



AFGHANISTAN HUMAN DEVELOPMENT REPORT 2011

Case Study

Social Realities of Karez System in Sayydabad District of Wardak

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

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The views expressed in the papers are the sole responsibility of CPAU and the authors and are not necessarily held by Center for Policy and Human Development or Kabul University.

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The Karez

“The centuries old Karez and other traditional systems should be rehabilitated and promoted as a traditional means of irrigation and drinking water supply.” Declaration of the National Conference on Water Resources Development and Management in Afghanistan, Kabul, July 2009

The Karez system is a traditional water management system used in Afghanistan for irrigation and human consumption. It is essentially an underground canal where the water flows via gravity from the water table and is accessed by a well called the “*mother well*” to the end point called “*daylight point*”. The Karez system or Karez-like systems have been encountered in the Middle East, parts of Europe, North Africa, different parts Asia and Latin America¹. It has different names in different places: in the Middle East it is known as *qanat*; in parts of Europe it is known as *galleria*; and in North Africa it is known as *foggara/khattera*. In fact this Karez-like system has been traced back to pre-Roman times².

The Karez is an important source of water in Afghanistan; it provides water to about 6% of the irrigated land in the country. There are believed to be over 6,000-7,000 Karez in Afghanistan providing irrigation to over 170,000 ha of land, as well as providing drinking water and water for livestock in 11 provinces³. As such, Karez systems provide water to an important proportion of Afghanistan’s farmers. Some have been in operation for several hundred years, including one in the Wardak province of Jalriz which is more than 300 years old and continues to provide water to nearly 3000 people⁴. However due to continuous drought over the last couple of years, “*all traditional groundwater irrigation systems have been reduced in capacity or dried up completely. About 60% of the Karezes are not in use*”⁵.

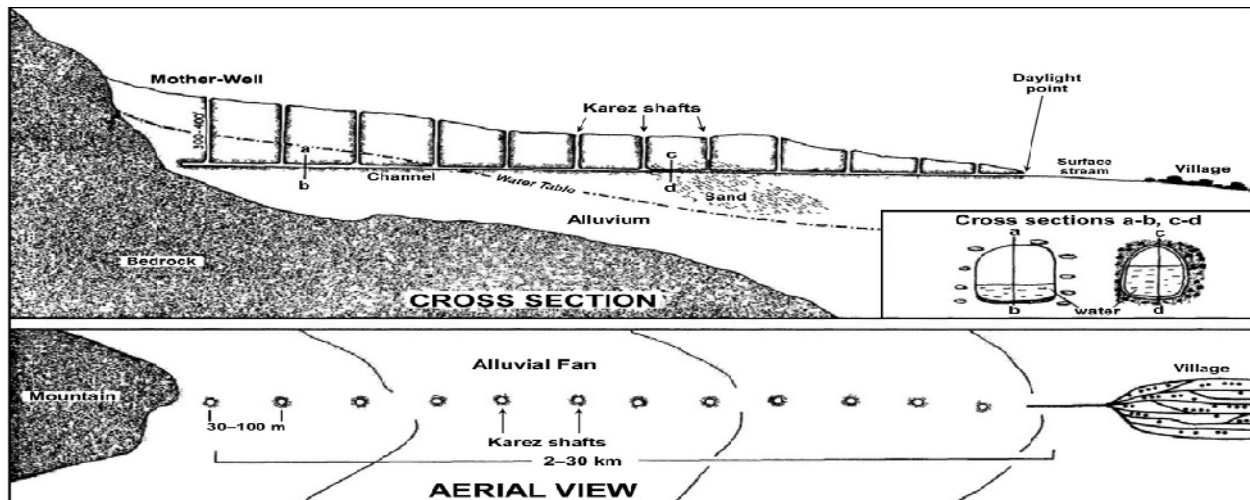
Research conducted in other parts of Afghanistan show that the Karez system is usually a common property⁶. It therefore requires social organizations and mechanisms for effective management of the distribution of water, maintenance of the Karez, and at times the expansion of the Karez system. Such social organizations require the setup of common norms and understandings, as well as the establishment of public communication channels, and it requires people to work together. People cooperating from different villages and communities create an opportunity for the sharing of thoughts and ideas, and helps create relationships and trade opportunities, in short “*social capital*”⁷. However in the case study area of Aman Khel, Shekanak, Sheik Azim, Si Si and Zarsanga villages in Sayyadabad district of Wardak, the Karezes are not a common property. The Karezes are private property used by large parts of the communities which thus requires the same type of social organization.

Typology

Karezes are underground water canals that tap into the groundwater via the mother well. Underground

“In many of the villages, particularly in the Pashtun areas, people had pooled and spent funds ranging from Rs. 80,000 in Yakub Karez to Rs. 120,000 in Pesh Morezai to rehabilitate their Karezes. One of the main reasons that they cited for continued interest in rehabilitating Karezes instead of abandoning them and going for tubewell irrigation was communal harmony.” (Mustafa & Qazi, 2007, p. 1803)

tunnels with gentle slopes carry water from the water table to the daylight point at the end of the Karez. The water is canalled for a distance of a few hundred meters to a few kilometres. The underground canal has a series of wells for maintenance purposes; these can also be used as a source of water for household consumption. At the daylight point there is a pool for water storage called a *hawz*; from the hawz the water is distributed by above-ground canals.



Source: (Mustafa & Qazi, 2007)

There are three types of Karez; long, short and tiled⁸. The long Karezes are underground canals which can range up to 20 km. These are usually excavated into faster flowing gravels which allow water to collect in the lower catchment. Its flow rate is constant and reliable, with long lag times between rainfall and flow effects. The short Karezes are usually located in higher elevations and excavated into more stony, slow flowing gravel. Short Karezes are more vulnerable to collapse compared to long Karezes. The flow rates in a short Karez are less stable and respond more rapidly to rainfall and snowmelt. The least common type of Karez is the tiled Karez, locally known as *jar* or *chow*. The tiled Karez is built adjacent or into washes to access subsurface-based flow. It is constructed by excavation of canals and protected with dry stone walls and slabs; it can be difficult and costly to maintain due to frequent flood damage⁹.

*The Karez System:
Advantages, Disadvantages and Threats*

Advantages

As with any other water management system, the Karez system has a number of advantages and disadvantages. One of the main advantages of the Karez system is that it is cheap to operate. Karezes are gravity based systems that exploit groundwater without any need for mechanical devices. Water is transported for substantial distances in subterranean conduits with minimal loss of water through evaporation¹⁰. The Karezes are a cost effective alternative in the long run; while expensive to build, they are the most affordable water management system to operate and maintain¹¹. Properly maintained Karezes have a significantly longer life span than modern pumps/wells. Pumps and wells have a life span of about 20 years while Karezes have been noted to function for centuries¹². They are intrinsically sustainable, adjusting themselves to the level of available groundwater. If the level drops because of lower rainfall, then the amount of water flowing through the Karez also drops. This makes it viable over the long term as it allows groundwater levels to recharge¹³. The Karez system can be identified as a historically unique global heritage, and an intrinsic global benefit¹⁴. Karezes are also closely linked to the local community cooperation thus creating solidarity and a sense of belonging at local levels¹⁵.

Disadvantages

The Karez system also has its disadvantages, notably the challenge to make it an efficient and effective alternative in an increasingly modern society. The Karez system requires continuous cleaning to prevent silting and collapsing. Its maintenance is thus a labour intensive activity which can be both difficult and dangerous¹⁶. The labour intensive nature of the Karez maintenance means that if you have an increase in labour cost in the future, the relative cost effectiveness will decrease. Moreover, Karez systems are usually not able to provide enough water for large scale agricultural and/or human consumption¹⁷. This limits the capacity of the Karez to be only an alternative water supply for extensive agriculture. Similarly the Karez also has limited capacity to keep up and provide drinking water for the increasing population. It is also less flexible than other alternatives¹⁸: the flow of water is more difficult to regulate, making it difficult to prevent the water from going to waste when it is not being used. Importantly, conflict over water is the second largest type of local conflict in Afghanistan¹⁹ and the Karez system is no exception. According to local respondents the Karez is a key source of conflict within and between villages²⁰.

Threats

The Karez system has been around in Afghanistan for centuries, but now its existence is being challenged by modern alternatives, degradation of the ground water, and changes in social perceptions. The shift towards pumps and wells has created a notable challenge for the Karez system. The pumping of groundwater is a lucrative alternative in the short run because it is more flexible and it gives access to water when required by the user. However this shift towards pumping ground water has also caused a decrease in ground water levels. The fall in ground water levels means that the existing Karezes cannot access the water and will thus dry up²¹. It is also becoming increasingly difficult to find the willingness among water users to contribute to

the operation and maintenance of the Karez²². The potential decrease in the perceived importance of the Karez can have a notable negative effect on the ability of the Karez system to be a source of positive social capital. Among the respondents in Sayyadabad the perceived importance of the Karez system was identified as the key factor enabling the Karez to bring people together and function as source of social capital²³.

At the time of research, there had not been any decrease in the perceived importance of the Karez system in the case study area. This might be due to the poor economic situation in the various villages. According to the local respondents very few people can afford to construct and/or operate wells and pumps²⁴. This makes the Karez system a comparatively more reasonable and lucrative option, potentially explaining its continued perceived importance in Sayyadabad.

Karez Management & Social Capital

Agriculture is the main livelihood strategy in Afghanistan with around 55% of the Afghan households engaged in farming²⁵. Afghanistan has a long history of irrigation and water management; as evidenced by the Karez system some irrigation and/or water management infrastructures have been around for hundreds of years²⁶. However these irrigation systems (the Karez system included) can be highly complex and have a variety of factors and issues requiring management. The distribution of water must be effectively organized, water rights and enforcement of these rights must be managed, disputes arising from water shortage or mismanagement must be resolved, and the cleaning and maintaining of the irrigation system must be organized²⁷.

The research conducted in Aman Khel, Zarsanga, Shekanak, Sheik Azim and Si Si villages of the Sayydabad district of Wardak, indicates a more complex reality surrounding the management of the Karez system. The ownership and management of a Karez is a hybrid between private ownership and communal property²⁸. The Karezes are seen as private property; as the water supplied in a Karez is individually owned and can be individually sold. But it acts as a common resource because a majority of the villagers have access to it. Thus the Karezes in Sayydabad are private property which requires the same kind of management as a common water resource. In the villages of Shekanak, Sheik Azim and Zarsanga the management of the Karez system has completely faltered. The Karezes have almost dried out and can only be used as a source of drinking water.

Water Management

As mentioned above Afghanistan has a long history of irrigation which can be highly complex and have a variety of factors and issues requiring social water management. Afghan communities also have a tradition of viewing the selves as “*fundamentally autonomous in matters of water management*”²⁹. Water is usually therefore managed locally by a water master known locally as the “*Mirab*”. The Mirab system varies from region to region but there are some commonalities among all of them³⁰. A Mirab is usually an individual appointed among the landowners by the landowners, who usually lives in the area they manage, and they are usually paid by the landowners in their management area. The function of the Mirab is to effectively organize the distribution of water, enforce water rights, resolve arising water related disputes, and organize the cleaning and maintenance of the irrigation system. The Mirab system can do this because it is a community based system and each Mirab is rooted in the communities they serve³¹. The Mirab also has knowledge about local water rights and they have the capacity to enforce these rights with the social pressures they command.

However in the case study area there is no Mirab managing the Karez system. This is due to the Karez being a private property and thus not applicable to typical social water management systems. Another reason for the absence of a Mirab is the lack of payment capacity among the users. According to one local respondent they cannot afford a Mirab³². Without a Mirab there are no mechanisms in place to effectively organize the distribution of water, enforce water rights, resolve arising water related disputes, and effectively organize the cleaning and maintenance of the irrigation system. This makes the Karez system vulnerable to mismanagement and conflict.

The Distribution of Water and Work

In previous studies the Karez system has been identified as a common resource managed by a range of social mechanisms³³. The water distribution is organized in a shab-roz (night and day) cycle among the shareholders. This cycle of water distribution typically ranges from 12-24 shab-roz which is further divided into 3 hour periods locally known as a pass. There are up to 8 passes for every shab-roz cycle. A Mirab is elected in order to properly manage this distribution of water. The distribution of water is worked out on the basis of a certain number of hours per jerib (0.2 ha) of land owned³⁴.

However in the case study area this cycle is not in place again due to the lack of a Mirab. Therefore the distribution of water is managed and enforced by each individual farmer. Traditionally, 10 minutes before his turn the person next in line will go up to the person before him and makes sure that his water use stops at the allocated time³⁵. The perception of the Karez as private property directly effects the allocation of the water. The water is allocated on the basis of individual input made during the time of construction. A person who contributed more to the construction receives more water. For older Karezes, the allocation rights have been passed down through inheritance. A person with 6 hour water rights will pass it down to his sons, if he has two sons for example then each will get 3 hours. This can potentially become a problem because the water is divided further and further. This means that more people have a stake in the Karez which will require more cooperation among more actors. It can also have a negative effect on the Karez because every individual gets a smaller stake which can make the Karez a less effective and rational option for individual users, thus further decreasing its importance.

The maintenance of a Karez is a difficult and labour intensive task and has to be done communally. The task of communal engagement in repairing and maintaining water systems is known as *hasher*. According to previous studies the labour allocation for the hasher is worked out on the basis of a certain number of hours per jerib³⁶. Some studies show that this is not always the case, people located in the upstream communities benefit more because they get better water supply and provide less labour for hasher³⁷. Other studies contend that this is not as a result of unfair water management and instead argue that those upstream do not engage with water management systems to the same extent as those mid and downstream³⁸.

However, in the case study area the labour contribution to hasher is not based on the amount of land owned. The labour contribution to the hasher in the case study area is based on water entitlements, the more water you have allocated the more you will have to contribute. There is no clear calculation on how much needs to be contributed, according to the local respondents it depends on the work that needs to be done³⁹. There was no evidence of unfair labour distribution in the case study area based upon people being located upstream or downstream. However there was evidence of unfair labour contribution based upon water entitlements. People with more water entitlements contribute more than they should when compared with those people with less water entitlements; this is also a source of conflict between these two groups⁴⁰.

Social Capital

Sayyadabad has a rich Karez history. It is said that the Pashtun tribe Mommand came to the area around 1000 years ago and were the first people to construct a Karez. The Karezes were

destroyed and rebuilt by the invading Hazaras who drove out the Mommands. The Hazaras were in turn driven out by the Pashtun tribe Wardak, who invaded the region, also destroying and then rebuilding the Karez systems⁴¹. The long-serving nature of the Karez system in the area is a testament to its importance to whatever community of people have lived there, at whatever time in history.

According to the local respondent the Karez is one of the most important parts of the community⁴². The Karez is essentially seen as the “spring of life”; it is the source of their livelihoods. It is important to understand the perceived importance of the Karez, as this will give insight into the how the Karez forms social relations. According to the local respondents the importance of the Karez overrides other individual interests and forces people to cooperate around issues dealing with the Karez. These links and relations created around the Karez then naturally flow into other parts of people’s lives.

The Karezkan is a good illustration of the above mentioned scenario. The Karezkan is a local expert on the construction and maintenance of the Karez. Due to decades of war there has been degradation in the human capital required to construct and maintain Karezes⁴³. In other words the number of Karezkan available has been reduced. This unfortunate development has meant that not all Karezes receive the expertise needed. However the few Karezkans available have been shared between villages. According to the local respondents this has had a positive effect on the relationship between people from different villages. Some of the Karezkans have even been reported to have gotten married in the villages they had been invited to work in, thus creating family bonds between different villages⁴⁴.

The water made available by the Karez can also enable generosity among and between villages. In 2006 and 2007 the village of Dare Doab was facing an acute drought and asked neighbouring villages for help. The water made available by the Karez in Si Si village enabled an assembly of village elders to aid Dare Doab village. Dare Doab village was provided with water for drinking and irrigation. This eased the effects of the drought Dare Doab was experiencing and it created a long lasting friendship between the two villages.

Conflict and the Karez System

The Karez system, as many other water management systems, is prone to conflict. However no violence has been encountered in the case study area directly related to the Karez. There are some obvious types of conflict related to the Karez such as conflict within families over the inheritance of the shab-roz distribution rights. But there are also a number of conflicts arising from the unique reality of the Karez being a hybrid between a common good and a private good. This dual existence has prevented an overall management system to be established such as the Mirab system and it has given more room for personal interest. In the case study area 4 types of conflicts were encountered related to the duality of the Karez:

1. Conflict over land related to the Karez.
2. Conflict between villages.
3. Conflict between upstream and downstream users.
4. Conflict over the maintenance of the Karez.

Conflict over Land Related to the Karez

In Aman Khel village in Sayyadabad there is a conflict over land between the villagers. The land is divided into three parts depending on their access to water through the Karez. The water flows from area one down to area three. The land mass in area one and two has been divided among the people and ownership is known in these areas. However in the third area the ownership of the land is unknown. This land is usually not fit for irrigation due to continuous drought and the limited amount of water provided by the Karez. However during non-drought years the land is fit for irrigation. The conflict in Aman Khel village is over how to distribute this land. On one hand one group of the villagers want the land to be divided according to the water entitlements. In other words, the more water entitlements you have to more land you get. The rationale being that people with more water entitlement have access to more water and can thus carry out more productive activities with the land. On the other hand, there is the group of people with less water entitlements who want the land to be divided based on population. The rationale being that there is not always enough water for irrigation so the land area should be converted into a housing area. There are two groups here, one sees a potential for personal profit from agricultural activities enabled by its access to water. The other does not see that potential due to its lack of access to enough water through its lack of access to land. Thus there is a conflict over the distribution of land based on the distribution of water.



The land area in Aman Khel village

Conflict between Villages

Si Si village in Sayyadabad has been experiencing marked population growth and a drought during the last couple of years⁴⁵. Their main source of water is the Karez which hasn't been able to provide enough water to meet the growing needs of the people in the village. The people of Si

Si village decided to extend their Karez and tap into another source of ground water, thus increasing the amount of water made available via the Karez. The expansion of the Karez in Si Si village was not allowed by the people in nearby Said Khan Khel village. According to the local respondents there are two traditional unwritten rules concerning the building or expansion of a Karez⁴⁶: firstly, the new Karez may not be close to another Karez in order to prevent it from diverting the water flow of that Karez to itself; secondly, the construction of the new Karez must not interrupt someone's private home.

The expansion the villagers of Si Si village had envisioned was in accordance with both the above mentioned traditional rules. But they were prevented by the villagers in Said Khan Khel because some of the wells of the new Karez ended up on private irrigation land. The people of Said Khan Khel village have connections with the local police and government which left the people of Si Si village incapable of doing anything to address their growing water demands⁴⁷.

Conflict among Upstream and Downstream users

Once the water in a Karez has reached the daylight point it is then distributed by traditional above ground canal systems. The above ground water system creates a classic upstream-downstream conflict, where people in the upstream area get more access to water while people in the downstream area have less access⁴⁸. The shab-roz division means that people have a number of minutes, hours or days of water flow allocated to them. In the case study area an interesting situation has arisen: users at the mouth of the canal and users at the tail end of the canal are both unhappy with their situation. People at the mouth of the canal lose water time because it takes about 15 min for the water to flow from the hawz to reach the irrigated land. This has a particular negative effect on small allocation holders. At the other end, users at the tail end do not get enough water because the flow of the water is weak creating inefficient use of allocation time and there is not enough water. Some villages have managed to temporarily solve these types of conflicts: in Aman Khel village the local community decided that every other day the water distribution would start from the opposite end.

Conflict over Karez Maintenance

In the case study area there is also conflict among the various users over the maintenance of the Karez. As mentioned earlier the maintenance of a Karez is a labour intensive activity and traditionally the labour distribution is organized around the shab-roz allocations. The more shab-roz a user has the more he has to contribute to the maintenance of the Karez. In the case study area there was conflict between people with large number of shab-roz allocations and people with less. People with less shab-roz allocations receive less benefit from the Karez and are thus less willing to contribute to the maintenance of the Karez. People with more shab-roz allocations benefit more from the Karez and have thus a greater incentive to maintain the Karez. These people are also usually more powerful and have more influence in the villages. This has created conflict between these two groups and has caused social tensions. According to some of the local respondents the people with less shab-roz allocations are in a way forced to contribute to the Karez maintenance by the people with more power⁴⁹. Coercion of the one group by the other breeds difficult social relationships in a variety of issues.

Conclusion

The Karez system in Sayyadabad is part of the historical heritage of the people of Afghanistan. It has withstood the test of time and it has served various people of the country throughout. The Karez system is also an ingenious piece of engineering work. It is long lasting, relatively cheap to maintain, environmentally sustainable and it provides good quality water. The Karez system has the power to create social bonds between people because it provides them with a vital resource – water, and its management depends on cooperation. This creates a very strong incentive for people to work together in order to get access to the water supplied by the Karez. This cooperation can grow into other parts of people's lives and create relationships that go further than access to water. It can truly be a source of positive social capital.

The management surrounding the Karez in the case study area is complicated due to the hybrid nature of the Karez being both a common good and a private good. The private good aspect of the Karez system prevents the build-up of social management systems required for the efficient management of common goods. This in turn creates room for conflict to arise between various users and stakeholders. Such conflict has a negative effect on the potential of the Karez to function as a social capital and can instead create divisions.

The future of the Karez system depends upon the establishment of efficient management systems. If not managed properly the Karez system can potentially falter even further and become a more intense source of conflict for the villages. This would greatly diminish the relative benefit received by having a Karez. Beyond the need for improved management, the Karez system must be fit into future development plans. The inability of the Karez system to provide water on a large scale bases prevents it from being a viable long term option due to its inability to keep up with increasing demand. All future management of water systems in Afghanistan, including the Karez, are dependent on the very core of its own functionality: cooperative management and planning.

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End Notes

- 1 (Keshawar, 2002; Mustafa & Qazi, 2007)
- 2 (Mustafa & Qazi, 2007)
- 3 (Qureshi, 2002; Roe, 2008)
- 4 (Tamuri 2007)
- 5 (Qureshi 2002, 17)
- 6 (Mustafa & Qazi, 2007; Rout, 2008; Roe, 2009)
- 7 (Qureshi, 2002)
- 8 (Rout, 2008)
- 9 (Rout 2008, 34)
- 10 (Qureshi, 2002; Mustafa & Qazi, 2007; Roe, 2008)
- 11 (Focus Groups, Sayyadabad Wardak, Jan 2010)
- 12 (Qureshi, 2002)
- 13 (Mustafa & Qazi, 2007; Rout, 2008)
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- 16 (Hussain, Abu-Rizaiza, Habib, & Ashfaq, 2008)
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- 24 Ibid
- 25 (NRVA, 2007/08)
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- 27 Ibid
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- 29 (Lee, 2007, p. 30)
- 30 (Lee, 2007; Roe, 2008)
- 31 (Roe, 2008)
- 32 (Focus Groups, Sayyadabad, Jan 2010)
- 33 (Qureshi, 2002; Mustafa & Qazi, 2007; Rout, 2008)
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