
WATER WISDOM AND SUSTAINABILITY: INSIGHTS FROM IRRIGATION SYSTEMS IN AFGHANISTAN

L'EAU DE LA SAGESSE ET DE LA DURABILITE: APERÇUS DE SYSTEMES D'IRRIGATION EN AFGHANISTAN

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ABSTRACT

Afghanistan has a 5000-year long irrigation history that has gone through many ups and downs. It also has a rich traditional system called the *Mirab* system for water distribution and routine and emergency maintenance. This indigenous system based on social relationship and arrangements is found to have evolved through time and has proved itself to be sustainable over the centuries. Currently, about 65% of the irrigation systems in the country still follow this *Mirab* system. The country also has the experiences of reviving from a period of war during which the irrigation infrastructures were destroyed and totally neglected. This paper presents an overview of Afghanistan's irrigation development history and the evolution of its irrigation institutions. It also outlines the experiences that the country has gathered in the endeavour of irrigation development and management during the different eras of history. Finally, based on these analyses, it also presents insights in the form of pointers that provide guidelines for sustainable development of irrigation systems.

RÉSUMÉ

L'Afghanistan a a 5000 ans de longs antécédents d'irrigation qui a traversé beaucoup de hauts et de bas. Il possède également un riche système traditionnel appelé le système *Mirab* à la distribution de l'eau et l'entretien courants et d'urgence. Ce système autochtone fondée sur les relations sociales et l'arrangement se trouve à ont évolué à travers le temps et s'est révélée être durable au fil des siècles. À l'heure actuelle, environ 65 % des systèmes d'irrigation dans les pays encore suivre ce système *Mirab*. Le pays possède également l'expérience de la relance d'une période de guerre au cours de laquelle les infrastructures d'irrigation ont été détruits et totalement négligées. Ce document présente un aperçu de l'histoire de développement de l'irrigation de l'Afghanistan et l'évolution de ses institutions d'irrigation. Il décrit également les expériences que le pays a recueilli dans l'effort de développement de l'irrigation et la gestion pendant les différentes époques de l'histoire. Enfin, en se fondant sur ces analyses, il présente également des connaissances sous la forme de pointeurs qui fournissent des directives pour le développement durable des systèmes d'irrigation.

Keywords: Water wisdom, irrigation institutions, *Mirab* system, sustainability, Afghanistan.

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1. History of Irrigation in Afghanistan

1.1 Review of History

The genesis of irrigation in Afghanistan can be traced back by some 5000 years during the period of Arian civilization when irrigated agriculture was introduced and expanded along the Amu River. The center of Arian civilization was in Balkh. The ancient city was called OmulBlad or mother of cities. In those ancient times, many large canals and dams were built in Sistan along Helmand River and the area was known as the “bread basket” of central Asia.

The first historical dam, called Khosh, was built 2000 years back in Sistan on Helmand River. The second one, by the name of Hawang, was built around 1400 to 1700 years ago and the third one, Rustam Dam, was built 1200 years back. The main locations of these dams were close to the present site of Kamal Khan dam which provided water to the large irrigable lands located between Khashrud and Helmand Rivers. One of the important historical canals was Tom canal which provided water to the northern and eastern parts of Sistan. This canal has played a significant role in the cultural and economic development of Sistan. This *Sistan* civilization ended about 750 years ago by the forces of Mongols and Timor Lane and the people of this region were not able to rehabilitate their dams and canals but still the old canal without water and old *Qalas* and villages can be seen in the deserts.

About 1000 years ago, the *Ghaznaviz* civilization also played an important role in the development of surface and ground water resources in the region. The *Ghaznavizs* had built many dams along Helmand and Ghazni Rivers and constructed hundreds of *Karezes* in the southern, western and eastern parts of their empire (*Ghazni* and *Sistan* Civilization). Band-e Sultan (built around 1011 A.D.) is one such dam, part of which can still be seen. During the eras of Ghurizs, Timories and Abdalies civilizations, irrigation systems expanded and they played a great role in the rehabilitation, maintenance, operation and construction of new Irrigation systems and *Karezes*.

Construction of dams and irrigation systems were the preferred instruments under the rule of Abdur Rahman (1880–1901) for extending his reign in order to forge an Afghan nation state under his rule. The Second World War left the Afghan government with relatively abundant financial resources due to its fur trade and provisioning of the allied forces in India. These funds were subsequently invested in completing the construction of hydraulic infrastructure planned during the early 20th century to consolidate and control the notion of an Afghan nation state.

Modern irrigation technologies were introduced in Afghanistan only after 1950s. This was spurred by the Cold War and also partially influenced by large-scale irrigation development works in neighboring countries like Pakistan, Uzbekistan, etc. These systems were conceived and constructed by mobilizing both bilateral and multilateral funding. Most of them were developed as multi-purpose schemes with both irrigation and hydro-power components.

During the two decades of conflict in the country, the irrigation sector suffered substantially, including destruction and neglect of irrigation infrastructure, collapse of national, provincial and local governance engaged in the management of the sector, and depletion of institutional and technical capacity.

Since the establishment of a transitional Government in 2002, several bi-lateral and multilateral donors, UN agencies and NGO's have arrived in Afghanistan to participate in the reconstruction and humanitarian needs of the communities. Irrigation rehabilitation was given high priority and several donors got engaged with the objectives of poverty alleviation, agricultural intensification and/or diversification and capacity development of both government professionals as well as the local farming community.

1.2 Evolution of Irrigation Institutions

The system of *Mirab* (Water Master) is observed to have evolved over time to take the responsibility of operation and maintenance of irrigation systems. *Mirab* is a person or number of persons who have traditional knowledge of an irrigation canal, elected by land owners mainly in downstream of the canal and responsible for proper distribution of allocated water among users, routine operation and maintenance including emergency repair of canal through mobilization of local communities for collective volunteer work (*Hashar*) as and when required, including coordination with authorities. *Mirab* is authorized to cut illegal diversion of water from canal, identify and introduce defaulters to the communities and authorities. Around 65 % of the irrigation systems in Afghanistan at present are being operated by the *Mirabs*.

The establishment of government institutions that were engaged in irrigation development in the country is found to have occurred only during the regime of the Royal Government of Afghanistan (1951 - 1973). Irrigation related activities were covered by two institutions. Ministry of Public Works carried out the major water infrastructures like dams, diversions, main canals, etc.), while the Directorate of Land and Water of the Ministry of Agriculture carried out minor irrigation structures including operation and maintenance (O & M).

From 1973 up to 1981, all water related activities were conducted by Water and Power Authority under direct supervision of Prime Minister's office and later on by the Ministry of Water and Power. Then, from 1981 up to 1989, irrigation related activities were conducted by the Ministry of Water Resources and Irrigation.

From 1989 to 2002, all water related activities were conducted by the Ministry of Water and Power of the then Democratic Republic of Afghanistan. While from 2002 to 2004, it was again split into two institutions under the Islamic Republic of Afghanistan: Ministry of Irrigation, Water Resources and Environment (MIWRE) for major works and Ministry of Rural Rehabilitation and Development (MRRD) for minor irrigation systems rehabilitation in rural areas.

A major shake-up is found to have taken place in terms of irrigation institutions in the year 2002. An International Conference on Water Resource Management and Development was held in Kabul from 29th April to 1st May 2002. The participants of this conference noted the vital role of water resources in the development of Afghanistan and emphasized on the need of rehabilitation and improvement of traditional irrigation systems, community participation, establishment of regulation on water extraction, effective use of water, conservation and preservation of environment, involvement of private sector and effective coordination. This was called the Kabul understanding. Declaration of this conference was a base for development of water sector related policies and strategies such as the Water Sector Strategic Policy Framework. The National Development Framework (NDF) in April 2002 set the key principles, policies and strategies that serve to guide the formulation and implementation of the Afghanistan Recovery and Reconstruction Program. This framework is especially relevant to the water resources, irrigation and rural development sectors. The institutions in these sectors were faced with developing a new vision of their future role, revision of the policy and institutional framework for the sector, and the massive task of institutional restructuring and capacity building to enable the respective line ministries and provincial and district offices to lead the recovery and reconstruction program.

From 2004 onwards, the irrigation responsibilities were split into three institutions: Ministry of Energy and Water (MEW) for major water and irrigation related activities, Ministry of Agriculture, Irrigation and Livestock (MAIL) for minor secondary irrigation systems and the Ministry of Rural Rehabilitation and Development (MRRD) for minor irrigation systems in rural areas. This was legally established through the promulgation of the Water Law in 2009. Roles of all government agencies working in the water sector were defined. MAIL commenced building up its Irrigation Directorate for the rehabilitation and development of irrigated areas and embarked on the On-Farm Water Management Project towards improving irrigation at the farm level. MEW initiated major irrigation rehabilitation works with the Irrigation Restoration and Development Project (IRDP) while MRRD got engaged in developing irrigation infrastructures and supporting agriculture in rural communities under programs like National Solidarity Programme (NSP) through Community Development Councils and their cluster.

1.3 Phases of Development

Review of historical development of irrigation in Afghanistan reveals that it has gone through many phases starting from initiatives from the community level to assistance from the government and later even to some international assistance. It can be viewed by dividing the timeline into the following five eras:

1.3.1 Community Led Development Era (5000 years ago – 1879)

This period refers to historic era when irrigation development was largely carried out through the initiatives of local communities. Starting from the period of recorded history of irrigated agriculture in the area, it covers the whole period where farmers, through their own efforts, developed indigenous irrigation systems using locally available materials by mobilizing their own resources. The farmers also developed social norms for allocation and distribution of water. Hence, by the mid of nineteenth century, these traditional systems were dominant and were an integral part of the Afghan society.

1.3.2 State Supported Development Era (1880 – 1979)

This is the period when support was extended from the state for expansion of irrigation facilities. Initiatives were made towards planned development of irrigation in the country. Multi-purpose schemes which included both irrigation and hydro-power components were also identified, studied and implemented. Apart from the resources from the state, bilateral and multilateral funds were also utilized.

1.3.3 Destruction Era (1980 – 1989)

This is the period of war in the country. The developed irrigation infrastructures were destroyed and even those that survived could not get any attention in terms of operation and maintenance and subsequently suffered substantial damages. Additionally, it resulted in a total collapse of governance and institutional system and a huge depletion of the technical and management capacity due to death and exodus of competent human resources.

1.3.4 Restoration Era (1990 – 2001)

This is the period after the war when the security situation in rural areas was relatively better. Local communities were able to start restoration of their traditional irrigation systems by themselves and, in some cases, rehabilitation activities through NGOs with mainly UN agencies financial support were carried out though not in a planned way.

1.3.5 Post Conflict Rehabilitation Era (2002 – the present)

Since the establishment of transitional Government in 2002, several bi-lateral and multilateral donors, UN agencies and NGO's have been supporting Afghanistan in the implementation of reconstruction. Irrigation rehabilitation is being given high priority with the objectives of poverty alleviation, agricultural intensification and/or diversification and capacity development of both government professionals and the local farming community.

2. Current Scenario

Currently, Afghanistan has 7.5 million ha cultivable land of which 3.8 million are irrigated. The irrigated area comprises of mosaic of different type of irrigation systems. These are broadly divided into two categories mainly on the basis of their origin: informal (traditional) and formal (modern) irrigation systems.

Traditional irrigation systems are schemes fed by rivers, shallow wells (*arhad*), springs or *karez* (*qanat*). Some of them have centuries old history. They were constructed by the local communities using locally available materials and maintained in a traditional informal manner on a communal village basis and water rights are determined and recognized accordingly. Although they are called informal, their operation and maintenance was highly structured involving different communities of different ethnic origin. These can be further divided into three categories: small, medium and large-scale systems depending on their size which is also partially dependant on their geographical locations.

Modern irrigation systems are those constructed using modern irrigation technology through government or non-government agencies following the recommended practices of engineering design and construction techniques. These include systems both with and without reservoirs. By the late 1970s Afghanistan had five large-scale modern irrigation systems in operation. Parts of the schemes were operated under private land ownership agreements, while others were operated as State farms "owned" by the government. The Government heavily subsidized these schemes and farmers were given very limited choice of crop selection or farming practice. Later, this changed and the management started to follow the rules of the large scale traditional surface schemes and the only difference is that the regulation of water flow depends on the interaction between government authorities and the village communities. There has been substantial financial and technical support for the rehabilitation of the irrigation sector since 1989 from NGOs and UN agencies. These programs have included a wide range of community development and agriculture sector support activities including rehabilitation and in some cases expansion of traditional irrigation systems including *kerezes* and tubewells. These endeavours are presently build up in the currently on-going irrigation projects in the country.

3. Insights from Afghanistan Irrigation Systems

Many lessons can be learned from the past experiences of Afghanistan in the irrigation sector. These can provide valuable insights not only to the nation but to others as well. Some of these, derived from historical review and the lessons learned in the process of formulation and implementation of irrigation projects and programs, are as follows:

- Traditional systems are found to be more sustainable than modern ones. Hence, key elements of traditional knowledge of resource mobilization, conflict resolution and water distribution that is inherent in the *Mirab* system should still be preserved and build upon in the development of modern irrigation systems also.
- Institutional strengthening has been found to be an essential component of any irrigation development endeavour and work in this direction should be initiated from the very inception of the irrigation development works.
- Systematic technical assessment of the problems and consultation with *mirabs* and farmers has been found to be the best approach for identifying and planning irrigation projects. The river basin and sub basin should be the planning units and all systems within the units should be systematically surveyed and assessed before priorities are selected and specific projects formulated in order to ensure that traditional water rights and allocations are preserved, that upstream and downstream impacts and conflicts are minimized and mitigated, and that proposed solutions are sustainable.
- Cost-effective and labour-intensive methods designs of irrigation works have been found to be most suitable in the rural context. Every opportunity should be taken to provide skills training to villagers during construction to improve community capacity and enable them to improve and sustain preventive maintenance.
- Rehabilitation projects have been found to be best formulated, designed and implemented in consultation and with the participation of communities, farmers and *mirabs*. These projects are also best implemented, supervised and monitored at the provincial and local levels.
- The government and donors should not pay for work that would traditionally be done by farmers by *hashar* canal and *kerez* cleaning and maintenance is an activity that has always been done by farmers and villagers with their own resources. Experience shows that if payment is given for these activities, traditional practices will be undermined, adversely affecting the sustainability of the irrigation systems.

4. Conclusion

Afghanistan has its own experiences of the development of its irrigation sector. Traditionally, it has its own indigenous system for addressing the irrigation operation and maintenance system through, what is known as, the *Mirab* system. Moreover, it also has its own experiences of reviving its irrigation sector which was adversely affected by the conflict in the country. Hence, Afghanistan has a lot of rich experiences of in the field of irrigation that can provide valuable insights for others as well.

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