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Integrated Water Resources Management for Rural Development and Environmental Protection in Afghanistan

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Afghanistan is relatively rich in water resources and land. However the last 3 decades of war and a series of droughts have caused many problems. These include a shortage of efficient institutions, organizational capabilities of staff and effective rules and regulations in regards to water use. Furthermore, a centralized structure of water management and overlapping mandates between institutions has led to poor coordination within the water sector and a general lack of information and data for planning. In addition, low public awareness among stakeholders' and damage of local traditional institution.

The above factors have brought about negative impacts on water resources of the country. For example, in 1980 Afghanistan had a 3.3 million hectares irrigated land which has since been reduced to 1.8 million hectares - this has clearly affected the economy and environment of rural areas. As per the new Water Sector Policy, the Supreme Council for Water Affairs Management has been established. This is chaired by first vice president and its members are from line ministries. This, it is hoped, will improve willimproveiiii coordination between key stakeholders. Moreover, previous Water Law has been revised. River Basin Agencies/ Councils, Sub-basin Councils and Water User Associations will be formed in the five river basins as management institutions.

The new Water Law focuses on stakeholders' participation in water management, equitable water allocation, and division of tasks at national, basin and sub-basin level including participation of all stakeholders in decision making. Based on new Water Sector Policy and Water Resources Sub- Sector, *Integrated Water Resource Management (IWRM)* is carried out through the river basin approach; the objective of IWRM is to decentralize the activities gradually to river basins and sub basins and considerable use of water resources (Mahmoodi, 2006). Therefore, to achieve an integrated water resources management the following common policy principles are:

- Integrated water resources development and management should be undertaken in a holistic and sustainable manner;
- Management and development of water resources should be participatory methods by stakeholders;
- Planning and development of water resources should be decentralized according to natural river basin boundaries.
- Water sector development activities should be participatory and consultative at each level by all stakeholders.

Thus, the goal of the Strategy is management and development of water resources, improved livelihood of present and future generation through:

- access to safe drinking water supply;
- Food security through water security;
- Protection of people income sources from negative impacts of droughts and floods;
- Access to hydro power in both rural and urban areas;
- Water supply for improvement and development of industries (MEW, 2004a).

In order to achieve these strategic goals, the following programs have been developed and are ongoing:

- 1 Institution development program and capacity building.
- 2 River Basin Management national program for poverty alleviation.

- 3 Rehabilitation of irrigation schemes program for modernizing of irrigation systems and prevention of water loss.
- 4 National Program for water resources development for identification of water resources, formation and application of water supply infrastructure.
- 5 Rural water supply and sanitation system for supply of safe drinking water of rural areas.
- 6 River bank protection program to control floods.

Implementing the above programs, we can achieve our goals which are poverty alleviation and unemployment reduction, socio-economical growth and public welfare; they will result in improved rural development and sustainable environmental protection (ANDS, 2007).

Key words:

Introduction

Water is life. Each drop is a legacy from the present to future generations. Without an adequate supply of water to serve the many needs of a productive society as well as to ensure a diverse ecological environment, there can be no progress in national development. It is necessary to sustain a natural environment that can regenerate (fresh) water of sufficient quality to fill social needs for a domestic water supply and sanitation, as well as economic needs for agriculture, hydropower generation, and industrial usage. Water for all these needs is demanded from the natural environment on an almost continuous daily basis (ANDS, 2007).

Afghanistan, which is located in an arid to semi-arid region of the world, has a dry climate. Most precipitation occurs as snow in winter and a smaller amount in spring as rain. In spite of the climate limitation, the presence of the high Hindu Kush Mountains means that the country enjoys considerable water resources. The total annual potential discharge of the five major river basins is more than 75 billion cubic meters (bcm) (MIWRE and UNICEF, 2002).

Eighty percent of Afghanistan's population is located in rural areas and depends for its livelihood on agricultural and animal husbandry activities. Therefore, control of waters, their effective use as national asset through rehabilitation and construction of dams and other infrastructures to access safe water and meet the demands are the crucial requirements for poverty reduction, employment generation, prevention of internal and external displacements and ensuring security and political stability. In addition, improving the efficient use of

water and water saving to meet the demands for water forms a challenge which can be met by reducing the wastage of water through preparing water usage programs, using water saving methods and managing and developing other methods to reduce the demands for water.

The negative impact of the last war, poor management of water resources, lack of planning, and the frequent occurrence of drought, especially in recent years, have caused improper use of water resources in Afghanistan. Therefore, at present, out of the total annual potential, only 30% is used, and the remainder is inaccessible, due to previous war, lack of infrastructures and poor management of water management (Mahmoodi, 2006).

Therefore, the strategic goals of the water sector for rural development and environmental protection in Afghanistan are to ensure the availability of a sufficient supply of water for drinking, agriculture, and other purposes and the protection of the supply from the negative impacts of drought and flood through IWRM by sustainable and participatory methods (MEW and MoUD, 2005).

Analysis of Current Conditions

Climate

Afghanistan's climate is continental, and air temperature ranges from 45°C in summer to -20°C in winter. In spring, a late frost can adversely affect agriculture, especially fruit production. The estimated average annual rainfall is around 250 mm, and it varies in different parts of the country, from 1,200 mm in areas of higher altitude in the northeast to 60 mm in the southwest. Snow falls every year in the mountainous regions and at higher altitudes of the northeastern and central highlands

and variably in the rest of the country. Annual evapotranspiration rates are relatively low in the Hindu Kush (900–1,200 mm) because of the long and severe winters. Evapotranspiration varies between 1200 and 1,400 mm in the northern plains and reaches up to 1,800 mm in the southern and southwestern plains (ANDS, 2007).

Water Resources

Afghanistan has considerable water resources; more than 80% of the country's water comes from snowmelt in the Hindu Kush. Most of the snow accumulation melts each summer. Water resources in the country are divided into five major river basins: (1) Amu Darya, (2) Northern, (3) Harirud–Murghab, (4) Helmand, and (5) Kabul (Fig. 1).

Recent studies have shown that the Amu Darya accounts for about 57% percent of the annual water discharge, the Kabul River for around 26%, the Northern for 2%, the Harirud–Murghab for 4%, and the Helmand for 11%. Recent estimates are that the nation annually has 75 bcm of potentially, available renewable water resources, of which 57bcm is surface water and 18bcm is groundwater (Table 1).

Irrigation

More than 80% of the people of Afghanistan work in the agricultural sector, but just 12% of Afghanistan's 65 million ha is arable; the total arable land area is 7.9 million ha, and in 1980, just 3.3 million ha were under cultivation. Because of the destruction of irrigation infrastructure and because about 90% of that irrigation infrastructure consists of traditional systems, the efficiency of the irrigation network is only 25–30%. Therefore, because of the last war and several droughts, only about 1.8 million ha are now under cultivation, and the remainder faces a shortage of water, creating bad conditions in rural areas of the country (Mahmoodi, 2006).

Drinking Water Supply

At present, 70% of the urban population and 80% of the rural population have no access to potable water. Most people suffer from a shortage of water for domestic use. The efficiency of water supply systems in cities and rural areas is 50%, owing to the lack of maintenance and the shortage of power for their operation. In spite of the efforts of the government and international organizations,

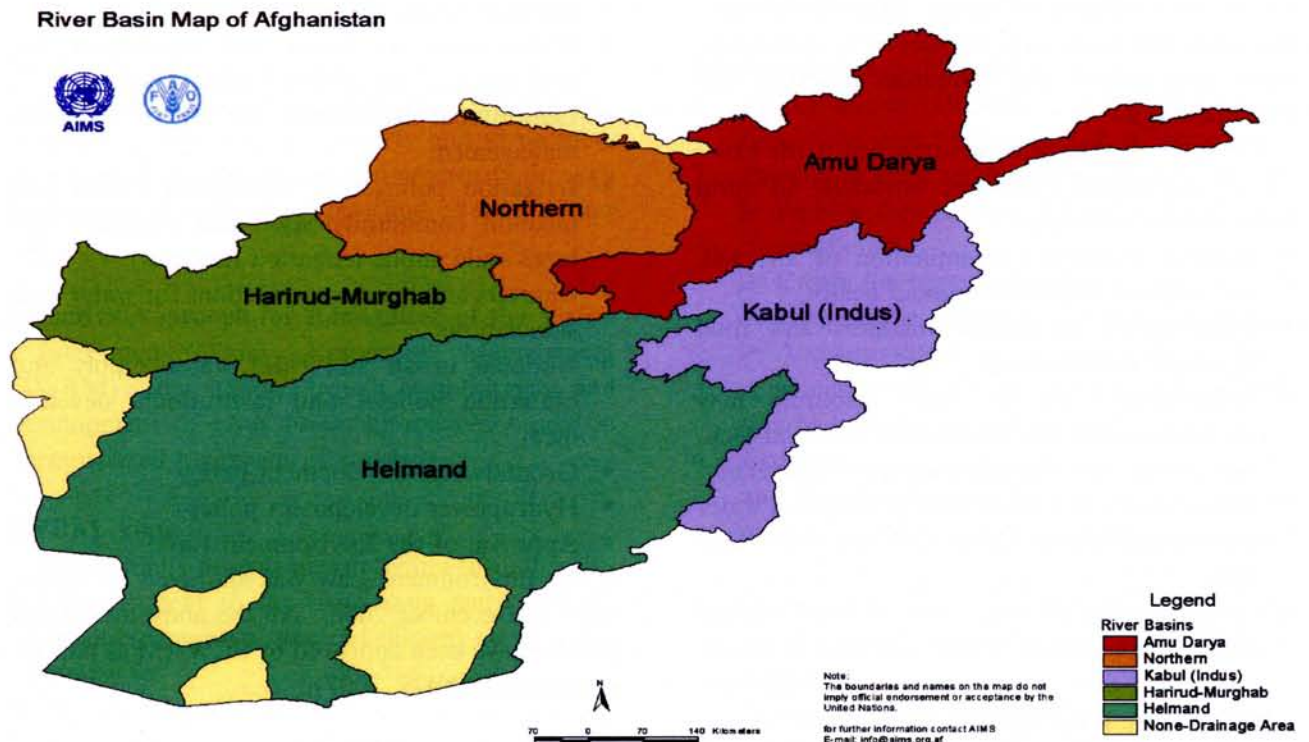


Fig. 1. Map of Five Major River Basins (Source: AIMS and FAO)

Table 1. Estimated surface and groundwater resources (bcm/year) (World Bank, 2004)

Type of Water Resource	Potential Available Water	Present Usage	
		Used	Unused
Surface water	57	20	37
Groundwater	18	3	15
Total	75	23	52

most of the rural population still drinks contaminated water, leading to outbreaks of diseases such as malaria, cholera, dysentery, and diarrhea, which disproportionately cause death among children, women, and old men. Therefore, provision of potable water is one of the main challenges in Afghanistan, and the new water policy thus gives first priority to provision of potable water (Mahmoodi, 2006).

Environment

Approximately 80% of the population of Afghanistan depends directly on the natural resource base of the country to meet its daily needs. Lack of basic natural resources, such as potable water, water for irrigation, and adequate pasture land, has led to the collapse of many rural livelihoods. Human health is seriously threatened by inadequate waste management and sanitation practices and water pollution.

The following impacts are expected if the existing environmental problems, especially in rural areas, are not addressed:

- Existing chemical contamination of air, soil, and water will threaten human health.
- Vulnerability to natural disasters and food shortages will increase.
- Inappropriate use of water resources may threaten agricultural production and food security, as well as wetland ecology and biodiversity.
- Deforestation combined with grazing and water scarcity will lead to soil erosion and desertification.
- Continued loss of vegetation in rural regions and mismanagement of soil will lead to floods, mudslides, and deterioration of groundwater and surface water quality (NEPA, 2005).

Present Status of Policies, Legislation, and Regulations

In 2002, an international conference on Management and Development of Water Resources in Kabul laid the foundation for development of the water sector in Afghanistan.. The outcome of the conference, also known as the Kabul Understandings, has been used for the formulation of various sector policies. The main policy guiding the water sector is the Strategic Policy Framework for the Water Sector, approved by the Supreme Council for Water Affairs Management (SCWAM) in November 2006 (first draft 2004). It describes the main way forward for the water sector and points out specific policies, laws, regulations, and procedures to be formulated as follows:

- Revision of the Water Law of 1991
- Water resources policy and regulations, for both surface and groundwater resources
- Institutional framework for water resources management
- Irrigation policy and regulations (small and medium community-based and medium- and large-scale public irrigation facilities)
- Charters and internal regulations for water user associations
- National urban and rural water supply and sanitation policies and institutional development
- Groundwater development policy
- Hydropower development policy
- Approval of the Environment Law

The Environment Law was approved by Parliament in December 2006. All the abovementioned policies have been approved by SCWAM as national policies (ANDS, 2007).

Obstacles and Problems

- Shortage of rules and regulations relating to the

water sector

- Lack of proper data for drawing strategic plans for water resources development
- Lack of water master plans for the river basins
- Shortage of staff and institutional set-up (establishment of river basin agencies, river basin councils and sub basin councils).
- Shortage of power for operation of water-supply systems
- Return of displaced people to Afghanistan
- Lack of a comprehensive national strategic plan for drought mitigation and flood control
- Destruction of irrigation and potable water infrastructure
- Poor performance of existing irrigation systems, which operate at 25–30% efficiency
- Shortage of water resources infrastructure
- Badly damaged rural- and community-based water user structures and associations
- Poor local technical knowledge at the community level and lack of appropriate technology
- Poor coordination among stakeholders
- Environmental degradation
- Limited financial resources
- Security problems (Mahmoodi, 2006)

Policies and Strategies in Integrated Water Resources Management (IWRM)

Goal

The overall goal of the Ministry of Energy and Water is to help alleviate poverty and to promote socioeconomic development and prosperity through protection of water resources and effective water use.

Effective Approach for Realization of the Vision

Integrated Water Resources Management (IWRM): This stands through establishment and development of river basin approaches based on decentralized management system.

IWRM Aims

To gradually decentralize activities from the central government to the river basin and sub-basin levels and to enable access and efficient use of water resources for

- Socioeconomic development
- Environmental protection and sustainable development

General IWRM Principles

- Comprehensive implementation of water resources management plans and development for the realization of the Afghan National Development Strategy
- Participatory water development and management including all stakeholders
- Water resources management, planning, and development based on river basin boundaries at the proper decentralized levels
- Water sector development activities carried out in consultation with, and with participation by, stakeholders (MEW, 2004b)

IWRM Strategy

Objectives

To improve the livelihoods of the present and future generations as follows:

- Ensure access to safe drinking water.
- Ensure food security through water security.
- Protect public income resources from negative impacts of droughts and floods.
- Ensure adequate energy availability through generation of sufficient hydropower in rural and urban areas.
- Make water available for national industries and other economic sectors (MEW, 2007).

Measures on Key Priorities

1. Proper use of (IWRM) through implementation of the river basin approach in the country;
2. Priority is given to the projects that:
 - Reduce the chances of damage by drought and floods.
 - Create job opportunities
 - Increase the irrigation and power supply
 - Access to safe drinking water (MEW, 2007)
3. A special priority will be given for rehabilitation of hydrometric network (Fig. 2).
4. Establish river basin and sub basin agencies and basins and sub basins councils for involvement of all stakeholders in the whole process of water management (Fig. 3) (Mahmoodi, 2007).
5. Coordinating role of Supreme Council for Water Affairs Management for the following purposes
 - Approve policies, strategies
 - Create coordination, split functions and prevent from overlapping in water sector;

Hydrometric Network and River Basins of Afghanistan

Ministry of Energy and Water
Emergency Irrigation Rehabilitation Project

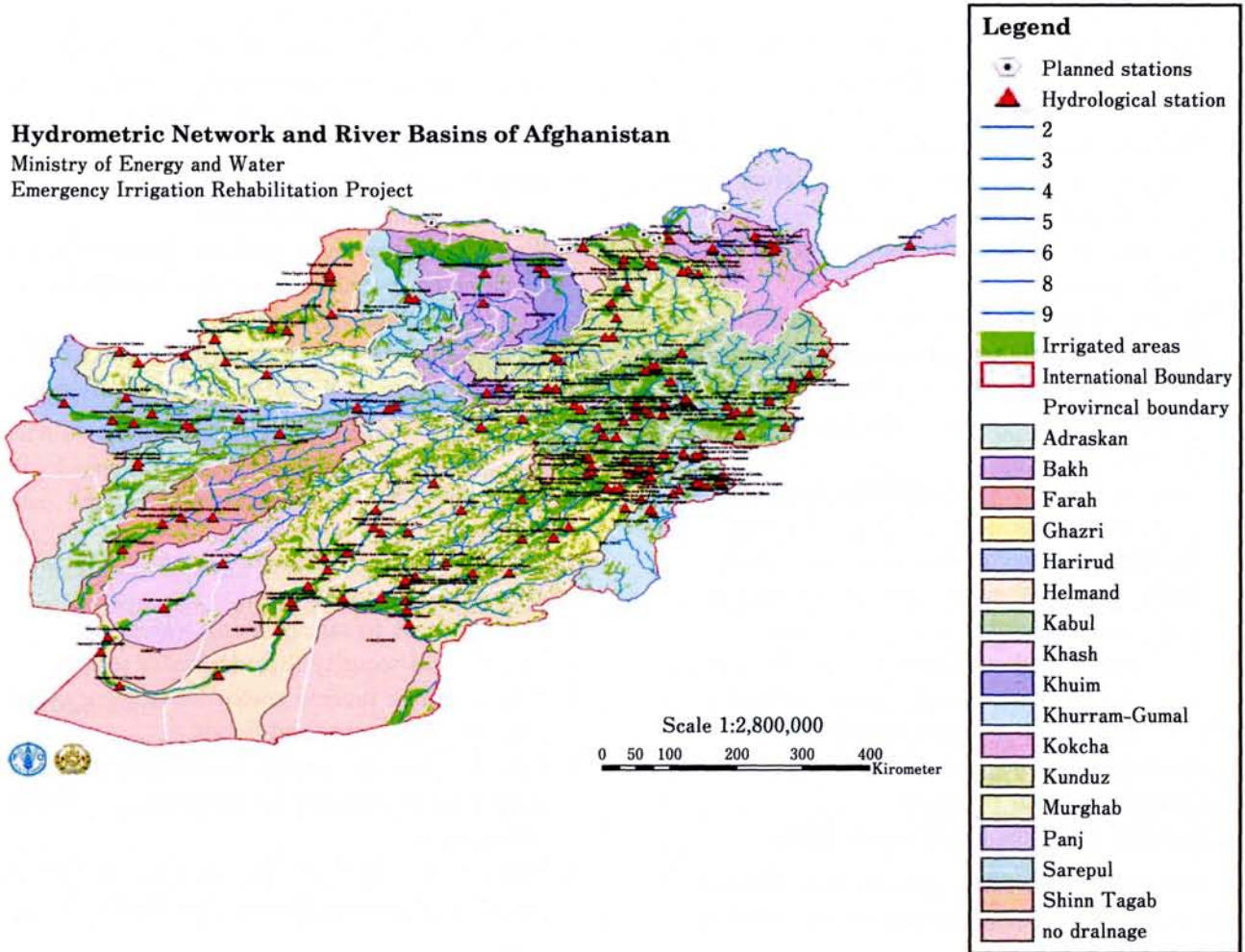


Fig. 2. Location of Hydrometric Networks (Source: MEW & FAO)

- Supervise, from the implementation of policies, strategies, laws and regulations;
- Create coordination, concerning water allocation for different uses;
- Decision making on negotiation with the neighboring countries on trans-boundary water issues. (MEW, 2007)

Desired Outcomes of the Proposed Strategy

Expected short-term outcomes

- Approval of the revised Water Law (by the end of 2007)
- Establishment of new institutions for water resources management and urban and rural water supply management
 - Kunduz River Basin: three sub-basin councils and sub-basin agencies (end of 2007)
 - Amu Darya River Basin: three additional

sub-basin councils and sub-basin agencies and a council and an agency for the entire river basin

- Balkh sub-basin institutions
- Western Basin institutions
- Afghan Urban Water Supply and Sewerage Corporation (AUWSSC) (end of 2007)
- Strategic Business Units (SBUs) functional (end of 2008)
- Hydrometric network installed and operating (2007–2008); data collected and processed and information services effectively provided to users (2008 onward)
- Environmental regulatory frameworks and management services and natural resource policies established for the protection of air and water quality, waste management, and pollution control (end of 2007)

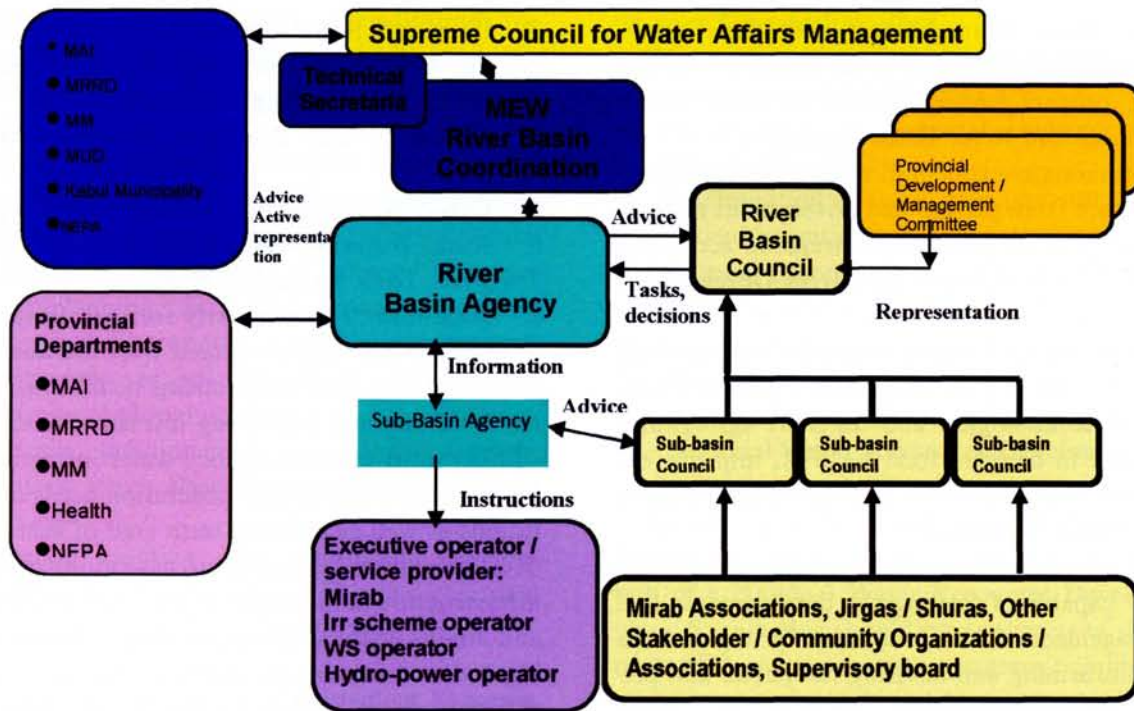


Fig. 3. River Basin Institutional Arrangements

- Water user associations, based on the traditional Mirab system, participate in all aspects of planning and management of the water resources in their area through the proposed river basin management institutions (river basin and sub-basin councils) (2007 onward)
- River basin management plans prepared for basins with functional river basin institutions in place (2008 onward)

Expected midterm outcomes (2013)

- Capacity building in different ministries in the water sector and new management institutions, started in 2007, in full swing; by 2012, 70% of staff properly trained, including an improved gender balance at all levels of staffing
- Kabul Water Supply fully operational in 2013
 - A total area of 2,534,000 ha under irrigation
 - Water provided by small and medium systems to 1,771,000 ha
 - Water provided by large systems to 763,000 ha (30%)
- Improvement/extensions of urban water supply networks to provide access to piped water to 50% of households in Kabul and 30% of households in other main urban centers
- Expanded new management institutions for

water resources management and urban water supply

- Northern River Basin Institution (2013)
- AUWSSC regulator appointed (2013)
- Four additional SBUs functional (2013)
- Access to safe drinking water extended to 90% of villages and sanitation to 50%
- 47% of villages benefit from small-scale irrigation
- Monitoring and Evaluation Units established by the Ministry of Energy and Water and River Basin Agencies providing information to management and donor agencies
- National Water Resources Development plan prepared, indicating options for potential dams sites, storage reservoirs for multipurpose use, resources for drinking water supply, irrigation expansion, and improvement in efficiency and effectiveness of water use. Feasibility studies, presently in progress, should become part of this plan (ANDS, 2007).

Desired long-term outcomes

Experiences and lessons learned from implementation of the short- and midterm desired outcomes will contribute to achieving these long-term desired outcomes:

- River Basin Management institutions established and functioning in all five river basins, with proper gender balance in River Basin Agencies and River Basin Councils
- Continuous investment in water resources infrastructure from private and government sectors, based on plans and designs prepared according to the National Water Resources Development plan
- Improvement of water resources management and introduction of alternative crops, new irrigation technologies, and different agricultural systems to increase food security, improve environmental conditions, and significantly reduce cultivation of poppies
- Staff of Ministries and River Basin Agencies fully capable of leading the developments and management of water resources in Afghanistan and informing and advising the public and private sectors accordingly
- Information systems operational for proper prediction of droughts and forecasting of floods
- Functional flood management system in all river basins
- Supreme Council of Water Affairs Management and its technical Secretariat functioning as a coordination body, with a pool of part-time contracted experts as advisors
- Procedures/institutions for transboundary waters functional
- Appropriate curriculum regarding all aspects of the water sector developed at local universities and technical colleges
- Water services providers in urban and rural areas functioning as independent, autonomous enterprises
- Supply networks for drinking water covering 90% of urban areas
- Access to clean water by 98% of the Afghan population (ANDS, 2007).

Plans and Major Programs

The ongoing and planned projects of the Ministries have been clustered and structured into a number of national programs, taking into account the requirements outlined in the priority policies:

1. Institutional Set-up and Capacity Building Program
2. National River Basin Management Program

3. Irrigation Rehabilitation Program (including the Agriculture Rural Infrastructure and Irrigation Schemes Improvement Program)
4. National Water Resources Development Program
5. Urban Water Supply and Sanitation Program
6. Rural Water Supply and Sanitation Program
7. River Bank Protection Program
8. Agriculture "Food Security for All" Program

These programs are charged with the dual tasks of remodeling and modernizing institutions while rehabilitating and improving infrastructure. They address short-term emergency water infrastructure rehabilitation and income generation needs of institutions as well as the long-term goal of sustainable development and creation of new multifunctional infrastructure in the water sector. As most projects and studies include components of capacity building and institutional development, project activities will be used as a training tool for the new river basin management staff as well as for water users and the staff of their organizations and others to be created as part of the river basin institutional set-up (ANDS, 2007).

1. Institutional Set-up and Capacity Building Program

Activities in this program are components of different ongoing and planned projects that focus on institutional set-up and capacity-building for water resources management, water resources infrastructure development, and urban and rural water supply development at the national level as well as at river basin and sub-basin levels. These activities have been combined into one program to enhance cooperation between the projects and to avoid duplication of efforts. The following activities as parts or suggested parts of projects should get proper attention for sustainable development in the water sector:

- Reorganization of Ministries, corporatization or privatization of viable state-owned enterprises (SOEs) and closing of the remaining SOEs
- Support for academic capacity and research
- Preparation for dialogue on transboundary water issues with neighboring countries
- All legislative reforms of the water sector, such as regulations implementing the Water Law,

guidelines, standards, set-up of institutions for water resources management, as well as training staff for implementation of the new legislation and regulations

- Capacity Building Development for Irrigation and Water Resource and Water Supply Management through continuous Technical Assistance in several areas: e.g., general management; planning, including economics; design; site surveys; agronomy and farm management; community organizing; gender balance; and operation and maintenance
- Capacity building and institutional development of River Basin Agencies and Sub-basin Agencies
- Capacity building and institutional development of AUWSSC and its SBUs and the rural water supply system (ANDS, 2007)

2. National River Basin Management Program

The new water policies and corresponding legislation have four major components:

- a. Integrated Water Resources Management—planning, development, and management of water resources for use by different sectors (drinking water, agriculture, mining, industry, etc.) will be integrated.
- b. River basin approach—natural river boundaries will be used as demarcation lines for the management of water resources and the related institutional set-up.
- c. Splitting functions—water resources management recognizes three levels of functions: legal and policy functions by the Ministry, organizational functions by River Basin Management, and operational functions by operators and service providers.
- d. Stakeholder participation in water resources management at the river basin level (ANDS, 2007).

3. Irrigation Rehabilitation Program

In 2002 several projects to meet the immediate need for irrigation infrastructure were developed, and these are still ongoing. Although these projects mainly focus on the infrastructure, they also provide significant input to the development of water resources and related issues, such as the rehabilitation of the hydrometric network for data collection

on river flows and weather.

Components of the irrigation rehabilitation program for the period 2008–2013 are

- Rehabilitation of National Hydrometric and Meteorological Stations;
- Rehabilitation of small, medium, and large traditional irrigation schemes nationwide;
- National Emergency Irrigation Schemes Rehabilitation of Helmand Valley Project;
- Construction of new national irrigation infrastructure.

4. National Water Resources Development Program

According to the Water Law the Ministry of Energy and Water is responsible for the preparation of a National Water Resources Development plan. Such a plan should cover aspects of development of the national water resources relating to the social, environmental, and economic needs of the country, including the following specific aims:

- Elaborate river basin development and management plans.
- Open the way for private sector investments in the water sector.
- Properly plan and construct infrastructure for rain and floodwater harvesting, supplementary irrigation, groundwater recharge, soil stabilization, etc.
- By the end of 2013, 30% of water should come from large systems.
- Prepare plans and designs for investments in water resources infrastructure.
- Manage water resources economically and equitably for a proper drinking water supply, environment protection, and improved land productivity (ANDS, 2007).

5. Urban Water Supply and Sanitation Program

By the end of 2010, municipal governments will have a strengthened capacity to manage urban development and to ensure that municipal services are delivered effectively, efficiently, and transparently in line with Afghanistan's Millennium Development Goals, and investment in water supply and sanitation will ensure that 50% of households in Kabul and 30% of households in other major urban areas will have access to piped water (ANDS,

2007).

6. Rural Water Supply and Sanitation Program

By the end of 2010, rural development will be enhanced comprehensively for the benefit of 19 million people in more than 38,000 villages. This will be achieved through the election of at least 14,000 more voluntary community development councils in all villages as yet without such a council, and promoting local governance and community empowerment. Access to safe drinking water will be extended to 90% of villages and sanitation to 50%; road connectivity will reach 40% of all villages, increasing access to markets, employment, and social services; 47% of villages will benefit from small-scale irrigation projects; 800,000 households (22% of all households in Afghanistan) will benefit from improved access to financial services, and the livelihoods of at least 15% of the rural population will be supported through the provision of 91 million labor-days (ANDS, 2007).

7. River Bank Protection Program

- (i) River bank protection and erosion control works: Through short-term/emergency, medium-term, and long-term measures, the impacts of annual floods will be reduced.
- (ii) Flood management and emergency program:
 - a. Emergency response to flooding: The response to flood disasters at the regional level will be coordinated and rapid, and the national response, including needs assessment, prioritization of activities, and coordination of the international response, will be effective and timely.
 - b. Medium- and long-term flood impact alleviation: A flood action plan for each river basin will be developed, and the risk of flooding will be reduced by the installation of appropriate and well-constructed permanent flood-control structures (ANDS, 2007).

Major Challenges

Insufficient Access to Safe Water for Different Uses (Water Supply)

- Post-conflict security
- To prepare a national water master plan in the River Basins (only the Kabul River Basin completed by Toosab, Iranian Consultancy)
- Lack of hydrometeorological data throughout

the country

- Insufficient institutional, managerial, and human resources capacity (limited technical capacity; limited multisector stakeholder collaboration; policies, the legislative framework, and planning need strengthening; river basin agencies and councils need to be established, and their participation in planning, decision-making, and implementation of plans facilitated)
- Lack of a comprehensive national strategy for drought mitigation and flood control
- Shortage of water resources infrastructure to control and develop water resources
- About 90% of irrigation infrastructure consists of traditional rural systems, in which more than 60% of water is lost between the water source and the cultivated land
- Shortage of power
- Limited financial resources
- Establishment of a dialogue on transboundary water issues with neighboring countries for mutual water use

Inefficient and Wasteful Use of Water (Poor Management of Water Demand)

- Public awareness via the media of other applicable ways to conserve and rationally use water is lacking.
- Modern irrigation methods such as drip and sprinkle irrigation are not used in rural areas.
- The water use norm for different plants needs to be determined, and excess irrigation, which is common among farmers, needs to be reduced.
- The efficiency and effectiveness of water use need improvement.
- Traditional irrigation infrastructure needs to be converted to modern irrigation systems.

Conclusions

- Water and power development by IWRM in Afghanistan is the first priority for the government.
- Over the next 20 years, the water sector in Afghanistan will play a vital role in the success of other economic development goals.
- Management and development of the water sector are aimed at improving the quality of life of the current and future population of Afghanistan, especially in rural areas through

- Sustainable and effective use of water resources;
- Ensuring access to safe and clean drinking water and sanitation;
- Reductions in poverty and unemployment through increasing agricultural production, power generation, and flood control;
- Ensuring protection of income resources of people in the face of drought and flood;
- Ensuring access to water energy to cities in rural areas
- Ensuring water access to the national industrial and other economic sectors;
- Giving priority to investment in storage dams and other water resources infrastructure;
- Protecting the environment from further damage and destruction and restoring biodiversity (Mahmoodi, 2007).

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