IRRIGATION MANAGEMENT IN AFGHANISTAN: THE TRADITION OF MIRABS

Eric Viala[1]

ABSTRACT

Like in other Central-Asian and Middle-eastern countries, Afghan farmers have over the ages learned to cope with a limited and infrequent supply of water and have developed appropriate structures and mechanisms. Afghanistan can boast of a very robust tradition of water user associations organized around canals and mirabs: operation and maintenance of traditional irrigation systems are carried out by local water users, typically headed by a *mirab,* ie a watermaster, not unlike the mayordomo of the aceqias of Mexico, the canalero of northern Latin America, or the amazil of Morroco (aiguadier in France). Each of these roles has his own specificities and the Afghan model is adapted to the Afghan natural and social background. This model worth studying as it is ages-old, and managed to survive the past 23 years of chaos. The mirab in Afghanistan is usually a respected elder that acts altogether as a steward of the water conveying infrastructure, a controller of water flows and a facilitator of allocation disputes.

INTRODUCTION

The Afghan economy, like other Central Asian economies, still heavily relies on agriculture. The aridity of the climate causes water resources to be scarce, and 80% of agriculture occurs through irrigation. Like in other Central-Asian and Middle-eastern countries, farmers have over the ages learnt to cope with a limited and infrequent supply of water and have developed appropriate structures and mechanisms. We will here shortly introduce the structures involved but mostly elaborate on the societal organization for water allocation with the leading role of the mirab (traditional watermaster).

HISTORICAL CONTEXT

Despite its aridity Afghanistan has a long history of agriculture and settlements boasting some of the oldest known sites of irrigation in the world. Since its early development in Mesopotamia around 7,000 BC, irrigation spread gradually from the Middle-East through Central Asia and up to China. By 2,000 BC large tracts of land were irrigated in Afghanistan. As irrigation networks expanded, methods to control and manage them developed and it is widely acknowledged that this

[1] Eric Viala is an irrigation engineer and was Project Manager in 2002-03 of the USAID-funded Afghanistan Irrigation Revitalization Project. He is now Team Leader for the design of the Integrated Irrigation Improvement & Management Project in Cairo, Egypt.

was the engine behind the early forms of civilizations: the administration of scarce water resources being central to the social and political hierarchy [Wittfogel]. Water was viewed as a "Gift from God" which could not be owned or controlled by an individual, but had to be used for the welfare of the community. Because of the importance of water to grow food, those responsible making decisions regarding water allocation and distribution were usually among the community leaders or important administrative officers.

One of the first detailed descriptions of traditional water management strategies is the Mujam ul-Buldan, Yakut's large geography written in the early 13th century. Yakut provided an excellent insight as to how water was managed at Merv (in present Turkmenistan), which at its zenith in the 11th-13th centuries was one of the largest cities of the Medieval world. The Mirab determined the amount of land to be cultivated in the oasis each year based on the level of the river in spring. Moreover, hourly reports on the level of water in the main canal were passed to his office to enable decisions on which off-takes were to be opened and closed. The system was so large that over 12,000 people were employed to maintain and manage the system. Moreover, all water users were obligated to take part in communal maintenance as well as pay for the water they used.

IRRIGATION IN AFGHANISTAN

The topography of Afghanistan is characterized by extensive desert plains, high mountainous ranges and scattered fertile valleys along major rivers. Roughly half of Afghanistan is located at an altitude of over 2000 m. Afghanistan has a dry continental climate: ninety percent of the country's limited annual precipitation (300 mm on average) occurs during the winter months between December and April, mostly falling as snow. In general, rainfed agriculture is subject to chance and consequently of limited productivity, while river flows allow spring and summer irrigation with greater agricultural output in the plains.

Agriculture is estimated to produce 85 to 90% of Afghanistan's Gross Domestic Product, and employs 70 to 80% of the population. It is the principal source of livelihood for a large sector of the rural population, particularly those living in more isolated regions of the country. Those provinces with the largest irrigated areas include Kandahar and Helmand in the south, Herat in the west, Baghlan, Balkh, and Kunduz in the north and Ghazni in the southeast. These seven provinces have the largest areas of low elevation (flat land) on the periphery of the country, located along the valleys of the four major river basins of the country, the Helmand River and its tributaries in the South, the Hari Rud in the west, the Balkh and Kunduz Rivers in the North, and the Kabul River in the east.

There are five basic types of irrigation in Afghanistan. These include: (i) modern surface systems, (ii) traditional surface systems, (iii) springs, (iv) karezes, and (v) wells. Modern systems represent approximately 10% of the total irrigated area;

karezes (see below) traditionally have represented about 5%; springs represent slightly more than 5%, and traditional canal irrigation systems with intakes from various rivers and streams represent more than 80%.

Modern and traditional systems divert river spring/summer flows for surface irrigation. Modern irrigation systems are characterized by the presence of perennial concrete infrastructure and machinery-dug canals. These have usually been funded by international donor agencies during the second half of the twentieth century. They are larger than 10,000 hectares and can be as large as 100,000 hectares. About a dozen modern systems exist in Afghanistan with an aggregate command area of around 350,000 hectares.

Traditional schemes are those which have few or no engineered structures and which generally rely on earthen water conveyance and control structures for water delivery. Typically they have been constructed by the users themselves ages ago. Traditional systems can be quite large (thousand of hectares and more). Where traditional systems have been selectively improved, the two system types tend to blend seamlessly together. Traditional canal-based schemes are widely distributed in every province in the country. They range in size from a few hectares in high mountain valleys to extensive networks covering thousands of hectares. They occur most extensively in the larger lowland provinces mirroring the distribution of overall irrigation in the country.

The three other types of irrigation tap into groundwater resources. Karezes (similar to the Qanats in the Middle-East, or rhettaras in the Maghreb) are traditional underground tunnels dug to reach the aquifer table and convey water to the surface some distance down slope. Estimates of the total number of karezes in Afghanistan range from 7,000 to 8,000. They are concentrated almost exclusively on the eastern, southern, and western flanks of the Hindu Kush. The past 23 years of war and strife have been extremely hard on karezes, which require regular maintenance and intensive manual labor to work effectively. Drilled wells are rapidly replacing karezes as supplementing surface irrigation systems and some cases bring new land under irrigation. These are abundant, and noticeable adjacent to the road from Kandahar to Kabul. These wells have become a significant and growing source of irrigation water. At present, no data are available to document the number of these wells, or their contribution as a new source of irrigation water. The trend to deep wells needs to be watched very closely, and could represent a dramatic future policy challenge for the government because of its unsustainability.

OPERATION AND MAINTENANCE OF TRADITIONAL IRRIGATION SYSTEMS IN AFGHANISTAN

Operation and maintenance of traditional irrigation systems are carried out by local water users, typically headed by a *mirab*. The word "mirab" which is also

used in Iran and in Central Asia, comes from a combination of the Arabic word mir (or amir-emir) which designates a leader, and ab, the dari word for water. The mirab is thus by definition the watermaster, not unlike the mayordomo of the aceqias of Mexico, the canalero of northern Latin America, or the amazil of Morroco (aiguadier in French). Each of these roles has his own specificities and the Afghan model is adapted to the Afghan natural and social background. This model worth studying as it is ages-old, and managed to survive the past 23 years of civil strife.

The mirab in Afghanistan is usually a respected elder that acts altogether as a steward of the water conveying infrastructure, a controller of water flows and as a facilitator of allocation disputes. We shall look at these various roles in turn.

As the steward of the infrastructure, the mirab spends a lot of his time walking along the canals, checking regularly upstream on the river intake (or mother well in the case of a kareze), on the main conveying canal, on the secondary canals, on the control structures such as weirs and turnouts. If maintenance works are needed, either because of ageing or because of disastrous events (generally floods), the mirab will require men from the communities served by the system to provide free labor. As an example, in the case of the intake of the canal being wiped out by a river flood, mirabs of larger canals are able to mobilize up to several hundreds farmers (bringing their own tools) who will work without being paid up to a few weeks under his and his assistants' supervision to rebuild the mud and log barrage. These workers, through the provision of free labor, informally renew their rights to get water. It is common practice for mirabs to keep track of who showed up or not, and those who repeatedly do not participate in canal repair and maintenance will be denied water.

As the controller of water flows, the mirab and his assistants personally operate or supervise the opening and closing of the various structures which distribute water from the main canal to the secondary and tertiary canals and then to the individual fields. Allocation of water is made based on different types of measurements:

- At the intake or along the main canals, flows are divided (between right and left banks, or different branch canals) through proportional weirs; likewise the width of turnouts corresponds to the share of that turnout and usually relates to the amount of land to be irrigated by that turnout;
- In time of drought, a more detailed timetable will be drawn by the mirab (after extensive consultations within the community) and water turns will be implemented

There are usually different levels of allocation processes: the head mirab (mirab-bashi) manages and allocates water along the primary canal, while along branch or secondary canals (each usually serving a village or a community), water

resources are allocated by sub-mirabs or directly divided by the communities/villages served.

As the facilitators of water disputes, the mirabs regularly solve minor disagreement on the spot. This is usually achieved through consultations of all parties, the search for a consensus or lacking this use of the mirab's moral authority. Major quarrels are referred to the *Shura,* the village or community council (also called jirga in Pashtu). The dari word 'shura' comes from the Arabic 'mashwara' (to discuss). It describes the traditional advisory council formed to solve conflicts, or deliberate on decisions affecting the community. The core of such councils comprise those whose opinions, negotiating skills and knowledge of tribal and/or religious law are respected, usually including elders, religious authorities, and local leaders. Any male head of household can attend the shura and all parties attending the shura are allowed to speak but obviously all voices in the shura are far from equal. While the council itself may have no direct means of enforcement, its authority is respected, and those who do not comply with its decisions will find themselves at odds with the community.

The mirab is usually a respected elder within his community. Mirabs are formally chosen (co-opted) by the shura for a given period of time (one to several years). There is definitely an apprenticeship process that leads to the position: most if not all mirabs started as assistant mirabs (called "checkbachis") and only after serving in that position for a period of time, graduated to the higher position. Some mirabs actually "inherit" the position from their father after serving as an assistant.

The water management organization lead by the mirab seems to vary quite a bit: in some instance, there is one mirab (with some assistants) for the main canal, who controls the canal intake and the distribution into secondary canals. Longer canals can be operated by two (or maximum three) mirabs, one being the upstream mirab and the other being the downstream mirab. They confer for major decisions, but each of them maintains his part of the canal and operates the turnouts. As previously explained, secondary canals can be managed by sub-mirabs or directly by the communities.

Water users, beyond the provision of free labor for the maintenance of the infrastructure, pay the mirab and his assistants for his services. The price varies, but the average "salary" for a head mirab seems to be one "man" (about 5 kg) of wheat per jerib (about 0.19 ha). Most mirabs acknowledge that not all farmers pay, and that they tend to classify households per their wealth. The poorest households do not pay and are not held liable as long as they provide labor. While peer pressure and social constraints demand that rich households pay their dues regularly.

MIRABS AND MODERN IRRIGATION SYSTEMS

Starting in the early 1950s, Afghanistan launched itself in a program of irrigation development, partially funded by donor agencies. About a dozen large irrigation systems were built in the following twenty years, some of them including reservoir infrastructure. All these systems are larger than traditional ones and cover more than 10,000 ha. Their construction by the central authorities meant that parastatal agencies (Helmand Valley Authority, Nangrahar Valley Authority) were created to maintain and manage them. This top-down type of management was originally accepted in some systems such as Helmand (irrigating new lands) because of the lack of a pre-existing social structure and of technical skills: settlers came from different regions, and initially most were nomads. But either initially or after some years, the control of secondary and tertiary canals was taken over by farmers and mirabs appeared in all modern systems.

Governmental and parastatal agencies kept control of the intake and primary canal mainly because the size of the primary infrastructure required large maintenance equipment that only governmental agencies could pay for. Communities through their mirabs would manage and maintain secondary and tertiary canals. Drains were also mostly maintained by the agencies as farmers were mostly unaware of the need for drainage: all traditional systems are along rivers on fertile and well drained silty soils, while some of the modern systems were developed outside of the river valleys on more sandy and thus more salinization-prone soils. Such was the situation in Afghanistan until the late 1970s.

SOVIET INVASION AND CIVIL WAR IMPACTS ON THE MIRABS

The Bolshevik Revolution and the subsequent emergence of the Soviet Union initiated a period of radical change in Central Asian water management. Water and land were no longer owned by individuals or communities but were common resources to be developed for the benefit of the country. Early on, the Soviet administration decreed that water management was to be taken 'out of the hands of traditional elders and councils. There emerged instead a number of government bodies who were responsible for the development of a regional water management strategy plans that would allow centrally determined production targets to be met.

The Soviet occupation of Afghanistan (1979-1989) was too short and too unsteady to launch similar changes. Although there are instances where the mirabs were replaced by Party members, generally to the detriment of the operation and overall productivity of the irrigation system, this seems to be more an exception than the rule. In such cases of authoritarian designation of the mirab, it was done more as a way to to assert better control over the local community, but not as a larger governmental policy. Most mirabs actually kept their positions. The disruption of irrigation systems was mostly due to the destruction of

infrastructure, the devastation of fields, and the displacement or exile of populations (often caught in the cross-fire between the Soviet Army and mujahedins).

The civil war that occurred thereafter (1989-2001) provided the same type of impacts: while few mirabs were authoritarily replaced, the same destruction of infrastructure and departure of farmers into exile occured. The Talibans, not unlike the Soviets, seemed also to have practiced a "scorched earth" tactic in the non-Pashtun regions (notably in the central Hazarajat and in the Tajik Shamali plains, just north of Kabul).

But during the entire period since 1979, the chaos and lawlessness contributed to undermining the role of mirabs, as communities were ripped apart: valuable irrigation structures were sometimes damaged because of long standing feuds between neighboring families, villages or tribes. But more importantly the collapse of social cohesion lead farmers to take water out of turns, or over irrigate their plots, to the detriment of downstream users. Warlords grabbed lands and water rights, building their own turnouts to divert water from the canal. This situation resulted in increased wastes of water while mirabs could only watch powerless, their moral authority no longer acknowledged.

THE SITUATION TODAY

Traditional systems have generally more or less survived these 20 years of turmoil, because the communities themselves have been able to preserve some type of cooperative management of water resources, and mirabs are still today selected and put in charge of supervising the irrigation processes. Some traditional systems suffered more because they happened to be located on battle frontlines, and their infrastructure was destroyed, forcing the majority of the community members into exile. The four-year drought recently (1998-2002) experienced all over Central Asia also heavily impacted Afghanistan and contributed to the exodus of farmers. However there are definitely encouraging signs of recovery in most traditional systems. From a rehabilitation perspective, assistance is definitely needed to bring back these systems on their feet, as returning farmers are usually in debt and thus have absolutely no resources besides their arms to resume farming. Caution should be exercised during rehabilitation assistance as there is a clear danger of further disrupting the social organization: paying workers to clean a canal while farmers are supposed to contribute free labor to do so can be considered for heavily silted up canals, not for yearly cleanup operations. Why would then farmers work for free if by complaining to donors, they can get paid for the same labor? This however would have major consequences on the way the community handles irrigations systems, since for example the provision of free labor is directly linked to the water rights of individuals.

Modern systems on the other hand suffered more because while governmental agencies lost operational capacities in terms of funds, staff and equipment, maintaining them proved beyond the potential of water users. Farmers almost completely took over the secondary and tertiary canals, while some technical staff stayed on (even if paid once in a while) and acted as informal advisors. An interesting example is the state farms in Jalalabad: the Nangrahar Valley Authority could not pay staff any more and ended up leasing public lands to farmers in order to carry on agricultural production, generate some income to pay for limited maintenance.

From a rehabilitation perspective, the focus should clearly be on modern systems, and in these on those structures that local farmers have not been able to maintain on their own, such as drains, intake, and primary canal.

CONCLUSION

Today the role of the mirabs is as crucial as ever, not only because of their activity but also because they represent the social cohesion of communities, along with other types of leaders or activities. The needs are multiple, from the construction of perennial infrastructure, technical training on water allocation and use efficiency, to the provision of equipment or rural credit. Extension services have to be developed to improve agricultural practices, and sensitization to equity issues should be introduced, looking at poorest segments of the population and most notably women. The underlying key question is how to strengthen the informal water user associations lead by mirabs without disrupting them.

Looking at modern systems, one can assume that secondary and tertiary infrastructure can and should be managed in the same way as traditional systems. The additional key issues are the maintenance and operation of the primary infrastructure, the partnership between the governmental agency in charge of this and the water users, and the funding of the works. The mirabs are the obvious link.

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