



**AFGHANISTAN HUMAN
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Research Paper

**Reform and Rehabilitation: The Opportunities and Risks for
Pro-Poor Intervention in Afghan's Irrigation Sector**

David Thomas

The views and opinions expressed in this paper are those of the author and do not necessarily reflect CPHD's views and opinions.

Executive Summary

This paper explores the connection among poverty, irrigation and rainfed agriculture in Afghanistan in the context of recent efforts to rehabilitate irrigation systems and reform the country's water sector.

Agriculture is the largest livelihood strategy within the country, and, of those engaged in agriculture, 79 percent have access to irrigated land. The likelihood of poverty for an Afghan if the household head is engaged in agriculture is 36 percent, close to the national average poverty rate. In a country plagued by drought, the vulnerability of the agricultural sector to changes in rainfall patterns and snow-melt is high. This was demonstrated by the events of 2008, which saw a collapse in the production of rainfed wheat.

At present, nearly a third of pre-war (that is, pre-1979) irrigated land lies fallow. Where land is irrigated, the irrigation is accomplished at efficiencies of around 25 percent. This compares with an average performance of 40–60 percent in the traditional earthen canal systems of the rest of the world (World Bank 2009).

Government efforts to increase the irrigated area of the country and improve irrigation efficiency – part of its strategy to encourage sustainable economic and social growth – will undoubtedly help millions of vulnerable farming households lift themselves out of poverty and food insecurity.

However, a current lack of understanding of the institutionalized inequalities in the operation of the country's community-based irrigation management systems risks frustrating interventions designed to improve the livelihoods of the most vulnerable farmers.

In addition to rehabilitating its irrigation infrastructure, Afghanistan urgently needs to adopt a policy of integrated water resources management to address issues of long-term supply, environmental sustainability and climate change.¹ Otherwise, the country runs the risk of losing both the benefit and future potential of its historical, community-based irrigation management system, again preventing the most vulnerable farmers benefiting from the country's economic growth.

A detailed and in-depth local analysis of the technical and social aspects of community-based water distribution is strongly recommended whenever an irrigation system is rehabilitated. An assessment of existing inequality and poverty should also be made to ensure that any intervention will, at the least, not make matters worse for the most vulnerable farmers.

1. Conceptual Link between Poverty and Irrigation

Hussain and Hanjra (2004) provide a useful conceptual framework through which to analyse the

¹ The Department for International Development (United Kingdom) predicts that, by 2030, drought in Afghanistan will be perceived as the norm (Savage et al. 2009).

connection between irrigation intervention and poverty alleviation in Afghanistan.² They make a distinction between the direct and indirect benefits of irrigation, as well as the short-term and long-term benefits. A summary of their framework is given below.

Access to good irrigation water can directly benefit rural communities and alleviate poverty in a number of ways, including by increasing production, by increasing income and consumption, by increasing employment, by increasing food security, by allowing smallholders to diversify cropping patterns and switch to high-value market-oriented production and by creating year-round farm and non-farm employment through higher production, higher yields and lower risk of crop failure.

Investment in irrigation has an indirect impact on poverty by contributing to a country's long-term overall economic growth and by increasing food supply, thereby reducing food prices.

While recognizing that irrigation enhances productivity, promotes growth and reduces poverty and while admitting that, in the long term, the poor may benefit from investment in irrigation, there is a risk that short-term benefits may accrue disproportionately to the powerful. Furthermore, while irrigation has a diverse impact on poverty, the magnitude of this impact can be expected to vary by location.

2. Overview

With the launch of the Afghanistan National Development Strategy, which emphasizes reducing rural poverty through increased irrigation and wheat productivity, and with the concurrent release of the Water Sector Strategy, which emphasizes integrated water resources management, the irrigation sector finds itself the target of high expectations at a time of potentially unsettling institutional changes.³ This comes after decades of war, which have seen over half the country's irrigation infrastructure destroyed.⁴

Given the more than twofold increase in the productivity of irrigated versus rainfed lands and given the long gestation period for new irrigation development, the Government of Afghanistan has assigned priority to the rehabilitation of existing, traditional irrigation systems, believing them to be the key to spreading the benefits of irrigation quickly and equitably throughout the country, including remote areas (World Bank 2008).

At one level, the logic of rehabilitating existing irrigation systems is self-evident: improved irrigation is associated with greater and more reliable flows of water and therefore improved yields, improved food security, less time spent repairing irrigation systems, and – with the right conditions of market access – an increase in farm incomes and a reduction in vulnerability. Indeed, the World Bank Emergency Irrigation Rehabilitation Programme has managed to rehabilitate over

² Note that their analysis is not specific to Afghanistan, but focuses on Asia.

³ The World Bank remarks that, to enable more rapid overall economic growth and significantly reduce rural poverty, agriculture needs to grow at 5 percent per year over the next decade. The aim of the Afghanistan National Development Strategy is to increase the percentage of villages benefiting from village-based irrigation from the 2007 baseline of 36.2 percent to 47 percent by the end of 2010 and to 68 percent by 2013. The target for new irrigation is an additional 450,000 hectares under irrigation by 2013 relative to 2008 levels (Government of Afghanistan 2008a). The aim in wheat is to double production from 2 to 4 tons per hectare (MAIL 2007). The strategic aim of the Water Sector Strategy is to “manage the Nation’s water resources so as to reduce poverty, increase sustainable economic and social development, and improve the quality of life for all Afghans and to ensure an adequate supply of water for future generations.” In irrigation, the aim is to increase the total area under irrigation from the 2007 baseline figure of 1.8 million hectares to 2.5 million hectares by 2013 (Government of Afghanistan 2008b).

⁴ Prior to 1979, 3.3 million hectares were irrigated (Government of Afghanistan 2007).

100,000 hectares since 2003, resulting in a 48 percent improvement in wheat yields and an average increase in farm incomes of US\$389 per hectare (World Bank 2009).

Of course, a lack of water is not the only factor limiting agricultural productivity in Afghanistan; a lack of credit, limited mechanization and the insufficient outreach of agricultural extension services all play a part.

Afghanistan has an ancient, community-based social water management system centred on *mirabs* (water masters), who are embedded in communities; in irrigation studies, the system is referred to generically as a farmer-managed system (for a detailed description, see Thomas and Ahmad 2009). This social construct appears to have survived the period of civil conflict, although it would be wrong to assume that years of war and rampant warlordism have not adversely impacted the effectiveness of the *mirabs*. A number of factors continue to put pressure on the existing system, including population growth, potential changes in rainfall patterns, changes in the timing and volume of snow-melt, a lack of a clear consensus on how to support traditional community structures, poor capacity in local government departments and legislative ambiguity (Savage et al. 2009).

The relationship between the equitable distribution of water and the operation of this community-based irrigation system is complex and not well understood or documented. The lack of understanding means that initiatives within the irrigation sector may not be as pro-poor as planners would like. For example, the government's aim to promote diversification into cash and (crucially) water-consumptive crops risks discriminating additionally against farmers already disadvantaged in terms of access to water.

We do not suggest that the strategies to rehabilitate irrigation systems or modify existing community water management institutions are unsound, but rather we wish to draw certain recently published research to the attention of planners and professionals, particularly reports associated with the Afghanistan Research and Evaluation Unit (AREU) and the Participatory Management of Irrigation Systems Project.⁵ These reports point to two conclusions, as follows:

- First, there are systematic inequalities in the distribution of irrigation water.⁶ These are based in part on location, power relationships, ethnicity and social status. These inequalities lead to subsequent inequities (that is, greater likelihood of poverty), which, in turn, lead to an unequal distribution of water, creating a viscous circle of entrapment.
- Second, community-based water management institutions are neither inherently inefficient nor inherently incapable of reducing inequality. Neither, however, are they perfect. Rather, they are merely human institutions the longevity (in certain parts of Afghanistan) and legitimacy of which have earned them the right to adapt rather than be eliminated if they are deemed capable of helping the government meet its development targets and deliver integrated water resources management. In particular, regarding the formation of water user associations (WUAs), these reports advise that *function* be put ahead of *form* and that the key question is how should WUAs be formed or organized in such a way that improves or at least does not worsen the status quo (Thomas and Ahmad 2009).

3. Key Statistics

⁵ In the National Risk and Vulnerability Assessment (NRVA) survey in 2007–2008, 65 percent of the respondents who had left some of their irrigated land fallow cited lack of irrigation water as the principle constraint. Furthermore, the rehabilitation of irrigation systems was the main priority in community development according to the male *Shuras* (traditional councils of elders); see MRRD and CSO 2009.

⁶ Inequalities refers here to both locally understood notions of fair distribution and to objective definitions of fairness.

The importance of irrigation and agriculture in Afghanistan cannot be understated. Of the population, 74 percent is rural, and 67 percent of this rural population lives from agriculture and livestock, making agriculture the country's main livelihood strategy (MRRD and CSO 2009). Productivity in the agricultural sector, however, remains low, contributing only 35.5 percent to gross domestic product in 2007.⁷

According to the National Risk and Vulnerability Assessment (NRVA) in 2007–2008, 55 percent of Afghan households are engaged in farming, while around 40 percent have access to irrigated land and 17 percent have access to rainfed land (MRRD and CSO 2009). Of those households engaged in agriculture, 79 percent have access to irrigated land, an encouraging increase of 8 percent over the share found by the 2005 NRVA survey (MRRD and CSO 2007).⁸ Around 17 percent of households with access to irrigated land report leaving at least part of their land fallow, while 75 percent state that a lack of water was the main reason, followed by 12 percent arguing that the cause was a lack of money. This finding strongly suggests that investment in improving irrigation efficiency, as well as extending command areas, would create significant improvements in agricultural output.

Wheat is the most important crop grown on these lands, accounting for 77 percent of irrigated land in the summer and 95 percent of rainfed land (MRRD and CSO 2009). Normally, Afghanistan is not self-sufficient in wheat and must import wheat to satisfy food demand.

Due to natural disasters and variable climate conditions, wheat production fluctuates widely. This is particularly the case of rainfed wheat, making those farmers reliant upon rainfed wheat particularly vulnerable (see below).

In Afghanistan, only approximately 12 percent of the land is arable (Rout 2008). Of this share, 85 percent requires irrigation (World Bank 2009). Thirty years of civil war and unrest have taken a toll on the country's irrigation system; Oxfam estimates that the period between 1978 and 1987 saw the partial or total destruction of over half the country's irrigation systems (Jackson 2009). It has been estimated that, as of 2007, only 1.8 million hectares of land were irrigated, a small area compared with the pre-war (1979) area of around 3.3 million hectares (World Bank 2008). In addition, irrigation systems operate at only 25 percent efficiency, which is well short of the international norm of 40–60 percent efficiency (World Bank 2009). Approximately 3.5 million hectares of land are rainfed and therefore reliant on timely rainfall, with yields around half those of irrigated lands.

Spring snow-melt is the major source of irrigation water. The areas of irrigated wheat are widely distributed throughout the country. Rainfed wheat, by comparison, is heavily focused in the northern third of the country (USDA 2008).

4. Concepts of Poverty in Afghanistan

In 2008, the Agency Coordinating Body for Afghan Relief published the findings of the Afghanistan Pilot Participatory Poverty Assessment (APPPA) (see ACBAR 2008). The motivation for the survey was the realization that, other than the 2005 NRVA, few poverty-related data (quantitative or qualitative) were available to inform pro-poor policy-making. Taking the maxim

⁷ It has been estimated that the total factor productivity of crops in Afghanistan dropped by 0.9 percent per annum between 1981 and 2001, compared, say, with the 2.3 percent increase in Iran (Avila and Evenson 2010). Data of the Food and Agriculture Organization of the United Nations for 2008 gives Afghanistan's wheat yield as 1.2 tons per hectare compared with 4.5 tons per hectare in Uzbekistan. See also NATO (2009).

⁸ Note that the 2005 NRVA survey (MRRD and CSO 2007) was conducted over only one season, while the 2007–2008 NRVA (MRRD and CSO 2009) was conducted over an entire year. Differences in access data may be an artefact of the sampling methodology rather than a genuine increase in access.

“the poor are the true experts on poverty” as its guiding principle, APPPA attempted to examine the poor’s own perceptions and definitions of poverty, providing qualitative data to complement the quantitative data of the 2005 NRVA.

Although APPPA did not address irrigation directly, its analysis, findings and recommendations nonetheless provide an important insight into how improvements in irrigation might help lift individuals out of poverty. APPPA concluded that poverty in Afghanistan was multidimensional and that its key components were as follows:

- A lack of assets
- Marginalization from essential services
- Powerlessness, helplessness, an inability to act to improve one’s well-being
- Food insecurity

Because of their weakened asset base, the poor had to struggle to meet their daily basic needs, and they were extremely vulnerable to shocks, conflicts and natural disasters such as drought, floods and earthquakes.

A key finding of the assessment was that the cost of basic household goods and foodstuffs had increased in line with the growth of the national economy, but at a more rapid rate than the financial assets of the poor, who were finding it harder to meet their daily needs. This recalls the short-term warnings of Hussain and Hanjra (2004) discussed above.

APPPA established a framework for analysing poverty as articulated by the poor in Afghanistan. It drew a distinction among the *drivers*, *maintainers* and *interrupters* of poverty. Some of the key drivers particularly relevant to agriculture were weak governance, seasonality and natural disasters. Shocks and seasonality were the major maintainers of poverty (along with weak institutions), while the key interrupters of poverty were a strong asset base and diverse livelihoods.

Within this framework, APPPA concluded that, to meet the immediate needs of the poor, special efforts should be undertaken to improve irrigation and water storage and to support small-scale agriculture through land reclamation and access to irrigation water. Access to health, education, clean water, employment opportunities and roads were also discussed.

5. Poverty and Irrigation

This section focuses on specific aspects of poverty associated with irrigation and agriculture.

As laid out in the Agriculture and Rural Development Sector Strategy, a component of the Afghanistan National Development Strategy, the government aims to

“move citizens from a state of extreme poverty to an improved quality of life, where sustainable food security is assured, and basic services are provided and incomes are raised” (Government of Afghanistan 2008a).

According to NRVA 2007–2008, the overall poverty rate in Afghanistan is 36 percent, meaning that around 9 million Afghans are not able to meet their basic needs (MRRD and CSO 2009). Of these 9 million, 6.7 million live in rural areas. Among households in which the household heads are active in the agriculture sector, more than one third (35.9 percent) are poor. This is a higher rate than the corresponding rate among households active in the education and health sectors, but lower than the rate for the construction, manufacturing and mining sectors. This discrepancy partly reflects

the increase in employment opportunities offered by higher education.

Unfortunately, the analysis of poverty associated with the first release of NRVA 2007–2008 data does not provide much insight into the link between irrigation and poverty. However, a number of relevant facts are highlighted in the analysis, as follows:

- There is evidence of seasonal variation in poverty rates, which are higher during the winter and spring and lower during the autumn harvest.
- Households owning land show the lowest poverty rate (26 percent), while those that are able to gain access to land by renting, sharecropping, or a mortgage arrangement show the highest rate (42 percent).
- The rate of access to irrigated land has increased in recent years.

NRVA 2007–2008 also addresses vulnerability, highlighting that 24 percent of households revealed they had experienced an agricultural shock within the previous 12 months, while 44 percent revealed they had experienced a natural disaster. From the current data, it is not possible to disaggregate the proportion of agricultural shocks that involve difficulties with irrigation.

An example of the inherent vulnerability of irrigation and rainfed agriculture to shocks may be found in the impact of drought conditions in 2007–2008, the worst drought in over 10 years, which saw precipitation over the vast majority of the country drop to less than 25 percent of normal levels for the 2008–2009 growing season (USAID 2009, USDA 2008). The result was a catastrophic drop in the production of rainfed wheat, down from 1.47 million tons in 2007 to only 0.22 million tons in 2008 (see table 1). Normally accounting for around 30 percent of total wheat production, rainfed wheat made up only 8 percent of total production in 2008. There was also serious concern about irrigated wheat due to the relatively low snow covering in the Hindu Kush Mountains, coupled with an earlier-than-usual snow-melt (USDA 2008). In the end, irrigated tonnage dropped by 16 percent, from 2.88 million tons in 2007 to 2.41 million tons in 2008, meaning a 40 percent drop in overall wheat production relative to 2007. This led to an increase in the 2008 price of wheat of over 50 percent (FEWS NET 2008).

Table 1: Wheat Production in Afghanistan, in 000s Tons

Type	2007	2008	2009
Irrigated wheat	2,878	2,406	3,387
Rainfed wheat	1,465	217	1,677
Total	4,343	2,623	5,064

A 2003 survey conducted jointly by the Food and Agriculture Organization of the United Nations and the Ministry of Agriculture, Irrigation and Livelihoods into agricultural livelihoods pointed to some of the more systemic and insidious problems associated with poverty and irrigation (see MAIL 2007). The report argued that *power asymmetries* had led to infringements of water rights at the apex of irrigation systems, resulting in the abandonment of villages in the lower reaches of systems, and that many farmers remained food insecure because of risky livelihoods; about 61 percent of the farmers had to rely on off-farm incomes to survive.

More recent work on the implications of power asymmetries has come out of the Participatory Management of Irrigation Schemes Project; research was conducted in 2005, and the findings were reported in 2007. The objective was to act as a pilot project to study the formation of WUAs as set out in the draft Water Sector Strategy (Government of Afghanistan 2007). The two main conclusions drawn from the single study were that water rights were not fixed, but challenged, and that the best method for establishing WUAs was to focus on those issues considered important by the communities along the canals, rather than following a general blueprint for WUA

establishment with predefined rules and rights. As summarized by one researcher (Chokkakula 2009),

“the experiences of PMIS [the Participatory Management of Irrigation Systems Project] suggest that research is always necessary before . . . forming a WUA. . . . Failure to achieve this understanding could lead in the best case to WUAs that are no more than paper tigers and in the worst case to an increase in water-related conflicts.”

AREU has recently researched the relationship among irrigation, fairness and poverty in Afghanistan. Several factors affecting the inequitable distribution of water in community-based social water management systems have been identified, including power relationships associated with socio-economic differences, ethnic and cultural relations, and structural and geographical factors (Chokkakula 2009). At the same time, AREU has recognized that these inequities can be addressed through technological solutions (for example, irrigation design) and institutional solutions (for example, the work of the mirabs). One notable example of an institutional solution is the fact that, in some canals, the most senior mirab in an irrigation system is selected from a community at the tail reaches of the system, the part of the system that suffers the most from inequality.

AREU makes an important point: unequal access to water leads to power imbalances, which, in turn, reinforce and exacerbate imbalances in the access to water. In other words, a poverty trap is set. Although geographical location relative to a canal is important, inequalities in accessing and using water are also driven by local social and power relationships. The spatial and social variability in irrigation distribution affects agricultural productivity, which can exacerbate social and economic inequalities. Equity in irrigation systems is not culturally inherited, but end-users must work to make systems equitable within a structure of unequal powers (Boelens and Davila 1998). In other words,

“equity must be understood as a dynamic social and political construction, contested at various levels” (Cremers et al. 2005).

Crucially, AREU has been able to provide data that link poverty with irrigation inequality, arguing that

“inequitable water management can directly impact the agricultural systems of disadvantaged farmers by affecting crop diversity and yields, and in the opportunity costs of a disproportionate labour burden” (Roe 2009).

AREU has identified some key irrigation system-related inequalities in its study areas. Among these are the following:

- The greatest disadvantage in accessing water is in the tail reaches of an irrigation system, although farmers in the tail reaches often spend the most time repairing and maintaining the irrigation system.⁹ Drought and water scarcity magnify these inequities because actions that contribute to the self-preservation of some communities increase the severity of the water scarcity in others.
- Upstream communities have a dual advantage: they can grow more diverse, higher-yielding crops, and they can achieve higher yields relative to downstream communities.¹⁰

⁹ Roe (2009) reports that, on average, farmers located at the tail reaches of irrigation systems contribute 16 days more labour relative to upstream farmers.

¹⁰ For example, Roe (2009) reports wheat yields of 2,135, 1,341 and 1,198 kilograms per hectare at 3.9, 8.8 and 15.1 kilometres, respectively, from the source of the Jaghatu stream.

Unfortunately, cultivators of high-value crops will often exceed their irrigation water allocation to preserve the crop if they face water shortages, thereby perpetuating scarcity downstream.

- Upstream users remain effectively unaccountable to downstream users.
- The views and needs of women and others with subordinate land rights (for example, sharecroppers) are poorly represented on water management committees.¹¹
- The sharecropping terms for high-value cash crops heavily favour the landowner over the farmer.
- The impacts of illicit abstraction upstream are amplified downstream, including the following:
 - The practices of dishonest mirabs
 - The theft of upstream water by powerful individuals, including warlords
 - The unauthorized and unchallenged breaching of weirs and the raising of diversion structures
- Community water management can be effective if problems are relatively minor, but may be less effective in the face of severe scarcity and heavily contested water use.

These inequalities often result in gradients of prosperity in the rural landscapes along Afghanistan's irrigation systems (Roe 2009).

6. Climate Change and Environmental Protection

According to a 2008 report, agriculture utilizes nearly 99 percent of the water in Afghanistan, and this use is likely to increase in the future due to growing demand (UNEP and NEPA 2008). A series of droughts and increasing air temperatures have reduced the size of the country's glaciers, altering the volume and timing of the main source of water used for irrigation. More than 2.5 million Afghans are already affected by drought, recurrent drought and water shortages; this number can be expected to increase.

A recent report by the Government of the United Kingdom on the impact of climate change on Afghanistan points to a long-term rise in temperature, a drop in rainfall, more rapid snow-melt and untimely rainfall (Savage et al. 2009). The report notes that the vulnerability of the agricultural sector to changes in rainfall patterns and snow-melt is high, as demonstrated by the events of 2008. However, the more worrying predictions are that, by 2030, "drought is likely to be regarded as the norm, rather than as a temporary or cyclic event" and that, by 2060, "large parts of the agricultural economy are likely to have become marginal without significant investment in water management and irrigation." It is expected that the crop failures due to water shortages and the amount of potentially productive land left uncultivated are likely to increase.

These are all strong arguments for ensuring that effective integrated water resources management is established in Afghanistan, that careful attention is paid to improving irrigation efficiency and that the creation of WUAs does not add to the already high levels of uncertainty within the irrigation sector by needlessly riding roughshod over existing community-based management systems.

7. Conclusions

The analysis presented in this paper has focused on the underlying institutional issues that contribute to the link among irrigation, rainfed agriculture and poverty.

¹¹ Roe (2009) estimates that 30 percent of irrigated land may be held under some form of subordinate rights.

Although not addressed specifically by this paper, we fully recognize that decades of war and a succession of natural shocks have played a direct role in undermining the ability of farmers to earn secure livelihoods. Regardless of the severity of these hardships, however, this paper clearly demonstrates the prominence of institutional arrangements and power asymmetries in determining how particular groups are affected by and able to cope with hardships.

The need to rehabilitate the country's irrigation systems is beyond question, as is the need to develop integrated river basin water management, another important step in coping with the impact of climate change.

It is strongly recommended that the following three simple fitness tests be applied to any rehabilitation or institutional reform prior to its implementation:

1. Have sufficient time and resources been allocated to map and understand properly the complexities and subtleties of the existing institutional arrangements regarding the distribution of water?
2. Has the risk that people who are already disadvantaged, such as sharecroppers, farmers at the tail reaches of systems and woman-headed households, may become additionally disadvantaged been properly assessed and addressed?
3. Regarding the formation of WUAs, has too much emphasis been placed on form rather than function?

In terms of the framework of Hussain and Hanjra (2004) regarding the connection between irrigation and poverty, it is clear that rehabilitating Afghanistan's irrigation systems can have a direct impact upon poverty by increasing the production and incomes of farmers, as documented by the World Bank Emergency Irrigation Rehabilitation Project (World Bank 2009). There is sufficient evidence, however, to suggest that short-term gains might not be evenly distributed, particularly among communities at the tail reaches of systems.

It could be argued that the nature of the link between irrigation and poverty in Afghanistan is typical relative to other Asian experiences reported by Hussain and Hanjra (2004). What sets Afghanistan apart, however, is the country's urgent need to rehabilitate vast areas of previously irrigated land and the duty this places on policy makers and implementation agencies to deliver pro-poor solutions. Adherence to the three fitness tests recommended in this report would assist in this goal.

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