004).
70. Lee (2003), discusses the continuous pumping of canal water for the factory at a rate ranging from 175 to 300 litres per second. If we take the highest estimate and assume that none of the pumped flow returns to the canal, this represents the water demand for approximately 200 hectares planted in mung bean, which would cover not more than 0.2–0.3 percent of the estimated 84,976 hectares of irrigated land in the Hazhda Nahr system in a normal year.
71. Berkoff (2004).
72. ADB (2004).
73. Brouwer et al. (1989).
74. Klemm (1996). The same range is given by Qureshi (2002).
75. For a comprehensive review of the concept of social capital, see http://go.worldbank.org/C0QTRW4QF0.
76. Lee (2003).
77. Thomas and Ahmad (2009).
78. Thomas et al. (2009).
79. See Roe (2009), one of the rare studies on collective maintenance.
80. Klemm (1996).
81. Lee (2003); Wegerich (2009).
82. Berkoff (2004); Thomas and Ahmad (2009).
83. SMEC (2006).
84. Lee (2007); PMIS project reports in 2009.
85. Thomas and Ahmad (2009); Pasquet (2007).
86. Dietz et al. (2003).
87. Lee (2007).
88. Dietz et al. (2003).
89. See Thomas and Ahmad (2009) for an example of the failure to apply such a rule. See also boxes 13–15 and the associated text.
90. See the SRI website on Afghanistan of the Cornell International Institute for Food, Agriculture and Development at http://ciifad.cornell.edu/sri/countries/afghanistan/index.html.
91. UNDP (2006).
92. MAIL (2009).
93. See, for example, PMIS project canal assessment reports on Baghlan and Taloqan.
94. This is the approach promoted in Roe (2009).
95. For illustrations of how opportunities for canal rehabilitation can lead to the establishment of water sharing rules and help resolve long-standing intercanal conflicts over water theft, see Thomas et al. (2009).
96. Since 2004, more than $150 million have been allocated to the project; see http://go.worldbank.org/Y73NBZI7Z0.
97. UNDP (2006).
98. See Thomas and Ahmad (2009).
99. Thomas and Ahmad (2009).
100. Thomas and Ahmad (2009).
101. Bruns et al. (2005).
102. Ostrom (1992).
103. Thomas et al. (2009).
104. Thomas et al. (2009).
105. Based on article 20 of the Water Law.
106. This was strongly emphasized by Taloqan mirabs and community representatives during a river basin working group meeting in Kunduz on 13 October 2008 that was reviewing the failure of water sharing in the basin during that year.
107. However, progress has been achieved through various social water management projects since 2006.
108. The Afghanistan Research and Evaluation Unit refers to this case as a successful conciliation between a delegation of Kunduz farmers (led by Asqalan canal elders) and Baghlan elders regarding the partial closing of the gates of the Baghlan canal head works to release water towards Kunduz. The description of what happened (which is not included in the report) shows a slightly different perspective.
109. Government of Afghanistan (2008b).
110. Varzi and Wegerich (2009).

Chapter 5

1. MIWRE (2004).
2. Government of Afghanistan (2008a).
3. Government of Afghanistan (2008b).
4. Government of Afghanistan (2008b).
5. Government of Afghanistan (2008b).
6. See, for example, GWP (2000), 22.
7. See, for example, WMO (1992).
8. WWAP (2006).
9. Shah et al. (2005), Moriarty et al. (2007a).
10. Medema et al. (2008).
11. Shah et al. (2005).
12. The mirab system is a system based on community-

based water service providers; see chapter 4.

13. Moriarty et al. (2007a).
14. Government of Afghanistan (2008b).
15. Medema et al. (2008).
16. Biswas (2004).
17. Moriarty et al. (2007a).
18. Centre for Policy and Human Development interview at the Irrigation Department, MAIL, Kabul, September 2009.
19. Centre for Policy and Human Development interview of the head of the Afghan Urban Water Supply and Sewerage Corporation, Kabul, 17 April 2010.
20. Government of Afghanistan (2008a).
21. ADB (2007).
22. Pasquet (2007).
23. WWAP (2006).
24. For the Millennium Development Goals in Afghanistan, see http://www.undp.org.af/MDGs/index.htm. The successor to the Bonn Agreement, the Afghanistan Compact was adopted in 2006 by the Afghanistan Government, the United Nations and the international community at the London Conference on Afghanistan; see http://www.mfa.gov.af/Documents/ImportantDoc/Afghanistan%20Compact.pdf.
25. WWAP (2006).
26. Kai Eide, Special Representative for Afghanistan of the United Nations Secretary-General and head of the United Nations Assistance Mission in Afghanistan from March 2008 to March 2010, speaking at the National Conference on Water Resources Development, in Kabul in July 2009; quoted in United Nations Assistance Mission in Afghanistan, 'UN Envoy: Water Management Key to Tackling Poverty and Tribal Conflicts', http://unama.unmissions.org/Default.aspx?ctl=Details&tabid=1783&mid=1882&ItemID=4596.
27. The statistical reporting directives of the Development Assistance Committee of the Organisation for Economic Co-operation and Development define disbursement as "the placement of resources at the disposal of the recipient agency" (see the directives database, at http://www.oecd.org/document/4/0,3343,en_2649_34447_1918532_1_1_1_1,00.html). This is consistent with the reporting requirements of the Government of Afghanistan and donor agencies on aid utilization as reflected in the 'Donor Financial Review', a publication produced and disseminated by the Ministry of Finance as part of an effort to assess the impact of international aid (see MFA 2009). The review process is now known as the development cooperation dialogue.
28. MFA (2009).
29. Data of the Ministry of Finance.
30. There is, however, some limitation in the transparency of the budget classifications in projects. Some projects focus exclusively on one category (for instance, infrastructure), while others focus on multiple categories, although the disbursement is reported as if only one category were covered. The numbers here must therefore be treated with caution.
31. National and international agencies are divided into two groups in terms of aid: donors and aid recipients. However, agencies may sometimes be donors, sometimes recipients and sometimes both depending on the type and modality of the aid under consideration. Good examples are United Nations agencies, donor-managed trust funds and government agencies that manage projects financed through discretionary resources, mainly concessional loans and budget support grants. To avoid double counting, we have classified agencies that are responsible for the allocation of aid commitments as aid providers, while we have classified agencies responsible for project implementation and aid delivery as aid recipients. Without such an approach, it is impossible to break down the aid commitments in certain projects so as to present a clear picture of aid allocations by agencies.
32. World Bank (2009).
33. OECD (2008).
34. OECD (2008).
35. See Government of Afghanistan (2008b). The programmes are the Capacity-Building and Institutional Development Programme. the Water Resources Development Plan, the River Basin Management Programme, the Irrigation Rehabilitation Programme, the Mid-term Urban Water Supply and Sanitation Programme, the Rural Water and Sanitation Programme, the Riverbank Protection Programme and the Food Security for All Programme.
36. WWAP (2003, 2006).
37. IISD (2010), citing also BSD (1999).
38. Moriarty et al. (2007a).
39. Agrawal (2001).

Bibliography

Chapter 1

ACBAR (Agency Coordinating Body for Afghan Relief), *The Afghanistan Pilot Participatory Poverty Assessment (APPPA) Final Report: Perceptions of Poverty from the "Poor", Conceptions of Policy for the "Poor",* April, Kabul: ACBAR, 2008.

ADB (Asian Development Bank), 'Proposed Grant Assistance to Afghanistan for the Rural Recovery through Community-Based Irrigation Rehabilitation Project', Report JFPR:AFG 36222, December, ADB, Manila, 2003.

Alkire, S., and M. E. Santos, 'Acute Multidimensional Poverty: A New Index for Developing Countries', Human Development Research Paper 2010/11 (July), United Nations Development Programme, New York, 2010.

Baraket, S., 'Vulnerability, Water and Human Security', unpublished background paper, Centre for Policy and Human Development, Kabul, 2010.

CPHD (Centre for Policy and Human Development), *Afghanistan National Human Development Report 2007; Bridging Modernity and Tradition: Rule of Law and the Search for Justice,* Kabul: CPHD; Islamabad: Army Press, 2007.

CSO **(Central Statistics Organization) and UNICEF (United Nations Children's Fund)**, 'Moving Beyond 2 Decades of War: Progress of Provinces', Kabul: CSO and UNICEF, 2003, http://www.childinfo.org/files/AfghanistanMICS2003.pdf.

Fukuda-Parr, S., and A. K. Shiva Kumar, eds, *Readings in Human Development: Concepts, Measures and Policies for a Development Paradigm*, New Delhi: Oxford University Press, 2003.

Giustozzi, A., 'Nation Building Is Not for All: The Politics of Education in Afghanistan', AAN Thematic Report 2 (May), Afghanistan Analyst Network, Kabul, 2010.

Government of Afghanistan, 'Afghanistan National Development Strategy, 2008–2009', Kabul, 2008.

Hogan, M. C., K. J. Foreman, M. Naghavi, S. Y. Ahn, M. Wang, S. M. Makela, A. D. Lopez, R. Lozano and C. J. L. Murray, 'Maternal Mortality for 181 Countries, 1980–2008: A Systematic Analysis of Progress towards Millennium Development Goal 5', Lancet 375 (9726): 1609–1623, 2010.

MOE (Ministry of Education), 'National Education Strategic Plan for Afghanistan, 1385–1389', MOE, Kabul, 2007.

MOE (Ministry of Education), 'Education Summary Report, 2008–2009, Afghanistan', MOE, Kabul, 2008.

MOPH (Ministry of Public Health), *Afghanistan Health Survey 2006: Estimates of Priority Health Indicators*, Kabul: Bloomberg School of Public Health at Johns Hopkins University and Indian Institute of Health Management Research, 2008.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), *National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan*, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

Prokop, M. A., 'Gender and Sociocultural Factors in Afghanistan: Barriers and Opportunities in Promoting Equality', unpublished note, Regional Centre for Asia-Pacific, United Nations Development Programme, Colombo, Sri Lanka, 2009.

Rahim, M., 'The Human Development Situation of Kabul Street Children', Centre for Policy and Human Development, Kabul, 2009.

Rennie, R., S. Sharma and P. Sen, *Afghanistan in 2008: A Survey of the Afghan People*, Kabul: Asia Foundation, 2008.

UNDP (United Nations Development Programme), *Human Development Report 1990*, New York: UNDP; New York: Oxford University Press, 1990.

UNDP (United Nations Development Programme), *Human Development Report 1994*, New York: UNDP; New York: Oxford University Press, 1994.

UNDP (United Nations Development Programme), *Afghanistan National Human Development Report 2004; Security with a Human Face: Challenges and Responsibilities*, Kabul: UNDP and Government of Afghanistan; Islamabad: Army Press, 2004.

UNDP (United Nations Development Programme), *Human Development Report 2006; Beyond Scarcity: Power, Poverty and the Global Water Crisis*, New York: UNDP; New York: Palgrave Macmillan, 2006.

UNDP (United Nations Development Programme), *Human Development Report 2007/2008; Fighting Climate Change: Human Solidarity in a Divided World*, New York: UNDP; New York: Palgrave Macmillan, 2007.

UNDP (United Nations Development Programme), *Human Development Report 2009; Overcoming Barriers: Human Mobility and Development*, New York: UNDP; New York: Palgrave Macmillan, 2009.

UNDP (United Nations Development Programme), *Human Development Report 2010; The Real Wealth of Nations: Pathways to Human Development*, New York: UNDP; New York: Palgrave Macmillan, 2010.

UNICEF (United Nations Children's Fund), 'Afghanistan Multiple Indicator Cluster Survey 2000', UNICEF, Islamabad, Pakistan, 2001.

UNICEF (United Nations Children›s Fund), *Best Estimates of Social Indicators for Children in Afghanistan*, 1990–2005, May, Kabul: UNICEF, 2006.

UNICEF (United Nations Children's Fund), 'Fast Facts: Af-

ghanistan', UNICEF Regional Office for South Asia, Kathmandu, 2009, http://www.unicef.org/rosa/Emergency_Fast_Facts.pdf.

UNICEF, 'Multiple Indicator Cluster Surveys', Childinfo: Monitoring the Situation of Children and Women, UNICEF, New York, various years, http://www.childinfo.org/mics.html.

WHO (World Health Organization) and UNICEF (United Nations Children's Fund), 'Progress on Sanitation and Drinking-Water: 2010 Update', WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, WHO, Geneva; UNICEF, New York, 2010.

Wordsworth, A., 'A Matter of Interests: Gender and the Politics of Presence in Afghanistan's Wolesi Jirga', Issues Paper Series, June, Afghanistan Research and Evaluation Unit, Kabul, 2007.

WWAP (United Nations World Water Assessment Programme), *Water for People, Water for Life: The United Nations World Water Development Report*, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2003.

WWAP (United Nations World Water Assessment Programme), *Water, a Shared Responsibility: The United Nations World Water Development Report 2*, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2006.

Chapter 2

ADB (Asian Development Bank), 'Proposed Abramovitz, J. N., 'Unnatural Disasters', Worldwatch Paper 158, Worldwatch Institute, Washington, DC, 2001.

ADB (Asian Development Bank), 'Country Paper: Pakistan; Asian Water Development Outlook', Asia-Pacific Water Forum, ADB, Manila, 2007.

Afghanistan Imperial Gazetteer, 1908.

Alam, U. Z., 'Questioning the Water Wars Rationale: A Case Study of the Indus Waters Treaty', Geographical Journal 168 (4): 354–364, 2002.

Alizadeh, A., and A. Keshavarz, 'Status of Agricultural Water Use in Iran', in Water Conservation, Reuse, and Recycling: Proceedings of an Iranian-American Workshop, 94–105, Washington, DC: National Academies Press, 2005.

Azimi, A., and D. McCauley, 'Afghanistan's Environment in Transition', December, South Asia Department, Asian Development Bank, Manila, 2002.

Banks, D., 'Guidelines for Sustainable Use of Groundwater in Afghanistan', Policy Document, Norwegian Church Aid–Afghanistan Programme, Kabul, 2001.

Banks, D., and O. Soldal, 'Towards a Policy for Sustainable Use of Groundwater by Non-governmental Organizations in Afghanistan', Hydrogeology Journal 10 (3): 377–392, 2002.

Beekma, J., and J. Fiddes, 'Floods and Droughts: The Afghan Water Paradox', unpublished report, Centre for Policy and Human Development, Kabul, 2010.

Bhattacharyya, K., P. M. Azizi, S. S. Shobair and M. Y. Mohsini, 'Drought Impacts and Potential for Their Mitigation in Southern and Western Afghanistan', IWMI Working Paper 91, International Water Management Institute, Colombo, Sri Lanka, 2004.

Broshears, R. E., M. A. Akbari, M. P. Chornack, D. K. Mueller and B. C. Ruddy, 'Inventory of Ground-Water Resources in the Kabul Basin, Afghanistan', Scientific Investigations Report 2005–5090, US Geological Survey, Reston, VA, 2005.

Cancelliere, A., G. Di Mauro, B. Bonaccorso and G. Rossi, 'Drought Forecasting Using the Standardized Precipitation Index', Water Resources Management, 21 (5): 801–819, 2007.

Coe, M. T., and J. A. Foley, 'Human and Natural Impacts on the Water Resources of the Lake Chad Basin', Journal of Geophysical Research 106 (D4): 3349–3356, 2001.

CPAU (Co-operation for Peace and Unity), 'Drought in Wardak and Faryab', Centre for Policy and Human Development, Kabul, 2010.

De Jong, A., 'Draft Groundwater Policy, Version I', Landell Mills Limited, Kabul, 2006.

Eriyagama, N., V. Smakhtin and N. Gamage, 'Mapping Drought Patterns and Impacts: A Global Perspective', IWMI Research Report 133, International Water Management Institute, Colombo, Sri Lanka, 2009.

Falkenmark, M., J. Lundquist and C. Widstrand, 'Macro-scale Water Scarcity Requires Micro-scale Approaches: Aspects of Vulnerability in Semi-arid Development', Natural Resources Forum 13 (4): 258–267, 1989.

FAO (Food and Agriculture Organization of the United Nations), 'Afghanistan National Livestock Census, 2003: Interim Report', FAO, Rome, 2003.

FAO (Food and Agriculture Organization of the United Nations) and WFP (World Food Programme), 'Special Report: FAO/WFP Crop and Food Supply Assessment Mission to Afghanistan, 8 September 2004', Economic and Social Development Department, FAO, Rome, 2004, http://www.fao.org/docrep/007/J2971e/J2971e00.htm.

Favre, R., and G. M. Kamal, Watershed Atlas of Afghanistan: Working Document for Planners, 2 vols, Kabul: Afghanistan Information Management Services, 2004.

FEWS NET (Famine Early Warning Systems Network), 'Northern Afghanistan Drought Impact Assessment', April, FEWS NET, United States Agency for International Development, Kabul, 2008, http://www.fews.net/docs/Publications/afghanistan_2008_04.final.pdf.

Gleick, P. H., The World's Water 2000–2001: The Biennial Report on Freshwater Resources, Washington, DC: Island Press, 2000.

Government of Afghanistan, 'Water Sector Strategy', Government of Afghanistan, Kabul, 2008.

Horsman, S., 'Afghanistan and Transboundary Water Management on the Amu Darya: A Political History', in Central Asian Waters: Social, Economic, Environmental and Governance, ed. M. M. Rahaman and O. Varis, 63–74, Espoo, Finland: Water and Development Publications, Helsinki University of Technology, 2008.

Houben, G., and T. Tünnermeier, 'Hydrogeology of the Kabul Basin Part II: Groundwater Geochemistry and Microbiology, Hanover: Federal Institute for Geosciences and Natural Resources, 2005.

Hussain, I., O. S. Abu-Rizaiza, M. A. A. Habib and M. Ashfaq, 'Revitalizing a Traditional Dryland Water Supply System: The Karezes in Afghanistan, Iran, Pakistan and

the Kingdom of Saudi Arabia', Water International 33 (3): 333–349, 2008.

ICARDA (International Centre for Agricultural Research in the Dry Areas), 'Needs Assessment on Soil and Water in Afghanistan: Future Harvest Consortium to Rebuild Agriculture in Afghanistan', September, ICARDA, Aleppo, Syria, 2002.

ICIMOD (International Centre for Integrated Mountain Development), 'Climate Change Impact on Ice and Water in the Hindu Kush, Himalaya: A Regional Perspective', unpublished PowerPoint presentation, Kabul, 12 May, 2008.

ICIMOD (International Centre for Integrated Mountain Development), Mountain Development Resource Book for Afghanistan, Kathmandu: ICIMOD, 2009.

IMF (International Monetary Fund), 'Islamic Republic of Afghanistan: Statistical Appendix', IMF Country Report 08/72 (February), IMF, Washington, DC, 2008.

King, M., and B. Sturtewagen, 'Making the Most of Afghanistan's River Basins: Opportunities for Regional Cooperation', February, EastWest Institute, New York, 2010.

Klemm, W., 'Promotion of Agriculture Rehabilitation and Development Programmes in Afghanistan: Water Resources and Irrigation', report, November, Food and Agriculture Organization of the United Nations, Islamabad, 1996.

Lautze, S., E. Stites, N. Nojumi and F. Najimi, 'Qaht-e-pool "A Cash Famine": Food Insecurity in Afghanistan, 1999–2002', May, Feinstein International Famine Center, Friedman School of Nutrition Science and Policy, Tufts University, Medford, MA, 2002, http://nutrition.tufts.edu/docs/pdf/famine/cash_famine.pdf.

Mack, T. J., M. A. Akbari, M. H. Ashoor, M. P. Chornack, T. B. Coplen, D. G. Emerson, B. E. Hubbard et al., Conceptual Model of Water Resources in the Kabul Basin, Afghanistan, Scientific Investigations Report 2009–5262, Reston, VA: US Geological Survey, 2010.

MAIL (Ministry of Agriculture, Irrigation and Livestock), 'Pilot for Improving On-Farm Water Management in Irrigated Agriculture', concept paper, April, MAIL, Kabul, 2009.

Molden, D., R. Sakthivadivel, M. Samad and M. Burton, 'Phases of River Basin Development: The Need for Adaptive Institutions', in Irrigation and River Basin Management: Options for Governance and Institutions, ed. M. Svendsen, 19–30, Colombo, Sri Lanka: International Water Management Institute; Wallingford, Oxfordshire, United Kingdom: CABI Publishing, 2005.

MRRD (Ministry of Rural Rehabilitation and Development), 'Analysis of Drought Impact in Afghanistan, Summer 1383 (2004)', internal publication, Vulnerability Analysis Unit, MRRD, Kabul, 2004.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

Narain, P., M. A. Khan and G. Singh, 'Potential for Water Conservation and Harvesting against Drought in Rajasthan, India', Working Paper 104, Drought Series Paper 7, International Water Management Institute, Colombo, Sri Lanka, 2005.

O'Brien, K., R. Leichenko, U. Kelkar et al., 'Mapping Vulnerability to Multiple Stressors: Climate Change and Globalization in India', Global Environmental Change 14 (4): 303–313, 2004.

Pain, A., 'Livelihoods under Stress in Faryab Province, Northern Afghanistan: Opportunities for Support', Afghanistan Field Office, Save the Children (US), Islamabad, 2001.

Pain, A., 'Opium Poppy and Informal Credit', Issue Paper Series, October, Afghanistan Research and Evaluation Unit, Kabul, 2008.

Partow, H., 'Sistan Oasis Parched by Drought', in The Atlas of Global Change, ed. L. Beckel, 144–145, Geneva: United Nations Environment Programme; New York: Oxford University Press, 2003.

Pereira, L. S., I. Cordery and I. Iacovides, Coping with Water Scarcity, Technical Documents in Hydrology 58, International Hydrological Programme, Paris: United Nations Educational, Scientific and Cultural Organization, 2002.

Revenga, C., J. Brunner, N. Henninger, K. Kassem and R. Payne, 'Pilot Analysis of Global Ecosystems: Freshwater Systems', report, October, World Resources Institute, Washington, DC, 2000.

Rijsberman, F. R., 'Water Scarcity: Fact or Fiction?', Agricultural Water Management 80 (1–3): 5–22, 2005.

Roe, A., 'Kuchis and Water Use in Afghanistan', Centre for Policy and Human Development, Kabul, 2010.

Rycroft, D. W., and K. Wegerich, 'The Three Blind Spots of Afghanistan: Water Flow, Irrigation Development and the Impact of Climate Change', China and Eurasia Forum Quarterly 7 (4): 115–133, 2009.

Saffi, M. Hassan, Groundwater Resources at Risk in Afghanistan, Kabul: Danish Committee for Aid to Afghan Refugees, 2007.

Sasabe, K., 'Water Resources Development Plan in the Master Plan for the Kabul Metropolitan Area', presentation of Japan International Cooperation Agency, Ministry of Energy and Water, Kabul, 8 July 2009.

Savage, M., B. Dougherty, M. Hamza, R. Butterfield and S. Bharwani, 'Socio-economic Impacts of Climate Change in Afghanistan: Final Report', report DFID CNTR 08 8507, Stockholm Environment Institute, Oxford, 2009.

Seckler, D., U. Amarasinghe, D. J. Molden, R. de Silva and R. Barker, 'World Water Demand and Supply, 1990 to 2025: Scenarios and Issues', IWMI Research Report 19, International Water Management Institute, Colombo, Sri Lanka, 1998.

Shobair, S. S., and Shankracharya, 'Framework of Policies and Strategies for Integrated Flood Management in Afghanistan', paper presented at the Ministry of Energy and Water's 'National Conference on Water Resources Development and Management in Afghanistan', Kabul, 7–9 July 2009.

Thompson, K. J., K. S. Henry, J. P. Hardy and A. M. Chalmers, 'Snow Harvesting: A Potential Water Source for Afghanistan', report A076705 (August), Cold Regions Research and Engineering Laboratory, Engineer Research and Development Center, US Army Corps of Engineers, Hanover, NH, 2009.

Uhl, V.W., 'Afghanistan: An Overview of Groundwater Resources and Challenges', Uhl, Baron, Rana and Associ-

ates, Inc., Washington Crossing, PA, 2003.

UNDP (United Nations Development Programme), Reducing Disaster Risk: A Challenge for Development; a Global Report, New York: Bureau for Crisis Prevention and Recovery, UNDP, 2004.

UNDP (United Nations Development Programme), Human Development Report 2006: Beyond Scarcity; Power, Poverty and the Global Water Crisis, New York: UNDP; New York: Palgrave Macmillan, 2006.

UNDP (United Nations Development Programme), Human Development Report 2007/2008; Fighting Climate Change: Human Solidarity in a Divided World, New York: UNDP; New York: Palgrave Macmillan, 2007.

UNEP (United Nations Environment Programme), 'History of Environmental Change in the Sistan Basin; Based on Satellite Image Analysis: 1976–2005', May, Post-Conflict Branch, UNEP, Geneva, 2006.

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific), Enhancing Regional Cooperation in Infrastructure Development Including That Related to Disaster Management, Bangkok: UNESCAP, 2006.

UNOCHA (United Nations Office for the Coordination of Humanitarian Affairs), 'Afghanistan Situation Reports: Natural Disaster', http://ochaonline.un.org/afghanistan/Reports/tabid/5289/language/en-US/Default.aspx (accessed on 1 June 2010).

USDA (United States Department of Agriculture), 'Afghanistan: 2009/10 Wheat Production Outlook Uncertain', Commodity Intelligence Report, 11 December, Foreign Agricultural Service, USDA, Washington, DC, 2008, http://www.pecad.fas.usda.gov/highlights/2008/12/Afghanistan/.

Vörösmarty, C. J., P. Green, J. Salisbury and R. B. Lammers, 'Global Water Resources: Vulnerability from Climate Change and Population Growth', Science 289 (5477): 284–288, 2000.

World Bank, 'Pakistan: Country Water Resources Assistance Strategy; Water Economy: Running Dry', Report 34081-PK (14 November), Agriculture and Rural Development Unit, South Asia Region, World Bank, Washington, DC, 2005.

WWAP (United Nations World Water Assessment Programme), Water for People, Water for Life: The United Nations World Water Development Report, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2003.

WWAP (United Nations World Water Assessment Programme), Water, a Shared Responsibility: The United Nations World Water Development Report 2, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2006.

WWAP (United Nations World Water Assessment Programme), Water in a Changing World: The United Nations World Water Development Report 3, Paris: United Nations Educational, Scientific and Cultural Organization; London: Earthscan, 2009.

Yang, H., P. Reichert, K. C. Abbaspour and A. J. B. Zehnder, 'A Water Resources Threshold and Its Implications for Food Security', Environmental Science and Technology 37 (14): 3048–3054, 2003.

Chapter 3

Beller Consult and Kocks Consult, 'Eleven Provincial Towns Water Supply and Sewerage Project', Central Authority for Water Supply and Sanitation, Ministry of Urban Development and Housing, Kabul, 2004.

Bold, Tessa, Paul Collier and Andrew Zeitlin, 'The Provision of Social Services in Fragile States: Independent Service Authorities as a New Modality', May, Centre for the Study of African Economies, University of Oxford, Oxford, 2009.

Bregnhøj, H., A. M. Eilersen, M. K. von Krauss and A. Backlund, '2003: Experiences with Ecosan in Danish Allotment Gardens and in Development Projects', paper presented at the 2nd International Symposium on Ecological Sanitation, "Ecosan: Closing the Loop", Lübeck, Germany, 7–11 April 2003.

CPAU (Co-operation for Peace and Unity), 'Water in Informal Settlements: A Case Study from Kabul', Centre for Policy and Human Development, Kabul, 2010a.

CPAU (Co-operation for Peace and Unity), 'Aid Effectiveness in the Water Sector: A Case Study from Faryab', Centre for Policy and Human Development, Kabul, 2010b.

CSO (Central Statistics Organization) and UNICEF (United Nations Children's Fund), 'Multiple Indicator Cluster Survey 2003, Afghanistan (MICS)', CSO and UNICEF, Kabul, 2003.

Fischaess, B., 'Summary of the Feasibility Study for the Extension of the Kabul Water Supply System', KfW Entwicklungsbank and Central Authority for Water Supply and Sanitation, Ministry of Urban Development, Kabul, 2003.

Gabrielli, A. F., M. Ramsan, C. Naumann et al., 'Soil-Transmitted Helminths and Haemoglobin Status among Afghan Children in World Food Programme–Assisted Schools', Journal of Helminthology 79: 381–384, 2005.

Government of Afghanistan, Millennium Development Goals: Islamic Republic of Afghanistan Country Report 2005; Vision 2020, Kabul: Government of Afghanistan, 2005.

GTZ (German Agency for Technical Cooperation), 'Improvement of Water Supply', GTZ, Darmstadt, no date, http://www.gtz.de/en/weltweit/europa-kaukasus-zentralasien/28316.htm.

Houben, G., and T. Tünnermeier, Hydrogeology of the Kabul Basin Part II: Groundwater Geochemistry and Microbiology, Hanover: Federal Institute for Geosciences and Natural Resources, 2005.

IRIN (Integrated Regional Information Networks), 'Afghanistan: Aid Promise Prompts IDPs to Return', 26 June, IRIN, United Nations Office for the Coordination of Humanitarian Affairs, Nairobi, 2008, http://www.irinnews.org/report.aspx?ReportId=78959.

IRIN (Integrated Regional Information Networks), 'Afghanistan: Sanitation Woes in Makeshift IDP Camps', 23 April, IRIN, United Nations Office for the Coordination of Humanitarian Affairs, Nairobi, 2009, http://www.irinnews.org/report.aspx?Reportid=84059.

IRIN (Integrated Regional Information Networks), 'In Brief: IDP Numbers Up in Afghanistan—UN', 17 March,

IRIN, United Nations Office for the Coordination of Humanitarian Affairs, Nairobi, 2010, http://www.irinnews.org/report.aspx?Reportid=88453.

Kalbermatten, J. M., D. S. Julius, C. G. Gunnerson and D. D. Mara, Appropriate Sanitation Alternatives: A Planning and Design Manual, World Bank Studies in Water Supply and Sanitation, 2, Washington, DC: World Bank; Baltimore: Johns Hopkins University Press, 1982.

MOEC (Ministry of Economy), CSO (Central Statistics Organization) and UNICEF (United Nations Children's Fund), Best Estimates of Social Indicators for Children in Afghanistan, 1990–2005, Kabul: UNICEF Country Office, 2006.

MOPH (Ministry of Public Health), Afghanistan Health Survey 2006: Estimates of Priority Health Indicators for Rural Afghanistan, Kabul: Bloomberg School of Public Health at Johns Hopkins University and Indian Institute of Health Management Research, 2006.

MRRD (Ministry of Rural Rehabilitation and Development), 'Rural Water Supply and Sanitation: National Policy Framework', September, MRRD, Kabul, 2004.

MRRD (Ministry of Rural Rehabilitation and Development), 'Afghanistan National Rural Water, Sanitation and Hygiene (WASH) Policy 2010', January, Rural Water Supply and Irrigation Programme Department, MRRD, Kabul, 2010.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), National Risk and Vulnerability Assessment 2005, Kabul: CSO, 2007.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

Nembrini, P. G., P. Jansen, J. F. Pinera, R. Luff, O. Bernard, M. Weber and M. J. Elliott, 'Cities in War: Thirsty Cities; Kabul Water Supply: Evolution since the 1992–94 War', Occasional Paper 7 (October), Geneva Foundation, Lakewood, WA, 2002.

Opryszko, M., S. Waheedullah Majeed and G. Burnham, Safe Water Systems Project: Final Report, 28 September, Kabul: Bloomberg School of Public Health at Johns Hopkins University and Ministry of Public Health, 2007.

Pain, A., 'Understanding Village Institutions: Case Studies on Water Management from Faryab and Saripul', Afghanistan Research and Evaluation Unit, Kabul, 2004.

Prüss-Üstün, A., R. Bos, F. Gore and J. Bartram, 'Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health', World Health Organization, Geneva, 2008.

Strand, A., and G. Olesen, eds, Afghanistan: Findings on Education, Environment, Gender, Health, Livelihood and Water and Sanitation (2001 to Early 2005), CMI Report 15, Bergen, Norway: Chr. Michelsen Institute, 2005.

Sulabh, 'Towards Rural Sanitation: Sulabh Sets New Trends', Sulabh International Social Service Organization, New Delhi, 2010, http://www.sulabhinternational.org/sm/rural_sanitation.php.

Ulrich-Hebel, Maja, 'KAP Study on Hygiene in Faryab: Baseline Assessment Report', April, Danish Committee for Aid to Afghan Refugees, Kabul, 2005.

UNCESCR (United Nations Committee on Economic, Social and Cultural Rights), 'Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights; General Comment No. 15 (2002): The Right to Water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights)', Document E/C.12/2002/11 20 January 2003, United Nations Economic and Social Council, New York, 2003.

UNDP (United Nations Development Programme), Human Development Report 2006: Beyond Scarcity; Power, Poverty and the Global Water Crisis, New York: UNDP; New York: Palgrave Macmillan, 2006.

UNEP (United Nations Environment Programme), Afghanistan: Post-conflict Environmental Assessment, Geneva: UNEP, 2003.

UNHCR (Office of the United Nations High Commissioner for Refugees), 'Afghanistan Situation Operational Update', September, Geneva, UNHCR, 2009.

UNHCR (Office of the United Nations High Commissioner for Refugees), '2010 UNHCR Country Operations Profile: Afghanistan', September, Geneva, UNHCR, 2010, http://www.unhcr.org/cgi-bin/texis/vtx/page?page=49e486eb6

UNICEF (United Nations Children's Fund), 'The 1997 Afghanistan Multiple Indicator Baseline (MICS)', UNICEF, Islamabad, Pakistan, 1998.

UNICEF (United Nations Children's Fund), 'Afghanistan Multiple Indicator Cluster Survey 2000', UNICEF, Islamabad, Pakistan, 2001.

UNICEF (United Nations Children's Fund), 'Fast Facts: Afghanistan', UNICEF Regional Office for South Asia, Kathmandu, 2009, http://www.unicef.org/rosa/Emergency_Fast_Facts.pdf.

UNICEF, 'Multiple Indicator Cluster Surveys', Childinfo: Monitoring the Situation of Children and Women, UNICEF, New York, various years, http://www.childinfo.org/mics.html.

WaterAid, 'The State of the World's Toilets 2007', Report 2, WaterAid, London.

WHO (World Health Organization), 'Country Profile of Environmental Burden of Disease: Afghanistan', Public Health and the Environment, WHO, Geneva, 2009, http://www.who.int/quantifying_ehimpacts/national/countryprofile/afghanistan.pdf.

WHO (World Health Organization) and UNICEF (United Nations Children's Fund), 'Progress on Sanitation and Drinking-Water: 2010 Update', WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, WHO, Geneva; UNICEF, New York, 2010.

World Bank, 'Why and How Should Kabul Upgrade Its Informal Settlements?', Kabul Urban Policy Notes Series 2, World Bank, Washington, DC, 2006, http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1150905429722/PolicyNote2.pdf.

Chapter 4

ADB (Asian Development Bank), 'Proposed Grant Assistance to Afghanistan for the Rural Recovery through

Community-Based Irrigation Rehabilitation Project', Report JFPR:AFG 36222, December, ADB, Manila, 2003.

ADB (Asian Development Bank), 'Balkh and Jowzjan Province Irrigation', draft report, technical assistance mission, Emergency Infrastructure and Rehabilitation Loan, Afghanistan Irrigation Component, ADB, Kabul, 2004.

Ashworth, J. M., "Groundwater Assessment of the Downstream Sections of the Balkh and Khulm Watersheds: Inception Report', Ministry of Energy and Water, Kabul, 2005.

Berkoff, J., 'Irrigation in the Balkh Basin: A Preliminary Assessment', unpublished report, Asian Development Bank, Manila, 2004.

Bhattarai, M., R. Sakthivadivel and I. Hussain, 'Irrigation Impacts on Income Inequality and Poverty Alleviation: Policy Issues and Options for Improved Management of Irrigation Systems', IWMI Working Paper 39, International Water Management Institute, Colombo, Sri Lanka, 2002.

Bird, J. D., W. Lincklaen Arriens, D, Von Custodio, 'Water Rights and Water Allocation: Issues and Challenges for Asia', Water for All 17, Asian Development Bank, Manila, 2009.

Brouwer, C., K. Prins and M. Heibloem, 'Irrigation Efficiencies', annex 1 in 'Irrigation Scheduling', Training manual 4 of 'Irrigation Water Management', Natural Resources Management and Environment Department, Food and Agriculture Organization of the United Nations, Rome, 1989, http://www.fao.org/docrep/t7202e/t7202e08.htm.

Bruns, B. R., C. Ringler and R. Meinzen-Dick, eds, Water Rights Reform: Lessons for Institutional Design, Washington, DC: International Food Policy Research Institute, 2005.

Caponera, D., 'Helmand (Hirmand) River Basin: Disputed Waters between Afghanistan and Iran', unpublished report, May, Food and Agriculture Organization of the United Nations, Rome, 1952.

Chabot, P. and P. A. Dorosh, 'Wheat Markets, Food Aid and Food Security in Afghanistan', Food Policy 32 (3): 334–353, 2007.

Chokkakula, Srinivas, 'Interrogating Irrigation Inequities: Canal Irrigation Systems in Injil District, Herat', Afghanistan Research and Evaluation Unit, Kabul, 2009.

Coward, W. J., 'Property and FMIS Governance: Two Books That May Be Unfamiliar, But That Inform the Discussion', in Farmer-Managed Irrigation Systems and Governance Alternatives: Proceedings of the Third International Seminar, ed. P. Pradhan and U. Gautam, 19–29, Kathmandu: Farmer-Managed Irrigation Systems Promotion Trust, 2004.

CSO (Central Statistics Organization), Afghanistan Statistical Yearbook 2007/08, Kabul: CSO, 2008.

CSO (Central Statistics Organization), Afghanistan Statistical Yearbook 2008/09, Kabul: CSO, 2009.

CSO (Central Statistics Organization), Afghanistan Statistical Yearbook 2009/10, Kabul: CSO, 2010.

Development Alternatives Inc, 'Helmand-Arghandab Valley Irrigation System: A Change Assessment 1973–1990', 1993.

Dietz, T., E. Ostrom and P. C. Stern, 'The Struggle to Govern the Commons', Science 302 (5652): 1907–1912, 2003.

Dudu, H. and S. Chumi, "Economics of Irrigation Water Management: A Literature Survey with Focus on Partial and General Equilibrium Models", Policy Research Working Paper 4556, World Bank, Washington, DC, 2008.

Favre, R. and G. M. Kamal, Watershed Atlas of Afghanistan: Working Document for Planners, 2 vols, Kabul: Afghanistan Information Management Services, 2004.

Flaming, L. and A. Roe, 'Opportunities for Pro-Poor Agricultural Growth', Synthesis Paper Series, Afghan Research and Evaluation Unit, Kabul, 2009.

France 24, http://www.france24.com (26 July 2010).

Gardin, J. C. and P. Gentelle, 'Irrigation et peuplement dans la plaine d'Aï Khanoum de l'époque achéménide à l'époque musulmane', Bulletin de l'Ecole Française d'Extrême-Orient LXIII: 59–99, 1976.

Gautam, U. and L. P. Uprety, 'Distributive Justice in the Development of Water Resources: Experience and Options from Nepal', paper presented at the First South Asia Water Forum, Kathmandu, 26–28 February 2002.

Government of Afghanistan, 'Water Sector Strategy', draft, July, Kabul, 2007.

Government of Afghanistan, 'Water Sector Strategy', Kabul, 2008a.

Government of Afghanistan, 'Water Sector Strategy', draft, February, Kabul, 2008b.

Government of Afghanistan, 'Water Law', Kabul, 2009.

Hussain, I. and M. A. Hanjra, 'Does Irrigation Water Matter for Rural Poverty Alleviation? Evidence from South and South-East Asia', Water Policy 5 (5–6): 429–442, 2003.

ICARDA (International Centre for Agricultural Research in the Dry Areas), 'Needs Assessment on Soil and Water in Afghanistan: Future Harvest Consortium to Rebuild Agriculture in Afghanistan', September, ICARDA, Aleppo, Syria, 2002.

ICON-Institute, National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

Kadouri, M. T., Y. Djebbar and M. Nehdi, 'Water Rights and Water Trade: An Islamic Perspective', in Water Management in Islam, ed. Naser I. Faruqui, Asit K. Biswas and Murad J. Bino, chapter 8, Ottawa: International Development Research Centre; New York: United Nations University Press, 2001.

Klemm, W., 'Promotion of Agriculture Rehabiliation and Development Programmes in Afghanistan: Water Resources and Irrigation', November, Food and Agriculture Organization of the United Nations, Islamabad, 1996.

Korten, D., Getting to the 21st Century, New Delhi: Oxford and IBH Publishing, 1990.

Lee, J. L., 'Water Resource Management on the Balkh Ab River and Hazhda Nahr Canal Network: From Crisis to Collapse', Report, Northern Region, United Nations Assistance Mission in Afghanistan, Central Asian Free Exchange, Kabul, 2003.

Lee, J. L., 'Water Management, Livestock and the Opium Economy: Social Water Management', Afghanistan Research and Evaluation Unit, Kabul, 2006.

Lee, J. L., 'Water Management, Livestock and the Opium Economy: The Performance of Community Water Management Systems', Case Study Series, May, Afghanistan Research and Evaluation Unit, Kabul, 2007.

Lind, E. A., 'Social Conflict and Social Justice: Lessons from the Social Psychology of Justice Judgments', Leiden University, Leiden, The Netherlands, 1995.

MAIL (Ministry of Agriculture, Irrigation and Livestock), 'Pilot for Improving On-Farm Water Management in Irrigated Agriculture', concept paper, April, MAIL, Kabul, 2009.

Medema, W., B. S. McIntosh and P. J. Jeffrey, 'From Premise to Practice: A Critical Assessment of Integrated Water Resources Management and Adaptive Management Approaches in the Water Sector', Ecology and Society 13 (2): 29, 2008. http://www.ecologyandsociety.org/vol13/iss2/art29/.

MEW (Ministry of Energy and Water), 'Draft Irrigation Policy', MEW, Kabul, 2004.

Mollinga, P. P., 'Water Control in Sociotechnical Systems : A Conceptual Framework for Interdisciplinary Irrigation Studies', unpublished paper, Centre for Development Research, Bonn, 1997.

Mukherjee, N., 'Measuring Social Capital: Forest Protection Committees in West Bengal', Economic and Political Weekly 37 (29): 2994–2997, 2002.

Ostrom, E., Crafting Institutions for Self-Governing Irrigation Systems, San Francisco: International Center for Self-Governance Press, 1992.

Pain, A., 'Understanding Village Institutions: Case studies on Water Management from Fayrab and Saripul', Afghanistan Research and Evaluation Unit, Kabul, 2004.

Pain, A., 'Opium Trading Systems in Helmand and Ghor Provinces', in Afghanistan's Drug Industry: Structure, Functioning, Dynamics, and Implications for Counter-Narcotics Policy, ed. D. Buddenberg and W. A. Byrd, 77–115, Kabul: United Nations Office on Drugs and Crime and World Bank, 2006.

Pain, A., 'Water Management, Livestock and the Opium Economy: The Spread of Opium Poppy Cultivation in Balkh', Case Study Series, Afghanistan Research and Evaluation Unit, Kabul, 2007.

Pain, A., 'Let Them Eat Promises: Closing the Opium Poppy Fields in Balkh and Its Consequences', Afghanistan Research and Evaluation Unit, Kabul, 2008.

Pasquet, J., Participatory Management of Irrigation Systems (PMIS): Farming Systems Research; Final Report, Plaisians, France: Groupe URD, 2007.

PMIS project report (forthcoming).

Pradhan, P., Patterns of Irrigation Organization in Nepal: A Comparative Study of 21 Farmer-Managed Irrigation Systems, Colombo, Sri Lanka: International Irrigation Management Institute, 1989.

Qureshi, A. S., 'Water Resources Management in Afghanistan: The Issues and Options', Working Paper 49, Pakistan Country Series 14, International Water Management Institute, Colombo, Sri Lanka, 2002.

Ramzi, A. M., G. Hazrat, F. Hussain and V. Thomas, 'System of Rice Intensification: An Emerging Alternative', Aga Khan Foundation–Afghanistan, Kabul, 2010.

Roe, A., 'Water Management, Livestock and the Opium Economy: Challenges and Opportunities for Strengthening Licit Agricultural Livelihoods', Synthesis Paper Series, April, Afghanistan Research and Evaluation Unit, Kabul, 2009.

Rout, B., 'How the Water Flows: A Typology of Irrigation Systems in Afghanistan', Issue Paper Series, June, Afghanistan Research and Evaluation Unit, Kabul, 2008.

Sharma, A., S. Varma and D. Joshi, 'Social Equity Impacts of Increased Water for Irrigation', in Proceedings of the Workshop on Analyses of Hydrological, Social and Ecological Issues of the NRLP, ed. U. A. Amarasinghe and B. R. Sharma, Strategic Analyses of the National River Linking Project (NRLP) of India Series 2, International Water Management Institute, Colombo, Sri Lanka, 2008.

Shukla, A. and K. R. Sharma, Participatory Irrigation Management in Nepal, Kathmandu: Printers Universe Ltd, 1997.

SMEC International PTY LTD, 'Position Paper on Water Resources Management and Mirab System in Balkh River Basin', Asian Development Bank, Manila, 2006.

SMEC International PTY LTD, 'Rapid Assessment of Irrigated Area and Cropping Pattern for Six Canal Systems in Lower Balkh Area', Asian Development Bank, Manila, 2006.

Sogreah (Société Grenobloise d'Etudes et d'Applications Hydrauliques), Kunduz Khanabad Irrigation Study: Final Report, 3 vols, Afghan Water and Soil Survey Authority, World Bank, Grenoble, France: Sogreah, 1966.

Tang, S. Y., 'Institutions and Collective Action in Irrigation Systems', PhD Dissertation, Indiana University, Bloomington, IN, 1989.

Thomas, V. and M. Ahmad, 'A Historical Perspective on the Mirab System: A Case Study of the Jangharoq Canal, Baghlan', Afghanistan Research and Evaluation Unit, Kabul, 2009.

Thomas, V., M. Ahmad and P. Khair Khwa, 'Jangharoq and Qelagai Canal Assessment', PMIS project report, 2009.

Thomas, V., A. Osmani and S. Abdi, 'Nahr-e-Said and Nahr-e-Zargar Canal Assessment', PMIS project report, 2009.

Thomas, V., A. Osmani and M. Ahmad, 'Integrated Approach for Participatory Management of Irrigation Systems: The Case of the PMIS Project', PMIS project report, 2009.

Thomas, V., A. Osmani and M. Ahmad, 'WUA Monitoring and Performance: Participatory Management of Irrigation System; Jangharoq, Said and Zargar Canals', PMIS project report, 2009.

Thomas, V. and A. M. Ramzi, 'System of Rice Intensification (SRI): 2009 Campaign Results and Recommendations', PMIS project report, 2009.

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific), "Water Security, Development and Cooperation in the Age of Scarcity", 'Socio-economic Policy Brief', draft, 2008. http://www.unescap.org/esd/water/WaterSecurity/Socio-economic%20policy%20brief_draft_2%20_format2_.pdf.

UNIDATA, 'Balkh Province: A Socio-economic Profile', Operations and Planning Section of the United Nations Development Programme and United Nations Operations Centre in Afghanistan, Kabul, 1992.

Uphoff, N., 'A Field Methodology for Participatory Self-Education', Community Development Journal 26: 271–285, 1991.

Varzi, M. M. and K. Wegerich, 'Much Ado about Nothing: Sub-basin Working Groups in Kunduz River Basin, Afghanistan', in Central Asian Waters: Social, Economic, Environmental and Governance Puzzle, ed. M. M. Rahaman and O. Varis, 47–60, Water & Development

Publications, TKK-WD-03, Espoo, Finland: Helsinki University of Technology, 2008.

Wade, R. Village Republics: Economic Conditions for Collective Action in South India, Cambridge: Cambridge University Press, 1987.

Waldman, M., 'Community Peacebuilding in Afghanistan: The Case for a National Strategy', February, Oxfam Research Report, Oxfam International, Oxford, 2008.

Chapter 5

ADB (Asian Development Bank), 'Asian Water Development Outlook 2007: Achieving Water Security for Asia', ADB, Manila, 2007.

Agrawal, A.,'Common Property Institutions and Sustainable Governance of Resources',World Development 29 (10): 1649–1672, 2001.

Ahmad, M., and M. Wasiq, 'Water Resources Development in Northern Afghanistan and Its Implications for Amu Darya Basin', World Bank Working Paper 36, World Bank, Washington, DC, 2004.

Anderson, I. M., 'Water Management, Livestock and the Opium Economy: Irrigation Systems', Case Study Series, May, Afghanistan Research and Evaluation Unit, Kabul, 2006.

Biswas, A. K., 'Integrated Water Resources Management: A Reassessment', Water International 29 (2): 248–256, 2004.

Broshears, R.E., M. A. Akbari, M. P. Chornack, D. K. Mueller and B. C. Ruddy, 'Inventory of Ground-Water Resources in the Kabul Basin, Afghanistan', Scientific Investigations Report 2005–5090, US Geological Survey, Reston, VA, 2005.

BSD (Board on Sustainable Development,Policy Division, National Research Council), Our Common Journey: A Transition towards Sustainability, Washington, DC:National Academy Press, 1999.

CPAU (Co-operation for Peace and Unity), 'Aid Effectiveness in the Water Sector: A Case Study from Faryab', Centre for Policy and Human Development, Kabul, 2010.

Dagdeviren, H., and S. A. Robertson, 'Access to Water in the Slums of the Developing World', Working Paper 57, International Policy Centre for Inclusive Growth, Brasilia, 2009.

FAO (Food and Agriculture Organization of the United Nations), UNDESA (United Nations Department of Economic and Social Affairs), IAEA (International Atomic Energy Agency) and UNESCO (United Nations Educational, Scientific and Cultural Organization), 'Groundwater Management: The Search for Practical Approaches', Water Reports 25, FAO, Rome, 2003.

Government of Afghanistan, 'Afghanistan, Millennium Development Goals: Progress at a Glance', Government of Afghanistan, Kabul, 2005.

Government of Afghanistan, 'Afghanistan National Development Strategy, 2008–2009', Government of Afghanistan, Kabul, 2008a.

Government of Afghanistan, 'Water Sector Strategy', Government of Afghanistan, Kabul, 2008b.

Government of Afghanistan, 'Water Law', Government of Afghanistan, Kabul, 2009.

GWP (Global Water Partnership), 'Integrated Water Resources Management', TAC Background Papers 4 (March), Technical Advisory Committee. GWP, Stockholm, 2000.

Hemson, D., K. Kulindwa, H. Leinand A. Mascarenhas, eds, Poverty and Water: Exploration of the Reciprocal Relationship, CROP International Studies in Poverty Research, Bergen, Norway: Comparative Research Programme on Poverty; New York: Zed Books, 2008.

Ibrekk, H. O., S. Stoveland and S. Ghani, 'Analysis of the Water Situation in Faryab Province, Afghanistan: Water Resources, Drinking Water, Sanitation and Irrigation', December, Royal Norwegian Embassy in Afghanistan, Kabul, 2006.

IISD (International Institute for Sustainable Development), 'Adaptive Governance', IISD, Winnipeg,2010, http://www.iisd.org/measure/principles/gov/.

Iza, A., and R. Stein, eds, Rule: Reforming Water Governance, Gland, Switzerland: International Union for Conservation of Nature and Natural Resources, 2009.

Lee, J. L., 'Water Management, Livestock and the Opium Economy: The Performance of Community Water Management Systems', Case Study Series, May, Afghanistan Research and Evaluation Unit, Kabul, 2007.

Medema, W., B. S. McIntosh and P. J. Jeffrey, 'From Premise to Practice: A Critical Assessment of Integrated Water Resources Management and Adaptive Management Approaches in the Water Sector', Ecology and Society 13 (2): 29, 2008, http://www.ecologyandsociety.org/vol13/iss2/art29/.

Memon, Y., M. Talpur and H. Murray-Rust, 'Capacity Building for Participatory Irrigation Management in Sindh Province of Pakistan', IWMIWorking Paper H028251, International Water Management Institute, Colombo, Sri Lanka, 2001.

MFA (Ministry of Finance), 'Donor Financial Review', Report 1388 (November), MFA, Kabul, 2009, http://www.undp.org.af/Publications/KeyDocuments/Donor'sFinancialReview%20ReportNov2009.pdf.

MIWRE (Ministry of Irrigation, Water Resources and Environment), 'A Strategic Policy Framework for the Water Sector', May, MIWRE, Kabul, 2004.

Molden, D., R. Sakthivadivel, M. Samad and M. Burton, 'Phases of River Basin Development: The Need for Adaptive Institutions', in Irrigation and River Basin Management: Options for Governance and Institutions, ed. M. Svendsen, 19–30, Colombo, Sri Lanka: International Water Management Institute; Wallingford, Oxfordshire, United Kingdom: CABI Publishing, 2005.

Moriarty, P., C. Batchelor, P. Laban and H. Fahmy, 'The EMPOWERS Approach to Water Governance: Background and Key Concepts', August, Inter-Islamic Network on Water Resources Development and Management, Amman, 2007a.

Moriarty, P., C. Batchelor, F. T. Abd-Alhadi, P. Laban and H.

Wegerich, K., 'Water Strategy Meets Local Reality', Issue Paper Series, April, Afghanistan Research and Evaluation Unit, Kabul, 2009.

WWAP (United Nations World Water Assessment Programme), United Nations World Water Development Report 2003: Water for People, Water for Life, Programme Office for Global Water Assessment, UNESCO, Colombella (PG), Italy, 2003.

Fahmy, The EMPOWERS Approach to Water Governance: Guidelines, Methods and Tools, August, Amman: Inter-Islamic Network on Water Resources Development and Management, 2007b.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

(Organisation for Economic Co-operation and Development), '2006 Survey on Monitoring the Paris Declaration, Country Chapters: Afghanistan', OECD, Paris, 2007, http://www.oecd.org/dataoecd/45/10/38949502.pdf.

OECD (Organisation for Economic Co-operation and Development), '2008 Survey on Monitoring the Paris Declaration, Country Chapters: Afghanistan', OECD, Paris, 2008, http://www.oecd.org/dataoecd/26/15/42094533.pdf.

OECD (Organisation for Economic Co-operation and Development) and WWC (World Water Council), Creditor Reporting System: Aid Activities in Support of Water Supply and Sanitation, 2001–2006, Marseille: WWC; Paris: OECD, 2008.

Pasquet, J.,Participatory Management of Irrigation Systems (PMIS): Farming Systems Research; Final Report, Plaisians, France: Groupe URD, 2007.

Qureshi, A. S., 'Water Resources Management in Afghanistan: The Issues and Options', Working Paper 49, Pakistan Country Series 14, International Water Management Institute, Colombo, Sri Lanka, 2002.

Salih, A., 'Qanats, a Unique Groundwater Management Tool in Arid Regions: The Case of Bam Region in Iran', paper presented at the International Symposium on Groundwater Sustainability, Alicante,Spain,24–27 January, 2006.

Shah, T., I. Makin and R. Sakthivadivel, 2005, 'Limits to Leapfrogging: Issues in Transposing Successful River Basin Management in the Developing World', in Irrigation and River Basin Management: Options for Governance and Institutions, ed. M. Svendsen, 31–50, Colombo, Sri Lanka: International Water Management Institute; Wallingford, Oxfordshire, United Kingdom: CABI Publishing, 2005.

Svendsen, M., ed., Irrigation and River Basin Management: Options for Governance and Institutions, Colombo, Sri Lanka: International Water Management Institute; Wallingford, Oxfordshire, United Kingdom: CABI Publishing, 2005.

Tropp, H., 'Building New Capacities for Improved Water Governance', paper presented at the Council for Scientific and Industrial Research's International Symposium on Ecosystem Governance, KwaMaritane Bush Lodge, Pilanesberg, South Africa, 10–13 October, 2005.

Varzi, M. M., and K. Wegerich, 'Much Ado about Nothing: Sub-basin Working Groups in Kunduz River Basin, Afghanistan', in Central Asian Waters: Social, Economic, Environmental and Governance Puzzle, ed. M. M. Rahaman and O. Varis, 47–60, Water & Development Publications, TKK-WD-03, Espoo, Finland: Helsinki University of Technology, 2008.

Wegerich, K., 'Water Strategy Meets Local Reality', Issue Paper Series, April, Afghanistan Research and Evaluation Unit, Kabul, 2009.

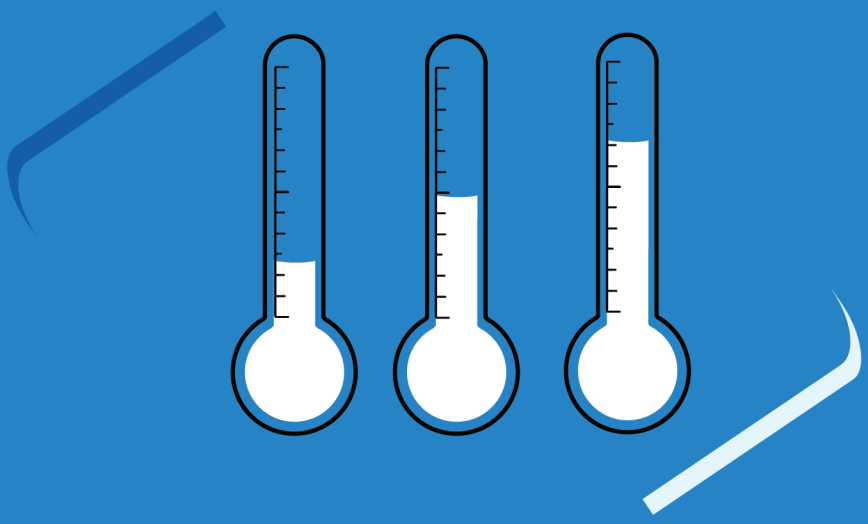
WMO (World Meteorological Organization), 'The Dublin Statement on Water and Sustainable Development', WMO, Geneva, 1992, http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html.

World Bank, 'Government of Afghanistan: New Agreements with the World Bank Aim at Widening Reforms and Improving Irrigation Infrastructure', World Bank, Washington, DC, 2009, http://go.worldbank.org/Y6L0Y5HWF0.

WWAP (United Nations World Water Assessment Programme), Water for People, Water for Life: The United Nations World Water Development Report, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2003.

WWAP (United Nations World Water Assessment Programme), Water, a Shared Responsibility: The United Nations World Water Development Report 2, Paris: United Nations Educational, Scientific and Cultural Organization; New York: Berghahn Books, 2006.

Reader's guide



Reader's Guide

The United Nations Development Programme (UNDP) has established four indicators for the annual global Human Development Report (HDR). These are the Human Development Index (HDI), the Gender-related Development Index (GDI), the Human Poverty Index (HPI-1 for developing countries and HPI-2 for selected countries of the Organisation for Economic Co-operation and Development) and the Gender Empowerment Measure (GEM). More recently, UNDP has established the Multidimensional Poverty Index (MPI) to measure poverty.

This reader's guide provides a brief introduction to these indicators and the respective calculation methods.

Overview of the Calculation of the Human Development Indicators

Figure 1 summarizes how the human development indices used in the Afghanistan *National Human Development Report (NHDR)* are constructed, highlighting similarities and differences. (see next page)

The Human Development Index

The HDI measures country progress based on three basic dimensions of human development, as follows:

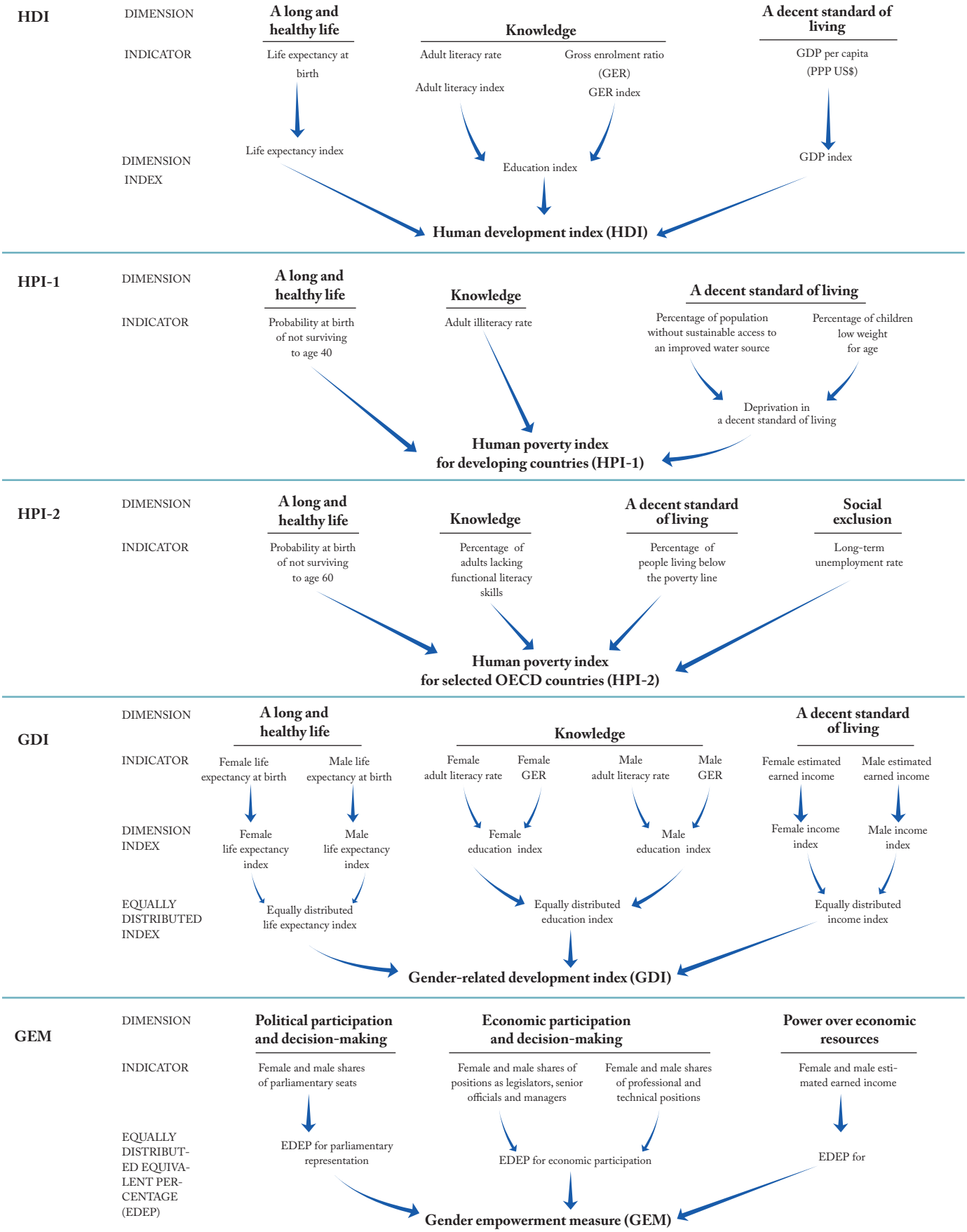
- **A long and healthy life**, as measured by life expectancy at birth
- **Knowledge**, as measured by the adult literacy rate (two thirds of the weighted value) and the combined primary, secondary and tertiary gross enrolment ratio (GER) (one third of the weighted value)
- **A decent standard of living**, as measured by gross domestic product (GDP) per capita based on purchasing power parity (PPP) in United States dollars.

Before the HDI itself is calculated, an index needs to be created for each of these dimensions. To calculate these indices, minimum and maximum values (goal-posts) are chosen for each underlying indicator (see table 1 and box 1).

Table 1 **Goal posts for calculating the HDI**

Indicator	Maximum Value	Minimum Value
Life expectancy at birth (years)	85	25
Adult literacy rate (%)	100	0
Combined GER (%)	100	0
GDP per capita (PPP US$)	40,000	100

Figure 1 Human development indices construction



Note: GDP = gross domestic product. PPP & USD$ = purchasing power parity in US dollars.
Source: Human Development Report (2006).

The HDI is limited for the following reasons:

- It is not a comprehensive measure of human development: it only focuses on three dimensions of capability.
- It is not designed to assess progress in human development over the short term because two of the component indicators—adult literacy and life expectancy at birth—are not responsive to short-term policy changes.
- It does not account for variations in human development within a country. Countries with the same or similar HDIs may differ with respect to how human development is distributed.

Box 1 A sample HDI calculation

The following is an example of the calculation of the HDI for Afghanistan using national data sources.

First step: calculating the life expectancy index

The life expectancy index measures the relative achievement of a country in life expectancy at birth.

Life expectancy index = (actual value – minimum value) / (maximum value – minimum value)
= (43.8 – 25) / (85 – 25) = 0.313

Second step: calculating the education index

The education index measures a country's relative achievement with respect to adult literacy rates and combined primary, secondary and tertiary gross enrolment rates. The value of the adult literacy rate (26.2 percent) is taken from the National Risk and Vulnerability Assessment (NRVA; see MRRD and CSO 2009). The gross combined enrolment ratio (57.7 percent) is calculated based on data of the Central Statistics Organization (CSO). The adult literacy index is calculated first, and the gross enrolment index is calculated second. Then the two are combined to create the education index. Two thirds of the weighted value is assigned to the adult literacy index, and one third to the combined gross enrolment index.

Education index = [(2/3)* (adult literacy index)] + [(1/3)* (gross enrolment index)]
Adult literacy index = (26.2% – 0.0%) / (100% – 0.0%) = 0.262
Gross enrolment index = (57.7% – 0.0%) / (100% – 0.0%) = 0.577
Education index= [(2/3)*ALI] + [(1/3)*GRI] = 0.175 + 0.192 = 0.367

Third step: calculating the GDP index

The GDP index is calculated using adjusted GDP per capita (PPP US$). The value of GDP per capita (PPP US$) is obtained from the World Bank and calculated according to the GDP index. For Afghanistan, with a GDP per capita of $1,105 in 2008, the GDP index is 0.401.

GDP index = Log (1,105) – log (100) / Log (40,000) – log (100) = 0.401

Fourth and final step: calculating the HDI

Once the dimension indicators have been calculated, one may easily determine the HDI. It is a simple average of the three dimension indicators.

HDI = 1/3 (life expectancy index) + 1/3 (education index) + 1/3 (GDP index)
= 1/3 (0.313) + 1/3 (0.367) + 1/3 (0.401) = 0.360

The Human Poverty Index for Developing Countries

While the HDI measures average achievement, the human poverty index for developing countries (HPI-1) measures deprivation in the three basic dimensions of human development captured in the HDI, as follows:

- *A long and healthy life:* vulnerability to death at a relatively early age, as measured by the probability at birth of not surviving to age 40
- *Knowledge:* exclusion from the world of reading and communications, as measured by adult illiteracy rates
- *A decent standard of living:* poverty as

measured by the weighted average of two indicators, that is, the percentage of the population unable to access improved water sources and the percentage of children who suffer from stunting (low height for age) and wasting (low weight for age).

The calculation of the HPI-1 is more straightforward relative to the calculation of the HDI. The indictors used to measure deprivation are already normalized between 0 and 100.

The Multidimensional Poverty Index

The MPI is an index of acute multidimensional poverty. The MPI reveals a different pattern of poverty relative to income poverty because it illuminates a different set of deprivations. Three dimensions characterize the MPI: health, education and standard of living. These are measured according to 10 indicators. Poor households are identified, and an aggregate measure is constructed using the methodology proposed by Alkire and Foster (2007, 2009). Each dimension and each indicator within each dimension are equally weighted.

The MPI illustrates to what degree a combination of deprivations can batter a household all at once. A household is identified as multidimensionally poor if and only if it is deprived in a combination of indicators the weighted sum of which exceeds 30 percent of deprivation. The dimensions and indicators are presented and explained in detail hereafter.

- *Health* (each indicator is weighted equally at 1/6):
  - Child mortality: if any child has died in the family
  - Nutrition: if any adult or child in the family is malnourished
- *Education* (each indicator is weighted equally at 1/6):
  - Years of schooling (if no household member has completed five years of schooling)
  - Child enrolment (if any school-aged child has missed school years 1 to 8)
- *Standard of living* (each of the six indicators is weighted equally at 1/18):
  - Electricity (an absence of electricity means a household is considered poor)
  - Drinking water (based on Millennium Development Goal [MDG] definitions)
  - Sanitation (based on MDG definitions, including that the toilet is not shared with other households)
  - Flooring (a household is considered poor if it has dirt, sand, or dung flooring)
  - Cooking fuel (a household is considered poor if it uses wood, charcoal, or dung for fuel)
  - Assets (a household is considered poor if it does not own more than one of the following: radio, television, telephone, bicycle, motorbike)

The MPI is the product of two figures: the headcount (H) or percentage of people who are poor and the average intensity of deprivation (A), which reflects the proportion of the dimensions in which households are deprived.

Is the MPI more accurate than the HPI? Once considered a pioneering concept, the HPI relies on country averages to reflect aggregate deprivations in health, education and standard of living. It does not, however, identify specific individuals, households, or larger groups of people that may be jointly deprived. The MPI addresses this shortcoming by capturing how many individuals experience overlapping deprivations (incidence) and how many deprivations they face on average (intensity). The MPI may be broken down according to indicator to show how the composition of multidimensional poverty changes depending on region, ethnic group and so on. This level of detail is useful for policy makers.

Human Development Indices: Sources and Definitions

Human development data are collected from international data agencies and country statistics departments. Sources are used to compile the indicator tables and cited at the end of each table. In the case of Afghanistan, however, long years of war have devastated statistical systems, which has resulted in inadequate and unreliable data.

For the calculation of human development indicators, this report relies mainly on the NRVA, which is the second largest data source in the country.

Inconsistencies between national and international estimates

Accurate HDI data depend on availability, quality and reliability over time. Into the mid-1990s, the global HDR was able to publish an HDI value for Afghanistan intermittently because it possessed data of sufficient quality and consistency to meet the standards necessary to calculate the index. The more than three decades of conflict and political strife have prevented researchers from collecting reliable HDI indicator data on Afghanistan except with respect to life expectancy.

In the interim, the UNDP and the Centre for Policy and Human Development have led in the production of two NHDRs in Afghanistan, in 2004 and 2007. These two reports acknowledged that data constraints prevented the global HDR from producing the HDI value and subsequent ranking for Afghanistan. To calculate a best estimate measure of human development, however, the NHDRs turned to national data sources to fill the gaps. For the purposes of advocacy and international comparisons, the reports suggested what the potential ranking of the global HDI would be if Afghanistan were to be included in the international rankings.

Strictly speaking, however, positioning Afghanistan's HDI into a global ranking should not be made even if it is based on national data sources and adjustments are made according to assumed growth rates. This is because one would be comparing unverified national data from one country (Afghanistan) to harmonized data for another, thereby generating dissonance with respect to the comparison.

The 2009 global HDR included, for the first time since 1997, an internationally comparable HDI value for Afghanistan. To be welcomed again into this international ranking of countries marks a significant step forward in the measurement of human development in Afghanistan. The nature of national and international data systems, however, can cause considerable confusion about the way to interpret human development trends most accurately.

Several points bear scrutiny. First, the focus of the global HDR is to compare the aggregate measure of well-being across United Nations member states. This can pose limitations, however, because the global HDR uses data that involve harmonizing indicators with statistics from over 200 countries and territories and then comparing them. Thus, the global HDRs publish data that are already at least two years old.

Second, to compare nations with nations in aggregate terms with rigour, international data sources periodically improve the historical data series. Thus, yearly global HDRs reflect revisions to data as much as progress or regression in development indicators. For this reason, we discourage comparing different HDI values from different editions of the global HDRs or NHDRs.

Finally, the 2007 HDI value for Afghanistan used by the UNDP Human Development Report Office is based on data from a previous year relative to the data on other

countries. This is because of the lack of more recent data in the international data system. In producing the yearly international HDI rankings, the Human Development Report Office relies on the latest data available for each country even if they are not available for the reference year. For HDI trends, data are used on the latest or nearest year relative to the reference year (for every five-year period from 1980 to 2005 and, then, 2006 and 2007). For the most part, life expectancy is calculated every year. However, population censuses collect data on adult literacy infrequently, which means data are not published annually. If this occurs, the global HDR maintains the same value until a more recent value becomes available through an international data source.

In the case of Afghanistan, the literacy rate derived from the 1979 population census was used as an estimate in the global 2009 HDR for every year from 1980 to 1995 inclusive. Because no more recent estimates from international data agencies are available, the literacy estimate derived from UNICEF's year 2000 run of the Multiple Indicator Cluster Surveys has been used for every year since then. The latest year for which the Institute for Statistics of the United Nations Educational, Scientific and Cultural Organization has measured a gross enrolment value is 2005. The GDP per capita data are derived from the World Bank's World Development Indicators Database, which was examining GDP in PPP US$ at constant 2005 prices for 2002–2006 when the 2009 global HDR was being prepared. The total population is derived from the United Nations Population Division's World Population Prospects 2008 Revision Population Database for the same years. The value used for 2007 is the 2006 value expressed in 2007 prices (which relies on a constant GDP price per capita).

Note references: MRRD and CSO (2009); global HDR 2010: correspondence with Chief of Statistics, Human Development Report Office, UNDP, New York; UNDP (2004); CPHD (2007); UNDP (2009); UNICEF (2001); UNESCO Institute for Statistics, at http://stats.uis.unesco.org/; World Bank, World Development Indicators, at http://data.worldbank.org/indicator; UNDESA Population Division, at http://esa.un.org/UNPP/.

Primary national and international data sources

Life expectancy at birth: This report relies on estimates on life expectancy at birth from the official population estimates and projections of the United Nations for 1950–2050 found in the World Population Prospects 2008 Revision Population Database. Data are prepared biennially by the Population Division of the United Nations Department of Economic and Social Affairs using information collected from national vital statistics registration systems, population censuses and surveys.

Adult literacy rate: Adult literacy rate refers to the population aged 15 and over and indicates the accumulated attainment of primary education and literacy programmes to provide basic literacy skills to the population. The adult literacy rate is estimated based on NRVA data.

Combined GERs in primary, secondary and tertiary education: GERs are based on data collected from the Afghanistan Statistical Yearbook 2007-08 Database and the Ministry of Education. Based on CSO 2008 estimates, the ratio is calculated by dividing the number of students enrolled in primary, secondary, and tertiary educational levels during a particular time-frame by the total population of the same age and during the same time-frame corresponding to educational levels. The quality of educational attainment is not revealed by combined GERs because grade repetition, coupled with drop-out rates, can distort the results.

GDP per capita (PPP US$): Data on GDP per capita data are only available at the country level and not at the provincial level. The

World Bank World Development Indicators Database provides GDP data. To compare the standard of living from country to country, GDP statistics must be converted into PPP terms to eliminate differences in national prices. The GDP per capita (PPP US$) estimate for Afghanistan was released for the first time in 2008.

Note references: UNDESA Population Division, at http://esa.un.org/UNPP/; MRRD and CSO (2009); CSO data, at http://www.cso.gov.af/stist_002.html; World Bank, World Development Indicators, at http://data.worldbank.org/indicator.

Glossary of technical terms

Acute malnutrition (wasting): A condition that is characterized by acute and significant weight loss due to either acute starvation or severe disease.

Adult literacy rate: The percentage share of the adult population that is able to read and write.

Aquifer: An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt, or clay) from which groundwater may be usefully extracted by means of a water well.

Chronic malnutrition (stunting): Low height for age due to chronic and prolonged inadequate nutrition or poor health that challenges the linear growth potential of children.

Climate change: The short- and long-term effects on the earth's climate as a result of human activities such as fossil fuel combustion and the clearing and burning of vegetation.

Climate shocks: Events such as drought and floods.

Economic water scarcity: The International Water Management Institute has introduced indicators of scarcity on the basis of the ratio between water use and water availability. Economic water scarcity is an indicator referring to countries in which less than 25 percent of the available river water is withdrawn for human consumption, but in which the population suffers from malnutrition.

Environmental degradation: Changes occurring in the environment through the depletion of environmental resources, including air, soil and water.

GDP per capita (PPP US$): Gross domestic product (in purchasing power parity terms in United States dollars) divided by the mid-year population. See purchasing power parity.

GDP per capita (US$): Gross domestic product (in United States dollar terms) divided by the mid-year population.

Hasher: A collective behaviour among Afghan people characterized by mutual assistance through free contributions of labour in land cultivation, canal maintenance and crop harvesting.

Improved water source: A water source that is likely to provide safe drinking water.

Infant mortality rate (IMR): One of the main indicators of child and maternal health. It represents the annual number of deaths of infants under 1 year of age per 1,000 live births during the same period.

Jerib: A measure of land surface area. One jerib equals 2,000 square metres (0.2 hectares) or 21,528 square feet (0.49 acres).

Karez/qanat: In the karez method, an underground tunnel is constructed to gather subsoil water through gravitational pull at the foot of a hill. The water is then either transported to fields or villages through ver-

tical shafts that are sunk underground, or it is drawn out at the foot of the hill where it has been gathered.

Kuchis: A pastoral nomadic social group living off of livestock and undertaking regular seasonal migration.

Life expectancy at birth: The theoretical number of years a newborn will live if the age-specific mortality rates in the year of birth are taken as constant.

Malnutrition: A term indicating poor nutrition that may technically refer to undernutrition or the condition of being overweight or obese, though, in practice, the term is typically used as a synonym for undernutrition.

Maternal mortality rate (MMR): The annual number of deaths of women due to pregnancy or childbirth-related causes per 100,000 live births.

Mirab: The title of an individual within a traditional or customary water distribution system who is responsible for managing water distribution among water users and for system maintenance.

Net enrolment ratio: The number of children in a specified age group enrolled at a given level of education divided by the total number of children in the same age group in the general population.

Physical water scarcity: The situation in which the demand for a water resource is approaching or has exceeded unsustainable levels as indicated by the amount of water available.

Population growth rate: The change in the population over a unit time period. The change is expressed as a percentage of the number of individuals in the population at the beginning of the time period.

Purchasing power parity (PPP): A measure of long-term equilibrium exchange rates based on the relative price levels in a country for a given basket of goods equalized across countries. The measure is typically expressed in United States dollars.

Sanitary toilet: A covered facility or installation, whether private or communal, designed to dispose of body waste.

Soil erosion: The displacement of naturally occurring environmental solids such as soil, rocks and sediment by means of natural processes or the actions of man or other living organisms.

Under-5 mortality rate: The probability of dying between birth and age 5. The rate represents the annual number of deaths of children under age 5 per 1,000 live births.

Upper catchment: The area of land from which rainwater or snow-melt drains into a reservoir, pond, lake, river, or stream.

Water stress: A situation in which the demand for water exceeds the amount of water available during a certain period or in which the use of water is restricted because of the poor quality of the water. Technically, water stress occurs if the annual availability of renewable fresh water is 600 cubic metres or less per person.

Water crisis: A situation in which the availability of water resources relative to demand is diminished so that there is a major threat to human stability.

Statistical Annexes

Table 1 Human Development Indicator: Trends

Year	Human Development Index (HDI) Value	Life expectancy at birth (years)	Adult literacy rate (% aged 15 and above)[a]	GER primary, secondary and tertiary education (%)[c]	GDP per capita (PPP US$)	Life expectancy index	Education index	GDP index
1980	..	39.3	18.2	21.0	..	0.238	0.191	..
1985	..	40.4	18.2	12.8	..	0.256	0.164	..
1990	..	41.3	18.2	..	..	0.272	..	..
1995	..	41.8	18.2	26.4	..	0.279	0.209	..
2000	..	41.8	28.0	13.8	..	0.280	0.233	..
2005	0.347	42.9	28.0	50.1	1,036	0.298	0.354	0.390
2006	0.350	43.2	28.0	50.1	1,054	0.304	0.354	0.393
2007	0.352	43.6	28.0	50.1	1,054	0.310	0.354	0.393
2008	0.360	43.8	26.2[b]	57.7[d]	1,105[e]	0.313	0.367	0.401

Notes:
a. Data are from UNICEF's Multiple Indicator Cluster Surveys.
b. Data are from NRVA (MRRD and CSO 2009).
c. UNESCO Institute for Statistics estimate.
d. Calculated based on population data of CSO and Ministry of Education data on the number of students.
e. Calculated on the basis of GDP in PPP US$ for 2006 from World Bank, World Development Indicators Database, 2009, and total population for the same year from United Nations Population Division Database, 2009.
f. "-" no data available.

Sources:
Column 1: Calculated on the basis of data in columns 6–8.
Column 2: UNDESA Population Division, at http://esa.un.org/UNPP/.
Column 3: UNESCO Institute for Statistics, at http://stats.uis.unesco.org/; NRVA (MRRD and CSO 2009).
Column 4: UNESCO Institute for Statistics, at http://stats.uis.unesco.org/; calculations from data of CSO and Ministry of Education.
Column 5: World Bank, World Development Indicators, at http://data.worldbank.org/indicator.
Column 6: Calculated on the basis of data in column 2.
Column 7: Calculated on the basis of data in columns 3 and 4.
Column 8: Calculated on the basis of data in column 5.

Table 2 Human Poverty Index

Human Poverty Index (HPI) Value	Probability of not surviving to age 40[a] (% of cohort) 2005 – 2010	Adult illiteracy rate (% aged 15 and above) 2007/8	Population not using an improved water source (%) 2007/8	Children under weight for age (% aged under 5) 2000 – 2006
61.6	40.7	73.8	73	39

Notes:
a. Data refer to the probability at birth of not surviving to age 40, multiplied by 100.

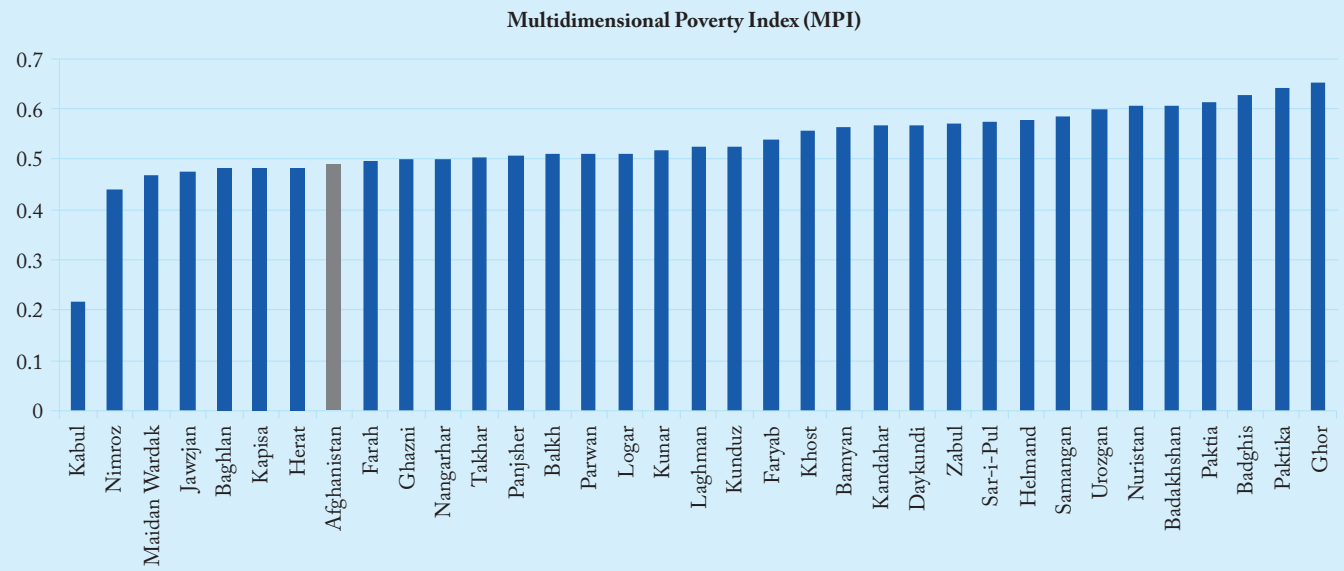
Sources:
Column 1: Calculated on the basis of data in columns 2–5.
Column 2: NRVA (MRRD and CSO 2009).
Column 3 and 4: NRVA (MRRD and CSO 2009).
Column 5: UNICEF (2007).

Table 3 **Multidimensional Poverty Index**

	Assets	Cooking fuel	Floor	Drinking water	Sanitation	Electricity	Nutrition	Child mortality	Child enrolment	Schooling
Badakhshan	82	99	98	79	100	100	62	47	39	38
Badghis	61	99	85	81	100	99	24	45	61	79
Baghlan	58	88	95	75	99	87	9	48	45	38
Balkh	43	78	97	72	94	61	48	36	45	49
Bamyan	81	99	97	86	100	100	23	43	46	55
Daykundi	84	99	100	86	100	100	18	52	37	56
Farah	37	89	76	84	99	98	12	5	59	71
Faryab	43	99	94	75	100	82	18	50%	46	59
Ghazni	24	98	99	82	100	99	41	25	54	30
Ghor	79	99	92	91	100	100	14	79	56	65
Helmand	0	96	92	97	93	89	5	32	70	86
Herat	39	74	82	71	92	61	17	48	49	54
Jawzjan	58	94	99	56	99	62	3	33	50	58
Kabul	13	29	56	42	89	33	15	24	38	20
Kandahar	1	74	83	65	91	76	18	42	67	91
Kapisa	70	99	99	85	100	100	16	22	50	34
Khost	54	100	91	64	99	100	41	21	59	57
Kunar	86	100	97	44	98	100	27	7	68	49
Kunduz	33	92	99	84	100	82	17	48	57	47
Laghman	49	98	97	68	100	100	38	23	62	42
Logar	48	83	94	87	100	100	30	27	67	31
Nangarhar	45	95	81	76	96	88	11	38	64	45
Nimroz	37	70	66	63	93	74	16	6	52	73
Nuristan	87	100	98	91	100	100	21	24	62	70
Paktika	45	100	88	64	99	100	34	47	80	67
Paktia	74	100	85	83	99	98	41	24	66	65
Panjsher	67	98	90	89	99	100	14	28	52	38
Parwan	50	94	96	82	99	92	9	52	54	37
Samangan	66	98	99	85	100	93	23	44	53	59
Sar-i-Pul	88	99	100	89	100	95	5	29	53	74
Takhar	23	98	98	72	98	100	13	33	52	56
Urozgan	0	99	90	83	100	100	18	0	88	94
Maidan Wardak	46	82	97	92	100	97	26	27	57	25
Zabul	2	100	87	69	100	98	10	16	76	87
Afghanistan	**41**	**83**	**87**	**72**	**96**	**80**	**21**	**35**	**53**	**51**

Source: NRVA (MRRD and CSO 2009).

Figure 1 **MPI values across provinces**



Source: Calculated based on MRRD and CSO (2009).

Table 4 **Gender-related Development Index**

Gender-related development index (GDI) 2007	Life expectancy at birth (years) 2008		Adult literacy rate (% aged 15 and above) 2007/8		Combined gross enrolment ratio in education (%) 2008		Estimated earned income (PPP US$) 2008[a]	
Value	Female	Male	Female	Male	Female	Male	Female	Male
0.331	43.9	44.0	12.5	39.3	43.0	71.7	576	1,842

Notes:
a. Calculated based on data on GDP PPP US$ from World Bank, World Development Indicators, at http://data.worldbank.org/indicator; population data of CSO using 30 percent share for women among the economically active population.

Sources:
Column 1: Calculated on the basis of data in columns 3–10.
Column 2 and 3: UNDESA Population Division, at http://esa.un.org/UNPP/.
Column 6 and 7: NRVA (MRRD and CSO 2009).
Column 6 and 7: Calculated by the Centre for Policy and Human Development using data of CSO and NRVA (MRRD and CSO 2009).
Column 8 and 9: Calculated based on data of CSO.
Column 9 and 10: Calculated on the basis of GDP PPP US$ from World Bank, World Development Indicators, at http://data.worldbank.org/indicator; population data of CSO.

Table 5 Commitment to Health: Resources, Access and Services

	Access nearest health facilities by foot or animal			Percentage of vaccinated children 12-23 months (NRVA 2007-08)					Birth attended by skill health personnel	
	1 hour or less	> 1 hour	No access	BCG	OPV3	DTP3	Measles	Full immunization	MICS 2003	NRVA 2008
Badakhshan	70	30	0	-	-	-	-	40	2	1
Badghis	36	64	0	-	-	-	-	4	12	2
Baghlan	53	31	16	-	-	-	-	39	6	2
Balkh	82	18	0	-	-	-	-	27	8	2
Bamyan	44	56	0	-	-	-	-	28	8	2
Daikundi	17	83	0	-	-	-	-	18		3
Farah	60	21	19	-	-	-	-	55	12	3
Faryab	49	50	1	-	-	-	-	25	2	6
Ghazni	72	25	3	-	-	-	-	32	7	6
Ghor	14	86	0	-	-	-	-	8	9	7
Helmand	81	19	0	-	-	-	-	1	2	7
Herat	85	9	6	-	-	-	-	43	24	7
Jawzjan	92	8	0	-	-	-	-	62	9	7
Kabul	96	3	1	-	-	-	-	73	46	10
Kandahar	39	54	7	-	-	-	-	4	16	10
Kapisa	88	12	0	-	-	-	-	2	12	13
Khost	83	13	5	-	-	-	-	63	18	16
Kunar	50	44	6	-	-	-	-	52	3	18
Kunduz	81	19	0	-	-	-	-	34	6	19
Laghman	67	30	3	-	-	-	-	11	3	20
Logar	64	34	2	-	-	-	-	83	9	21
Nangarhar	65	24	11	-	-	-	-	57	22	21
Nimroz	71	10	19	-	-	-	-	40	7	21
Nuristan	34	56	10	-	-	-	-	1	1	21
Paktika	60	28	12	-	-	-	-	18	5	23
Paktia	77	23	0	-	-	-	-	53	9	24
Panjsher	80	21	0	-	-	-	-	4		28
Parwan	76	24	0	-	-	-	-	50	4	28
Samangan	55	44	2	-	-	-	-	39	29	32
Sar-i-Pul	54	46	0	-	-	-	-	71	0	36
Takhar	81	19	0	-	-	-	-	16	1	60
Urozgan	24	74	3	-	-	-	-	-	6	73
Maidan Wardak	71	29	0	-	-	-	-	78	11	73
Zabul	26	62	12	-	-	-	-	-	1	-
National	**68**	**28**	**4**	**74**	**71**	**43**	**56**	**37**	**14**	**24**

Notes:
BCG = vaccine against tuberculosis. OPV3 = oral poliovirus vaccine type 3. DTP = combination vaccine against diphtheria, tetanus and poliomyelitis.
"-" no data available.

Sources:
Column 1-8: NRVA (MRRD and CSO 2009).
Column 9: Data are from UNICEF's Multiple Indicator Cluster Surveys (MICS) 2003; see UNICEF (2001).
Column 10: NRVA (MRRD and CSO 2009).

Table 6 Water and Sanitation

	Population access to safe drinking water (%)		Population paying for drinking water (%)		Average monthly payment (AFN)		Population access to improved sanitation (%)	
	2005	2008	2005	2008	2005	2008	2005	2008
Badakhshan	13	20	3	6	10	24	0	0
Badghis	15	17	2	5	513	321	7	0
Baghlan	19	24	3	7	129	96	2	1
Balkh	31	29	7	12	80	100	12	8
Bamyan	8	13	0	0			0	0
Daikundi	3	15	0	0		9	0	0
Farah	37	16	2	4	98	71	7	1
Faryab	23	25	1	6	400	257	2	0
Ghazni	35	17	3	2	51	106	1	0
Ghor	14	8	1	0	90	5	1	0
Helmand	28	5	1	0	166	8	5	7
Herat	31	28	8	20	198	119	14	9
Jawzjan	24	43	3	10	532	225	15	2
Kabul	65	56	15	16	168	210	25	18
Kandahar	64	37	7	2	199	460	22	11
Kapisa	27	18	0	1		7	3	0
Khost	34	36	7	9	234	390	1	1
Kunar	24	53	0	7	50	46	11	5
Kunduz	25	15	0	1		123	0	0
Laghman	39	32	0	1		15	4	0
Logar	45	15	3	0	26		0	0
Nangarhar	43	24	2	6	82	87	6	6
Nimroz	38	12	30	28	243	559	15	9
Nuristan	2	10	0	0			0	0
Paktika	28	35	1	0			0	1
Paktia	30	18	2	2		54	3	1
Panjsher	16	11	1	4		8	1	1
Parwan	32	19	3	0	105	54	0	2
Samangan	7	14	22	3	341	271	0	0
Sar-i-Pul	8	12	2	1	225	56	0	0
Takhar	29	26	2	2	61	33	1	2
Urozgan	8	18	0	53		223	3	0
Maidan Wardak	22	9	1	0	60		4	0
Zabul	0	30	1	6		254	0	0
National	**31**	**27**	**5**	**7**	**181**	**182**	**7**	**5**

Notes:
Table includes data from NRVA 2005 (MRRD and CSO 2007) and NRVA 2007/8 (MRRD and CSO 2009). We are not able to compare the latter with the former because the survey periods are different. NRVA 2005 survey used a survey period of three months, while NRVA 2007/8 used a survey period of 12 months.

Sources:
Column 1, 3, 5 and 7: NRVA (MRRD and CSO 2007).
Column 2, 4, 6 and 8: NRVA (MRRD and CSO 2009).

Table 7 Literacy and Enrolment

	Adult Literacy rate (% ages 15 and older)			Adult literacy rate (% ages 18 and older 2008)				Female literacy rate (% ages 18 and older 2008)				Male literacy rate (% ages 18 and older 2008)			
	2003	2005	2008	Rural	Urban	Kuchis	Overall	Rural	Urban	Kuchis	Overall	Rural	Urban	Kuchis	Overall
Badakhshan	32	31	29	21		13	21	8		4	8	35		22	34
Badghis	7	11	10	8		1	7	2		0	2	12		2	11
Baghlan	32	21	25	17	34	3	20	4	18	0	7	30	51	7	34
Balkh	22	44	28	14	41	6	23	5	29	7	13	23	52	6	32
Bamyan	29	29	22	16		58	17	2		46	4	30		73	31
Daikundi	-	28	20	14			14	5			5	24			24
Farah	26	21	16	14		3	14	5		0	4	24		5	22
Faryab	18	27	19	12	38	7	15	3	23	0	5	22	54	14	25
Ghazni	29	35	33	26			26	6			6	47			47
Ghor	12	19	26	23		23	23	5		3	5	41		43	41
Helmand	17	5	12	11	32	0	11	1	9	0	1	19	52	0	20
Herat	21	36	26	16	39	5	21	6	28	1	11	25	50	10	31
Jawzjan	8	31	18	5	37		11	1	23		5	10	51		18
Kabul	30	58	48	21	48	6	43	5	30	1	25	36	65	10	59
Kandahar	6	16	8	3	13	0	6	0	4	0	1	6	21	0	11
Kapisa	33	39	33	25		0	25	6		0	6	45		0	44
Khost	25	28	16	13		1	12	1		0	1	25		3	23
Kunar	31	32	21	18		0	17	2		0	2	33		0	32
Kunduz	35	33	21	11	32	10	16	3	18	1	6	20	46	20	26
Laghman	22	14	26	24		1	21	4		0	4	43		2	39
Logar	29	21	31	30		18	28	2		0	2	55		34	52
Nangarhar	31	29	24	18	46	2	20	3	21	0	5	34	71	4	36
Nimroz	8	22	18	16		0	14	8		0	7	23		0	21
Nuristan	21	25	16	13			13	1			1	23			23
Paktika	21	2	28	28		9	26	5		0	4	50		16	45
Paktia	25	35	12	9		2	9	1		0	1	17		3	15
Panjsher	-	33	28	24		19	23	5		0	5	42		33	41
Parwan	36	37	28	23		7	22	7		0	7	39		13	38
Samangan	25	19	24	20			20	6			6	33			33
Sar-i-Pul	16	12	10	6		9	7	2		0	2	11		19	11
Takhar	20	16	18	11	30	11	14	2	15	3	3	21	45	18	24
Urozgan	15	5	10	5		7	5	0		7	1	9		7	9
Maidan Wardak	35	25	33	30		13	28	1		0	1	57		24	54
Zabul	11	1	18	21		3	18	1		0	1	39		6	34
National	**24**	**28**	**26**												

Sources:
Column 1: NRVA (MRRD and WFP 2003).
Column 2: NRVA (MRRD and CSO 2007).
Column 3-13: NRVA (MRRD and CSO 2009).

Table 7 **Literacy and Enrolment** *(continued)*

	MDG Youth literacy rate (% ages 15-24)		MDG Net Primary enrolment ratio (%)		MDG Net secondary Enrolment ratio 2008 (%)		
	2005	2008	2005	2008	Male	Female	Both Sex
Badakhshan	38	-	46	77	..	..	..
Badghis	9	-	19	32	..	..	..
Baghlan	29	-	29	67	..	..	..
Balkh	49	-	58	59	..	..	..
Bamyan	32	-	39	63	..	..	..
Daikundi	21	-	50	72	..	..	..
Farah	22	-	32	37	..	..	..
Faryab	24	-	53	61	..	..	..
Ghazni	46	-	39	62	..	..	..
Ghor	17	-	28	52	..	..	..
Helmand	6	-	6	5	..	..	..
Herat	39	-	55	57	..	..	..
Jawzjan	35	-	40	51	..	..	..
Kabul	65	-	46	72	..	..	..
Kandahar	13	-	23	14	..	..	..
Kapisa	47	-	60	59	..	..	..
Khost	36	-	38	41	..	..	..
Kunar	33	-	43	52	..	..	..
Kunduz	35	-	62	54	..	..	..
Laghman	19	-	48	59	..	..	..
Logar	21	-	22	51	..	..	..
Nangarhar	34	-	39	54	..	..	..
Nimroz	29	-	33	48	..	..	..
Nuristan	18	-	47	39	..	..	..
Paktika	2	-	9	29	..	..	..
Paktia	30	-	65	35	..	..	..
Panjsher	38	-	42	56	..	..	..
Parwan	44	-	42	49	..	..	..
Samangan	14	-	37	54	..	..	..
Sar-i-Pul	12	-	22	38	..	..	..
Takhar	18	-	32	54	..	..	..
Urozgan	4	-	1	4	..	..	..
Maidan Wardak	28	-	31	59	..	..	..
Zabul	1	-	0.1	7	..	..	..
National	**31**	**39**	**37**	**52**	**21**	**10**	**16**

Note: ".." no data available.

Sources:
Column 1: NRVA (MRRD and WFP 2003).
Column 2, 4, and 6: NRVA (MRRD and CSO 2007).
Column 3, 5, 7, 8, 9 and 10: NRVA (MRRD and CSO 2009).

Table 8 Housing and Technology: Diffusion and Creation

	Telephone line (per 100 population)	Mobile Phones (per 100 population)	Access to electricity (%)		Fuel used for cooking 2008		
	2008	2008	2005	2008	Solid fuel	Non-solid fuel	No heating
Badakhshan	0.0	0.8	1	37	99.1	0.5	0.4
Badghis	0.1	0.8	0	4	99.7	0.3	0.0
Baghlan	0.0	6.5	15	37	98.8	1.1	0.1
Balkh	0.1	7.4	49	57	97.9	1.9	0.2
Bamyan	0.0	1.2	6	41	98.8	0.8	0.4
Daikundi	0.0	0.2	25	45	99.4	0.6	0.0
Farah	0.0	2.4	9	17	88.1	11.3	0.7
Faryab	0.0	3.0	17	36	99.3	0.7	0.0
Ghazni	0.0	3.8	37	73	99.8	0.2	0.0
Ghor	0.0	0.6	3	31	100.0	0.0	0.0
Helmand	0.0	6.0	21	12	90.2	5.3	4.5
Herat	0.7	5.4	22	42	90.8	8.8	0.5
Jawzjan	0.1	3.8	42	46	96.5	3.5	0.0
Kabul	0.3	17.3	61	85	96.9	2.3	0.8
Kandahar	0.0	4.8	27	29	94.6	5.4	0.0
Kapisa	0.2	3.9	6	40	98.6	1.4	0.0
Khost	0.1	3.4	4	29	99.4	0.0	0.6
Kunar	0.0	1.5	41	39	99.8	0.2	0.0
Kunduz	0.0	6.3	18	34	99.8	0.2	0.0
Laghman	0.0	5.7	13	40	85.4	0.7	13.9
Logar	0.0	3.1	21	33	99.3	0.7	0.0
Nangarhar	0.0	7.8	19	34	77.5	2.8	19.7
Nimroz	0.0	4.6	32	30	67.1	32.8	0.2
Nuristan	0.0	0.0	62	56	99.7	0.0	0.3
Paktika	0.1	0.1	6	6	98.5	0.3	1.3
Paktia	0.1	1.0	16	13	99.6	0.4	0.0
Panjsher	0.0	2.7	16	49	98.0	1.7	0.3
Parwan	0.1	5.5	22	39	99.6	0.4	0.0
Samangan	0.0	3.4	5	32	100.0	0.0	0.0
Sar-i-Pul	0.0	1.3	6	56	100.0	0.0	0.0
Takhar	0.0	3.5	5	19	99.1	0.9	0.1
Urozgan	0.0	0.1	8	0	99.3	0.2	0.5
Maidan Wardak	0.0	2.8	9	50	99.7	0.0	0.3
Zabul	0.0	2.4	2	7	100.0	0.0	0.0
National	**0.1**	**5.8**		**42**	**95.8**	**2.4**	**1.9**

Sources
Column 3: NRVA (MRRD and CSO 2007).
Column 1, 2, 4, 5-7: NRVA (MRRD and CSO 2009).

Bibliography

Alkire, S., and J. Foster, 'Counting and Multidimensional Poverty Measurement', OPHI Working Paper 7 (December), Oxford Poverty and Human Development Initiative, Oxford, 2007.

Alkire, S., and J. Foster, 'Counting and Multidimensional Poverty Measurement (Revised and Updated)', OPHI Working Paper 32 (December), Oxford Poverty and Human Development Initiative, Oxford, 2009.

CPHD (Centre for Policy and Human Development), Afghanistan National Human Development Report 2007; Bridging Modernity and Tradition: Rule of Law and the Search for Justice, Kabul: CPHD; Islamabad: Army Press, 2007.

MRRD (Ministry of Rural Rehabilitation and Development) and WFP (World Food Programme), 'National Risk and Vulnerability Assessment 2003', National Surveillance System, MRRD, Kabul, 2003, http://www.mrrd.gov.af/nss-vau/NRVA%202003.htm.

MRRD (Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization), National Risk and Vulnerability Assessment 2005, Kabul: CSO, 2007.

MRRD **(Ministry of Rural Rehabilitation and Development) and CSO (Central Statistics Organization)**, National Risk and Vulnerability Assessment 2007/8: A Profile of Afghanistan, Cologne: ICON-Institute GmbH & Co KG Consulting Gruppe, 2009.

UNDP (United Nations Development Programme), Afghanistan National Human Development Report 2004; Security with a Human Face: Challenges and Responsibilities, Kabul: UNDP and Government of Afghanistan; Islamabad: Army Press, 2004.

UNDP (United Nations Development Programme), Human Development Report 2009; Overcoming Barriers: Human Mobility and Development, New York: UNDP; New York: Palgrave Macmillan, 2009.

UNICEF (United Nations Children's Fund), State of the World's Children 2008: Child Survival, New York: UNICEF, 2007.

UNICEF (United Nations Children's Fund), 'Afghanistan Multiple Indicator Cluster Survey 2000', UNICEF, Islamabad, Pakistan, 2001.

Afghanistan Human Development Report 2010 appears at a critical moment. The country is at the centre of global attention and is now facing the start of a 10-year countdown to meet the 2020 Millennium Development Goal deadline. Yet, there are already worrying signs of a large-scale shortfall. Remarkable development gains have been registered in Afghanistan over the last nine years, but the distance remaining is great. The government, civil society and aid donors must act with a sense of urgency and shared commitment to deliver on the pledges enshrined in the Afghanistan National Development Strategy. Fulfilment of these promises cannot wait, and time is running out.

The Forgotten Front: Water Security and the Crisis in Sanitation examines the deep and persistent deprivation in access to drinking water, sanitation and irrigation in Afghanistan, as well as the risks of drought and floods. Reliable access to sufficient and safe water is integral to all aspects of human development: the presence or absence of reliable access represents the difference between prosperity and poverty, good health and bad health. Access to water or a lack of access to water facilitates or blocks the ability of Afghans to live full, secure and productive lives.

Today, Afghanistan faces a water crisis. Three in four Afghans—16.8 million men, women and children—lack access to safe drinking water. Every hour, six children die because of poor sanitation and the want of clean water. A poorly performing irrigation sector, coupled with highly inequitable water sharing practices, results in missed human development opportunities. Drought and floods are propelling thousands of households to adopt survival strategies that often deplete their most productive assets—such as livestock or land—and trap them still more deeply in poverty.

Understanding the relationships between water and human development helps focus the debate on the vast majority of Afghans whose human right to water is being violated. A human development approach to water insecurity can unlock new insights on the urgency and scale of the challenge. Linking water and human development helps support the movement towards a state, civil society and citizenry that respect and ensure basic human rights.

This report presents the case that water security is intrinsic to and instrumental in achieving progress towards human development in Afghanistan.