Improving Water Distribution for Poverty Reduction in Transition Economies: Results of an Action Research on Central Asian Tertiary Canals

Murat Yakubov*, Iskandar Abdullaev, Mehmood Ul Hassan*****

*Research Officer, International Water Management Institute-Central Asia, Uzbekistan (m.yakubov@cgiar.org)
** Researcher, International Water Management Institute-Central Asia, Uzbekistan (i.abdullaev@cgiar.org)
*** Researcher, International Water Management Institute, Ghana office, (m.hassan@cgiar.org)

Abstract

The rural poverty is becoming acute to chronic in Central Asian region since the collapse of the Former Soviet Union. The rural population is most affected by the social, economic, and institutional shocks of the post independence reforms in Central Asia to the extent that today, about 85% of the farm households live below an average of US$ 1/head per day. Over 70% of population in the region lives in rural areas. The major policy change in agriculture for the last decade was privatization of the agricultural land. The introduction of private farming after 70-year long socialist collective farming resulted in the emergence of hundreds of thousands of new inexperienced farmers. A thousand-fold increase in the number of farmers in the post-Soviet rural landscape poses a challenge to water distribution amongst tens to hundreds of small-scale farmers sharing one tertiary canal. The old water distribution approaches, mostly oriented to serve the largeness of former collective farms, have become obsolete.

The Soviet era water distribution approach had been based on preparing seasonal water demand plans, using standardized crop water requirements for different agro-ecological zones, which were subject to proportionate adjustments in case forecasts for water availability were low. Former collective farms were first required to submit its water demand, then revise it after each 10 days, and finally receive the volume requested with proportionate adjustments if any for the season. Such huge farms were usually specialized in mono-crop cultivation, having several hydro-technicians and water masters on their staff to distribute water amongst their fields following technical standards and recommendations, the approach, which worked quite well. However, the post-independence land reforms have resulted in massive land fragmentation and the emergence of multiple small farm units within the boundaries of former collective farms, leading to chronic inequities in water distribution (Ul-Hassan, et. al, 2004). Seasonal water use plans continued to be made only for secondary and tertiary distributary canals ignoring everything below these levels, where farmers actually would abstract their water. Besides, it had suddenly become impossible to collect precise cropping plans data from now numerous farmers along one canal. Thus, the water use plans so prepared would normally fail to reflect the real on-farm water needs. Throughout the cropping season, each user would submit a verbal request 3 days prior to irrigation to canal water master. The water master would collect and register all such requests and then start releasing water. Since no measuring devices are normally available in the head of distributary off-takes, no records would be maintained to account for water actually released and distributed. Given large numbers of overlapping water requests from the farmers, the water master faces great difficulty to set up a workable schedule of water releases. As a result, almost all the outlets would be left open to let the water continuously flow into the fields. Consequently, the smaller fields would be filled up quickly with the surplus water discharged to the drainage network, while the bigger plots would never be irrigated in full throughout the entire season. It is also not unheard of in this situation that if a farmer is not personally present in his/her field while irrigating it, there will be always somebody to steal his/her water. So, given the whole new situation, the previously functional water management practices have turned up unsuitable or even redundant resulting in much of a chaos, inequities and unreliability in the present water delivery at the tertiary level and thus complicating poverty situation especially among those who are hydraulically more tail-end located along irrigation canals.

Both the water users and the water masters were equally frustrated with such a situation, expressing a strong demand for more transparent and equitable water distribution methods that would suit their interests and require no additional investments in the infrastructure. This was the reason for the International Water Management Institute (IWMI) to develop and pilot-test in 2003 and 2004 a simple time-based water distribution method in one of the typical tertiary canals in Kyrgyzstan as a part of its work within the IWRM-Ferghana Project[1]. Thus, the paper provides brief description of the site, the water distribution approach and the impacts on crop yields, farm incomes and resultant fee collection.

[1] The Integrated Water Resources Management in the Fergana Valley Project is financially supported by the Swiss Agency for Development and Cooperation and is implemented in the Fergana Valley parts of Kyrgyzstan, Tajikistan and Uzbekistan by International Water Management Institute and Scientific Information Center of the Interstate

Introduction

The newly emerged independent states in Central Asia have been facing drastic increases in the poverty levels since the collapse of the Soviet Union.. Disrupted economic ties and post-independence reforms that followed in the region have inflicted much of a shock, both social and economic, on local populations especially those living in the rural areas. With most population in the newly independent Central Asian states being predominantly rural (70%) the only thing that the rural people could still rely on in their livelihoods was farming whatever irrigated land they had either in their personal family disposal - normally as tiny kitchen gardens in the backyard of their houses – or as additional land received on an ownership or long-term tenancy basis following massive land privatization or land redistribution of former huge-size collective farms. Since crop cultivation in Central Asia is hugely water-dependent, access to and availability of irrigation water was one of the crucial factors for rural people to survive and cope with new realities of transitional economy. Given continuous fragmentation of agricultural lands the entire former water management paradigm which was previously meant to serve the construct and needs of huge-size collective farming has become victim to the newly emerging context. This was further complicated by the new geopolitical order in the region including competing multiple national and sub-national interests

The emergence of private farmership in Central Asia following 70 years of collective farming has brought both positive and negative changes. While increases in land and water productivity and use of innovative approaches and resources conservation practices were among the positive ones, those on the negative side included exclusion of huge numbers of former collective farm workers from the access to limited land and water resources thus resulting in increasing rural poverty, social tensions and stratification of the rural society. This has also resulted in creating much of a problem and disruption in water distribution among multiple water users, especially, on the tertiary level.

Previously, in the former Soviet Union (FSU), water distribution in agriculture used to be based on water use plans, that applied a statutory crop water requirements principle

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Commission for Water Coordination. The project aims at reorganizing water management organizations along the hydrological boundaries of main and secondary canals instead of the administrative boundaries of farms, districts and provinces, promotes stakeholder participation in the management, and identifies options for improving water and land productivity.

when planning and implementing water distribution Water supply requirements for each specific crop once tested and verified through pilot trials were then formally standardized and served as mandatory norms when planning irrigation for each such crop. This approach was well justified under the then collective farm system when most farms were huge in size and specialized in mono-crop cultivation. Given the new context of agricultural reforms resulting in massive land fragmentation and the formation of multiple medium to smallholder farms, equitable water distribution today using the same approach is hardly possible. Water use plans so prepared are normally meant only for distributary (secondary and tertiary) canals in a given irrigation system leaving everything below this level at large. Thus water among the watercourse off-takes is distributed against water users' requests. Each user would submit a verbal request 3 days prior to irrigation to the *Mirab* (*water maste*r, in local Turkick languages). Since no measuring devices are normally available in the head of distributary off-takes, no records would be maintained to account for water actually released and distributed. Given large numbers of overlapping water requests from the farmers, the *Mirab* faces great difficulty to set up a workable schedule (roster) of water releases. As a result, almost all the outlets would be left open to let the water continuously flow into the fields. Consequently, the smaller fields would be filled up quickly with the surplus water discharged to the drainage network, while the bigger plots would never be irrigated in full throughout the entire season. In fact, water releases would be made on a "first come – first served' basis. It is also not uncommon in this situation that if a farmer is not present on his/her field while irrigating it, there will be always somebody to steal his/her water. So, given the whole new situation, the previously functional water management practices have turned up unsuitable or even redundant resulting in much of a chaos, inequities and unreliability in the present water delivery at the tertiary level and thus complicating poverty situation especially among those who are hydraulically more tail-end located along irrigation canals.

Trial of Pro-poor Water Distribution

Experience elsewhere shows that bringing proper institutional change alone into the presently disrupted irrigation management by first helping farmers at the very grassroots to self-organize themselves into self-help water users groups (WUG) by each tertiary command with their own rules and principles developed to ensure proper canal maintenance, resource mobilization and water distribution based on their own understanding of what is equitable and fair, and then bringing all such tertiary self-help

groups through their authorized representatives or leaders under one nested water users association (WUAs) at a higher secondary level, this also coupled with building required capacities of these new participatory institutions could be crucial in bridging existing gaps and problems and, thus, considerably improve irrigation performance and poverty situation. Involving water users in such a manner requires truly participatory approaches and methods, that are user-oriented and simple enough to be understood by farmers.

One of such methods meant to help water users to solve their water problems at the on-farm level is water distribution based on time allocations which was pilot-tested in one of the WUAs in Osh Province of the Kyrgyz Republic during 2 consecutive cropping seasons in 2003 and 2004. When experimenting with the new approach the following two major assumptions were made:

(i) Actual water demand for each off-take along the study tertiary canal is based on applicable crop water requirements; and

(ii) The time required to deliver the requested amount of water is sufficient.

Pilot Canal

To pilot-test the proposed time-based water distribution method, a tertiary canal (named *Sokolok)* was selected in WUA“Japalak” of Osh Province, Kirghizstan.. This canal can well be representive of a typical tertiary canal in today’s Central Asia. The WUA in question was first founded in 1996, comprising 2,112 ha in the total irrigated service area. The command area of the study Sokolok canal is 290 ha with the length of about 6 km. Through its 14 registered quaternary off-takes it supplies water to a total of 473 water users. The maximum capacity of Sokolok at the off-take is 250 l/s. The tertiary receives water from the Aravan-Akbura main canal, which is one of the largest irrigation canals in the Osh Province, South Kirghizstan.. Major crops grown in the pilot canal area were wheat, corn, vegetables, potato, sunflower and apples. The cropping pattern when experimenting comprised 43.4% corn, 11.5% winter wheat, 3.3% sunflower, 3.1% vegetables such as onions, tomatoes, and cucumbers, and 2.1% orchards and fruit trees. Of the total command area, one third (34.6 %) was occupied by backyard gardens.

Trial Process

The whole trial consisted of two phases. In the *first phase* - the spring-summer cropping season (April to October) of 2003 – it was the project staff who did and facilitated most of the actual trial and data collection processes when organizing and implementing the time-based water distribution method. In the second phase - during the spring-summer cropping season of 2004 - the water users were left alone to run the entire process on their own with the project staff just monitoring it and recording various data such as canal head discharges, irrigation duration by each off-take, cropping patterns, yields etc. There were two persons hired by the project in the first year to facilitate implementation and data collection. The data so collected included water discharges in the head of both the distributary canal and its off-takes, cropping patterns by each off-take, the number of hours each off-take was entitled and actually receiving water, any changes in water schedules, per capita incomes from crop cultivation, irrigation service fee collection rates,; any conflicts occurred throughout the season.

Major Steps When Implementing Time-based Method

Organizational Issues: Water Users Groups for Effective Implementation

Implementation of the proposed time-based water distribution method required good self-organization of the water users along the study distributary canal. WUA Japalak where the study canal is located was organized some 10 years ago in a top-down fashion with no much of an involvement on the part of the water users at large. So there had been no water users groups, formal or informal, in place. When meeting the local water users for the first time, this issue was deliberately raised and discussed with them at length. As a result all the water users met agreed that the formation of their self-help water users groups by each off-take was important. Within 2 weeks, such water users groups (WUG) were finally formed in all the 14 off-takes and their leaders elected. The WUG leaders were given authority to represent their water users when planning irrigation as well as when opening and closing the off-take gates as per irrigation schedule.

Preparation of an irrigation schedule was central to implementing the time-based water distribution method. Consultations with the water users of the “Sokolok” canal suggested that the farmers preferred their irrigation turns to proceed from the head to

the end of the canal. Thus, by April 1, 2003 the irrigation schedule for the first 10 days was prepared and approved by the water users. The schedule was very simple and farmer-friendly, specifying the exact time for each off-take concerned when to start and when to finish irrigation .As per the schedule, irrigation would start and finish at midnight on, respectively, the first and 10^{th} day of a 10-day cycle. Since night irrigations in the canal area had been already frequently practiced for the past 10 years, there were no objections from the water users to irrigate during the nighttime. In addition the water users agreed to stick to the following rules:

(i) More than one off-take could be opened at a time to divert water;

(ii) No exchanges of turns between off-takes should be allowed, and

(iii) Should any of the off-takes tamper with the agreed turns schedule, it will be fined with turn cancellation next time when it will be its turn to irrigate.

In addition, *Mirab* of the canal was asked to register any interruptions occurred during the course of schedule implementation. To make sure all water users along the canal are aware of the agreed irrigation schedule, it was decided to be put on an iron display in the head, middle and tail-end of the canal..

Trial Results

Wheat Yields

Privatization, distribution and fragmentation of land of the former huge collective farms among newly established numerous middle to smallholder farmers led to the creation of two types of family farming in Central Asia: commercial and subsistence. The latter mostly comprising of tiny backyard garden owners, grow crops predominantly for self-consumption to ensure their food security, being most prone to poverty. One of the most important crops for such small subsistence family farms to survive is wheat, so almost all such farms for food security reasons try to grow this crop. It should be though noted that those in the tail end of the selected canal in the study area had frequently failed to grow good wheat crop due to insufficient water reaching their fields. Thus, assuming that the proposed water distribution method could have improved water access for those in the tail-end, one would expect a considerable change in wheat yields if applying the method.

The trend for the wheat yields in the study canal, following the first year of interventions (2003) was, in overall, positive. Average wheat yields of those in the tail-end off-takes (#10, 12) increased by 45-50% (Figure 1). At the same time there was a slight decline (3-4%) in the yields of those from the head-located off-takes (#1, #2). Nevertheless, in overall the wheat yields across all study off-takes were higher and more stable than in the baseline year (2002). However, some tail-located off-takes (9, 11, 13, and 14) still refrained from growing wheat in 2003, despite that the time-based water distribution employed in that year was an overall success. This was not because the farmers thought they had too tiny a land or lacked some inputs other than water. The major reason behind this was continued skepticism by the people in that their water availability could improve as a result of the new method

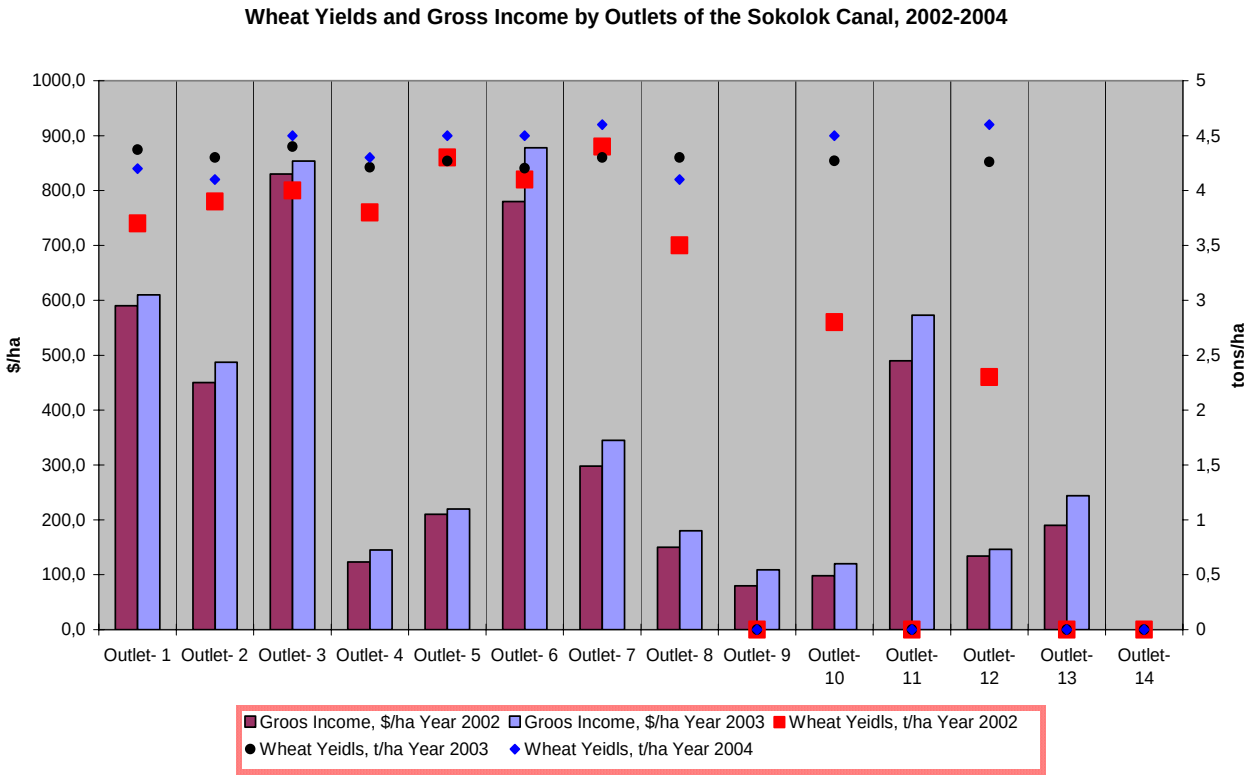

Figure 1

Incomes from Agricultural Activities

Trends by farmers in generating their gross incomes reflect how successful their farming activities are. Survey results suggested that 80% of the total income earned by the farmers of the study canal is derived from agriculture. Total agricultural income that a farmer can earn is the function of various inputs employed, such as seeds, fertilizers, mechanical equipment and labor. Markets and market facilities in Kyrgyzstan are

relatively better than in the neighboring countries with most local farmers, including the smallholders enjoying the same level of access to various agricultural inputs other than water. Thus, with farmers' access to all inputs other than water being equal, a canal with good water distribution performance will have minimum differences in per-unit-of-area incomes by farmers from different reaches of the canal. The incomes analysis set forth below was performed for 2 consecutive years - 2002 (baseline year) and 2003. Information for the 2004 season is presently being collected and not yet released.

The gross incomes by different off-takes of the study canal as reported by the respondents were quite varied due to differences in the cropping patterns, inputs applied and the costs of various other agricultural operations employed. The farmers with their main land holdings in the midstream off-takes (#7, 8, and 9) were residing in a village located along the off-take 14. So to avoid double-counting, the latter was not included in the income analysis. The residents here used canal water for both irrigating their home gardens and drinking. The yearly per-unit-of-area income earned by different off-takes in 2002 ranged from $100/ha (Off-take #9) to $800/ha (off-take No 3). There was clear indication that the farmers from the head-located off-takes were better off in their income generation (Figure 3). The off-takes 7 to 10 as well as 12 and 13 showed the lowest per-unit-of-area income generated. Most likely this was a result of different cropping patterns employed by different off-takes: while those in the upstream grew wheat and high value vegetables (peppers, tomatoes), those in the downstream off-takes cultivated corn and low value vegetables (e.g. pumpkin). In addition, those in the upstream grew 2 crops per season, while those from the downstream - only one crop. With the general trend in per-unit-of-area incomes remaining the same in 2003, the mean income generated across all study off-takes increased. Increases in incomes generated by the farmers in the off-takes 6 through 13 were higher than those for the off-takes #1 to #5 (Figure 1).

Water Service Fee Collection by Off-takes

Basic assumption for this indicator holds that if water distribution improves water users are more willing to pay for WUA services. There is direct relationship between total fees collected and the quality of services provided since better water distribution helps boost farmers' incomes. During the intervention period no specific attempts were made by the WUA to improve financial discipline. Therefore, any changes in the total fee collected can be viewed as an impact from the time-based water distribution method employed.

The analysis of total water fees collected in 2002-2003 suggests there is no relationship between the size of per-unit-of-area income and the size of irrigation service fee (Figure 5). The water users from the off-takes that generated lower per-area-of-unit incomes paid the same or more in water fees both in 2002 and 2003. Likewise, the water users from the downstream off-takes paid more in water service fees than those from the upstream ones.

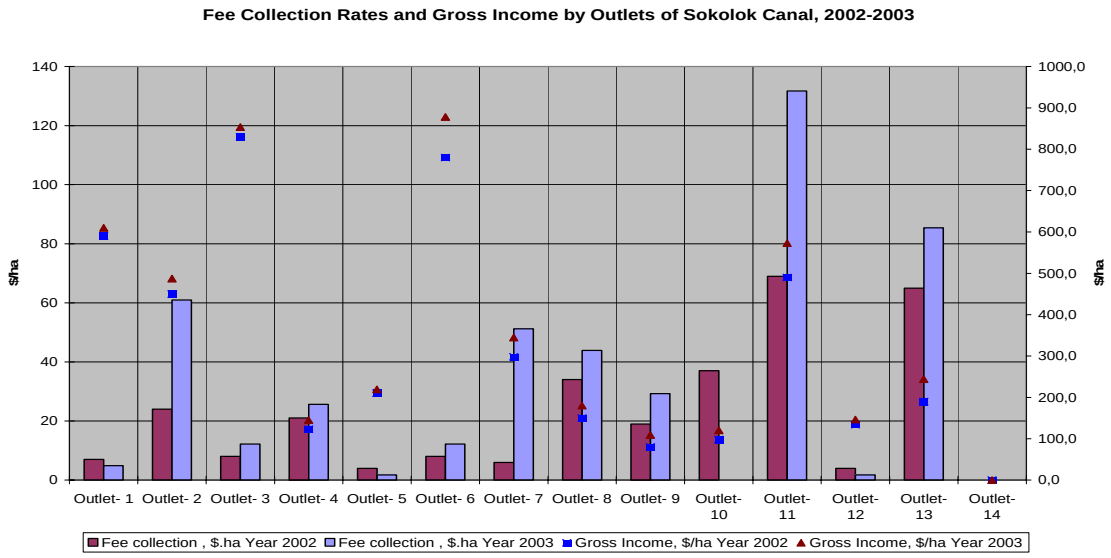

Figure 2

Though water charges in Kyrgyzstan were introduced in mid-90's, the water users are still reluctant to pay for irrigation services. It should be though noted that service fee collection in all the study off-takes, but for #1, 5 and 12, increased by 1.5 to 2.0 times as a result of the intervention.

Conclusions

The above action research discussed clearly suggests that if actions and processes are properly understood and taken up by the users themselves they are most likely to sustain. The logic behind this is simple: it is farmers themselves who would clearly feel the difference and make out all the benefits and losses from whatever interventions they are suggested or made a part of. On the other hand, when properly enabled and facilitated, the results of the interventions that are actively participated and co-owned by water users including when planning and implementing them become much more sustainable than when imposed top-down. Therefore, the process of water distribution at WUA level must be somewhat more flexible, simple, participatory and socially

acceptable in order to sustain. Distributing water using inadequate water use planning practices of the past as is still the case now, tends to turn farmers merely into passive beneficiaries thus failing to provide proper incentives for them to more actively improve their social self-organization and cohesion around common issues emanating from sharing one canal so that they could develop, negotiate and follow their internally accepted rules and principles such as for canal maintenance, water distribution, resource mobilization etc., as well as to defend their vested rights (including those to water) and interests as an organized group when dealing with other similar groups especially those from the upstream or higher hydraulic levels. Thus, continuous inaction or even resistance to bring change to this situation is actually equal to holding fast to the destined-to-be dead body of the top-down management paradigm. After all, solving major water distribution problems this way has never been a success in the past. Moreover, this could become even a major obstacle for water users to be more actively involved in water management. Therefore, the only way to move things forward would be devising truly participatory solutions that can effectively help in overcoming and alleviating the ubiquitous and continuous inequities, grievances, unfairness and tensions between those in the tail-end and those in the head of canals when distributing water, thus, making the former, more secure in getting their due share of water as they might be entitled to.

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