USER PARTICIPATION IN MAIN CANAL GOVERNANCE

Herath Manthrithilake[1]; Sandjar Djalalov[2]

Introduction

The Soviet Union has built-up a massive irrigation system in Central Asia, between two main rivers, Amy Darya and Syr Darya rivers draining into Aral Sea. This irrigation system, one of the largest in the world, covering 9.1 million ha, was primarily providing cotton for the Soviet Union. Apart from cotton, wheat, rice, and orchards were providing much needed food and fibre for the locals. The large farms called 'Sovhoz' and 'Kolhoz' were owned and managed by the government and produced government's quotas of cotton and grains. Water management authorities, based on administrative districts were responsible for the delivery of water to the farm boarders. Within the farm water and other input management was done by the specialized groups –"brigades" of the farm under a Director. Hence, the water management authorities had only few bulk clients as water users and managed only the main and secondary canals. Water in third and forth order canals which were within the farms were managed by the farm authorities. The O & M works of the systems too, managed with the same accordance.

With the dismantling of the large government owned farms along with land reforms, thousands of smallholders, owning from fragment of a hectare to hundreds of hectares hanged onto those tertiary and lower level canals. They do grow cotton, wheat, fruits, vegetables, and variety of other crops in these plots. However, in most countries, still cotton and wheat are favoured by the farmers and in Uzbekistan, these crops are mandatory. Along with land reforms, water sector reforms too, have taken place. Kyrgyzstan was first to introduce Integrated Water Resources Management (IWRM), water fees, land alienation and established Water Users Associations (WUA), as early as in 1996. Unlike Kyrgyzstan, the Uzbek government still provides services and subsidies to agricultural producers. The organization and management of these services follow the old soviet style centrally planned and controlled systems with very limited or no participation of private sector. Although irrigation services are free of charge, the Uzbek government recovers its irrigation costs and other subsidies through setting prices for wheat and cotton (main cash crops) very low (ADB, 2005). In 2005, Uzbekistan has ordered converting all cooperative farms known as "Shirkaths" to Water User Associations. Irrigation service fees are introduced and pilot tested in few such WUAs in all districts of Uzbekistan. In Tajikistan, reforms were affected by the civil war, which started soon after the independence. Since the end of the civil war, - the late 1990s, the government has pursued liberal policies and the economic growth has been reaching 10.2 percent in 2003 (ADB, 2004). Tajikistan has set a price for irrigation services. However, it is still runs with large government farms along with small private farms, which makes the WUA operation a miserable activity.

[1] Head,IWMI Central Asia Office,Apt. 123, Dom 6, Murtazaev St,Tashkent 100000, Uzbekistan. Tel:(998-71)1370445, Fax:(998-71)1370317. h.manthri@cgiar.org

[2] Regional Water Program Manager, Swiss Cooperation Office Uzbekistan, 15 Ivleva Str. Tashkent. 700100 Uzbekistan. Phone: +998 71 1205455 Fax 1205456, sandjar.djalalov@sdc.net

It is worth to mention here that the intensity, pace and objectives of the reforms varies from sector to sector and country to country. In general, although institutional reforms in Uzbekistan are not commenced as rapidly as in other countries in Central Asia, their implementation has been rapid (Pomfret 2003). On the contrary, in Kyrgyzstan and Tajikistan though the policy reforms were fast, the implementation of the same is lagging and weak.

In the above-described setting, "Integrated Water Resources Management in Fergana Valley Project[3] (IWRM – FV) along with the support of Water Departments of Kyrgyzstan, Uzbekistan, and Tajikistan started water sector institutional reforms as part of promotion of IWRM principles. This exercise based on intensive social mobilization at all levels and these institutional reforms are much wider than normally used in WUA creation approach. Below the WUAs farmers are organized into Water User Groups (WUGs) along tertiary canals and above WUA, those WUAs are federated to participate in main canal management. This paper describes how users are involved in canal management and impact of that user participation on the performance.

In the past, during the Soviet times due to strategic importance of the main crops grown - cotton and wheat, Moscow had an eye on the irrigation system. Then these countries, called 'Republics of the Soviet Union', had to adhere to policies set by the Moscow. Hence, all the water systems including the reservoirs with hydropower stations operated with an irrigation bias policy set by the Moscow. Institutionally, agriculture being the largest and the most important water user, one local Ministry handled both the subjects – agriculture and water management. Ministries had water management run along the admin district base or "Oblast" (in Russian). Each Oblast had several sub-districts called "Raigion" (in Russian). These sub-district water management organizations called "Raivodhoz" were responsible, for all activities related to water management within the raigion. Most of main canals are so long that they cut across not only several sub-districts but also several Districts. Main canal, passing through a particular sub-district was managed by the relevant Raivodhoz. The raivodhoz controlled not only the outflow from the canal to the users but also the transit to next section belongs to the adjoining raivodhoz. Hence, the raivodhozes at upper reaches had the advantage against the lower ones. Often this has led to conflicts between the raivodhozes as de-facto 'users' of water to fulfil the region's own agricultural plans and promises towards the government. So, the upstream/ down stream conflicts were common at district and sub-district levels, and even between provinces. The issue was mainly the tail-end water supplies.

The operations of these multitudes of canal sections were coordinated by a central unit called "Dispatcher Point", which subsequently linked to Basin management and the Water Department. However, this dispatcher could not resolve conflicts as it did merely the monitoring part. With the advice of Basin organization on availability of water in the river system, the ministries used to set "limits" on water use for that particular year. Often the heads of oblovodhozes or raivodhozes interfered with the water distribution, which was

[3] IWRM FV project funded by Swiss Development and Cooperation, implemented in the Fergana Valley of Kyrgyzstan, Tajikistan and Uzbekistan by International Water Management Institute (IWMI) with Scientific Information Centre (SIC) of Interstate Committee on Water Coordination (ICWC) of Central Asia.

again outside the 'accepted plan' and led to more obscure distribution. Though the 'limit' is normally lower than the 'planned', the 'actual' water use sometimes exceeded even the 'planned' due to such interferences.

In the past, water users were huge government owned farms. Hence, Raivodhoz has delivered water up to the farm gate and there upon, it was the responsibility of the irrigation "brigade" of the farm. Every year, the farm would provide the cropping plan according to the production quota assigned to them by the state. Raivodhoz used these proposed cropping plans to develop 'water use/ demand plans'. Irrigation water requirement was determined for 10-day intervals (decade) based on crop type, sown area, soil characteristics, ground water depth and other environmental factors of irrigated areas. Based on these estimated requirements, Raivodhoz has scheduled and delivered the water. The Raivodhoz had a firm grip over the delivery of water to the farms and water conflicts between the farms were rare, but occurred. However, more frequently conflicts occurred between Raivodhozes themselves.

The Problem

With the land reforms introduced, independently managed farm sizes have become much smaller and privately owned. As the result, number of farms too increased from few numbers to several thousands. The farm gates moved from main and secondary canals to lower level canals. Now, thousands of smallholders hanged onto smaller canals, which have almost no regulating structures and asking water in different quantities at different times. The job of Raivodhozes has become more complicated and overloaded the existed capacities. Large numbers of overlapping requests from numerous smallholder farmers for smaller quantum of water for different crops, and the efforts to make water delivery schedules using existed method resulted in chaos, inequity, and unreliability at all levels of the irrigation water management. This has also led to a mismatch between water supply and actual cropping needs, waste of water and an exponential increase in the number of water-related disputes. The operations were further aggravated with the non-existence of proper canals and structures linking to individual farm holdings, while the main irrigation supply and drainage networks too are in a dilapidated state, due to decades of financial problems.

Under the influence of the technical assistance rendered by the international organizations, newly independent countries of Central Asia started creating a new institutional structure at farm level - Water User's Associations (WUA) for water management. In ideal situation, WUAs could have effectively replaced the former "irrigation brigades" within farms. However, new small holder situation and absence of technical know how within newly created WUAs could not make this replacement effective. As mentioned earlier, the first WUAs in Central Asia appeared in 1996 in Kazakhstan and Kyrgyzstan, where the legal base for such activity was created. In Tajikistan, farmer cooperatives under took the water distribution role. In Uzbekistan, where agriculture reform proceeds in step wise, a new type of 'independent cooperative farm' - "Shirkat" were created in place of old government farms, and the experiments with WUAs has begun in 1999. However, only in 2003, state water policy simultaneously with creation of basin management systems, acknowledged the creation of WUA as a step in reforms. In all five countries, WUA movement is now getting the momentum. However, again the progress is small and at different paces. WUAs created

with the initiative 'from above' are regarded and operate as something similar to former Kolhoz and Sovhoz (old state owned farms), with a different name board.

With the adoption of IWRM principles, the 'oblovodhozes' were reorganized as "Basin Irrigation System Management Organizations" (BISMOs) and parts of the main canal sections, which came under 'raivodhozes' were regrouped as "hydroychastok" (in Russian) or "hydro units". The coordination, which was carried out by the centralized dispatcher unit came defunct.

Despite these multiple fragmentations and worsening ground situation, the water management authorities continued to operate the way they used to do. The result being, almost all canal outlets left open to let water continuously flow without any regulation. Consequently, users in the upper reaches of canals have enjoyed the access to more water at the cost of the tail-end water users, and small fields fill up quickly and surplus water discharged to the drainage network, while bigger plots never irrigated fully throughout the season (IWMI, 2004). Hence, over use, deficit, water logging, salinity, etc, were haunting every corner of this huge system, which has led to low yield, poverty and other livelihood issues.

In summary, the main question was how to serve the multitude of farm holdings in an equitable, uniform, justifiable, and sustainable way, so that user conflicts are minimized if not eradicated, and transparency and fairness maintained through out the network, despite all structural ills encompassed. The WUAs and Water User Groups (WUGs) set up through bottom up approach are solving these problems effectively. The issue is how to make sure that the trust placed on the WUAs sustained. For this WUA should have uniform and reasonable supplies of water. For this purpose, main source of supply – the main canal has to function in an appropriate way. How to improve the operations of the Canal?

Hypothesis

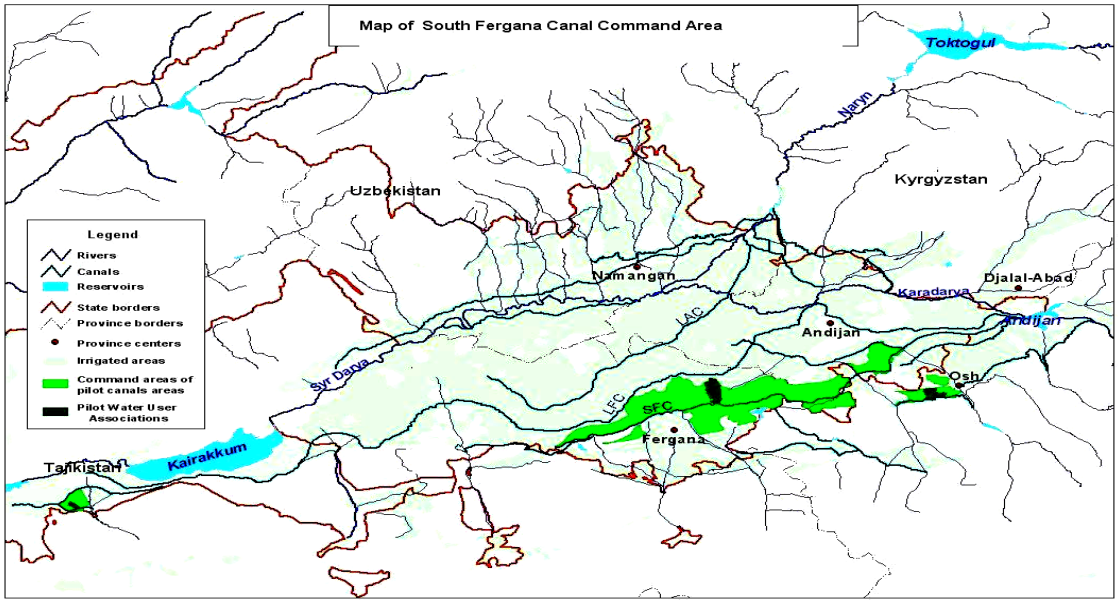
Experience elsewhere suggests that effective water delivery in situations like these can only be achieved by fostering greater participation of users in the process of planning and distribution of water (Abernethy 1988; Horst 1990). Involving water users in the planning and distribution processes requires participatory approaches and methods that are user-oriented, as well as simple enough to be understood by farmers. This kind of user involvement can achieve only through a thorough social mobilization or creation of good awareness on the role and responsibilities of the users. The world has lot more experience of setting up Water User Associations for smaller systems. The hypothesis here is that similarly, users' participation in main canal management would improve the performance of the canal operations.

Experiment

The Ferghana Valley is considered as the oasis of the Central Asia (see Map 1). This valley forms the upper to middle reach of the Syr Darya River Basin, where three quarters of the river's run-off originates in Kyrgyzstan. This area of highest productivity is shared by three countries, namely, Uzbekistan (71 %), Tajikistan (8 %) and Kyrgyzstan (21 %). This valley

consist of 49,000 km² in total (5% of the Central Asian territory) is home for 27% of Uzbekistan, 31% of Tajikistan and 51% of Kyrgyzstan population. The total population of the valley is about 10.5 million, makes more than one-fifth of the Central Asian population. Thereby this area contains the highest density of population (250 people/ km² compared to that of 14 people/ km² for Central Asia on average. The Valley has a number of most extensive and economically important irrigation systems in Central Asia. Due to these reasons, this project mainly aimed at water sector institutional reforms was located in this area. Therefore, the Project Steering Committee has selected three main canals for pilot testing from each country (Annual workshop, 2002). These canals are:

1. **South Ferghana Canal** (SFC) in the Ferghana Province of **Uzbekistan**;
2. **Aravan Akbura Canal** (AAC) in the Osh Province of **Kyrgyzstan**;
3. **Khodja-Bakirgan Canal** (KBC) in the Soghd Province of **Tajikistan**



Map 1. Fergana Valley and three pilot Main Canals

Characteristics of these canals are given in *Table 1*. These long main canals in Central Asia are continued to be managed by dividing them into sections based on admin region. For instance, South Fergana Canal (SFC) came under eleven raivodhozes. The other two relatively smaller canals had two raivodhoz per each.

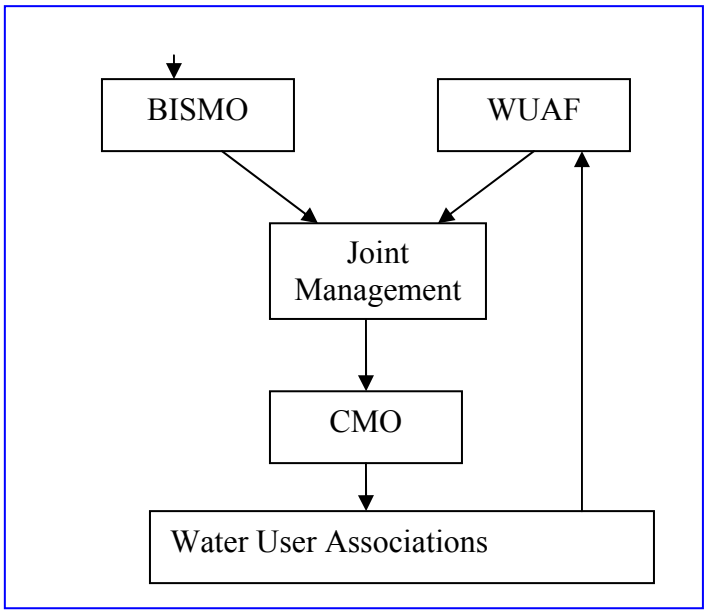
Name of the Canal	**Length (km)**	**Head Discharge (m3/Sec)**	**Command area (ha)**
South Fergana Canal (SFC)	137	100	83,884
Aravan Akbura Canal (AAC)	37	25	9,200
Khoja-Bakirgan Canal (KBC)	31	33	8,100

Tab. 1 Canal Characteristics

With the efforts of IWRM-FV project, a single Canal Management Organization per each canal was formed. Canal is no longer in the hands of several admin units but managed as a

one whole unit under a Chief Engineer. These new Canal Management Organizations (CMO) are now responsible from head to tail of the canal, without any interventions from oblovodhoz or raivodhoz. Thereby the political interferences over the fragmented canal management have been stopped.

The next important step was to involve stakeholders in the management of the canal. A governance body, - type of a 'managing board' were formed with stakeholder participation for each of them. This is a novelty in the whole Central Asia and perhaps in the whole ex-soviet countries. Understanding of this concept - managing such an important economic unit with *stakeholder participation,* was initially difficult for many in the water management authorities here. Hence, there was a huge reluctance and suspicion on the proposed system on the part of authorities. There were difficulties in understanding and separation of the roles of 'governance' & 'management'. A 'government paid canal manager and his staff' could not be "*supervised"* by a "non-governmental body". Further, there were legal obstacles to overcome, as it was illegal to transfer government funds into the hands of a non-government body for operations and maintenance of the canal. Compromise was reached by setting up a '*joint management board*' with representatives of both BISMO[4] and User Federations according to the financial contributions they make towards the operations of the Canal. After a long discussion and dialogues, in December, 2005 Kyrgyz Water Department agreed to authorize a 'joint management' to run the CMO. The new management structure is shown in the Diagram 1.



Diag. 1. Management model

With this approval from Water Ministry of Kyrgyzstan, for the Aravan Akbura Canal management and governance functions were separated. The day-to-day management is handed over to the professional staff of the Canal Management Organization (CMO), while

[4] BISMO is the same Oblovodhoze renamed under the basin management concept as Basin Irrigation Management Organization.

policy making over the CMO was passed on to an independent governance body consisting members of BISMO and Water Users Associations Federation (WUAF). The BISMO and other water authorities agreed not to interfere with the decisions of the governing board. Also, the governing body has to operate within the laws of the country and can make policy decisions pertaining to finances and water distribution only within the canal command area. WUAs along the canal and other stakeholders are federated into a single organization (WUAF) and representatives of this federation are now sits on the new canal governing body, along with the government representatives coming from BISMO. The membership quota for this governing body is divided according to the financial contributions make by of each party to the operations of the CMO. In Aravan Akbura governing body there are four members representing BISMO (government) and WUAF is represented by three members. The CMO chief is a non-voting member of this governing body. Chair of the 'Joint Management Board' (JMB) is elected by voting from the board members. This governing body now successfully oversee the policies and functioning of the CMO of Aravan Akbura Canal.

Above management structure was selected by the stakeholders of the AAC out of three options to them by the project. Similarly, work is going on to select the form of management for other two canals too.

The situation with regards to South Fergana Canal (SFC) is not matured as of AAK. The situation at SFC is more complex. Form of user representation is just being agreed upon and legal recognition is yet to come for this users Federation. The documents are with the Ministry of Justice for registration. The CMO has taken over the control of whole length of the canal including several major structures. Despite of these difficulties, users have already taking part in the operations of the canal. Yet to be 'registered' canal governing board is currently chaired by a woman water user and influence of the board is already showing results.

In Tajikistan, the HBC CMO is already functioning and collecting water fees. The WUAs are just getting into their places and it is too early to federate them. However, already a stakeholder committee is informally overseeing the CMO of KBC. Despite, technical and legal shortcomings, the canal governing bodies started to 'informally' function from December 2005 and showing positive results.

Results & discussions

The impact of project interventions on the canal performance is vital in many perspectives. Failure could tantamount to many repercussions for the future user participation in water management. However, the success too can have great impacts on these irrigated agriculture based economies as a whole. Therefore, it is important to measure the impact of these interventions. There are many ways to assess the impact or performance of an irrigation system (Bos et al. (2005), Small and Svendsen (1992), Wolters (1992), Murray – Rust and Snellen (1993), Bos et.al.(1994). More advanced systems like 'benchmarking', was designed to compare performance across systems, within defined contexts (IPTRID/WB/IWMI).

The main performance indicator used in this study is Delivery Performance Ratio (DPR), which shows changes in quality of services provided by the canal management and quantifies the uniformity and equity of water delivery. DPR is calculated as the ratio of actually delivered volume of water against the planned. The Delivery Performance Ratio (Bos et al. 2005), indicate the quality of services to water users, which is quantified through the ***uniformity*** and ***equity*** of water delivery. The ***uniformity*** is measured as the temporal change while the ***equity*** is measured as spatial variability of DPR.

$$\mathbf{DPR\ (T, S) = W}\ \boldsymbol{actual}\ \mathbf{/\ W}\ \boldsymbol{planned} \qquad (1)$$

Where, **DPR** – delivery performance ratio
W *actual* – actual water delivery in the diversion point in a given decade (cubic meters)
W *planned* – planned water delivery in a given decade (in cubic meters)

According to FAO (1986) classification the following three levels of DPR is distinguished:

- **deficient** water distribution (when **DPR< 0.8**)
- **moderate** distribution (**0.8<DPR<1.2**) and
- **excessive** distribution (**DPR>1.2**)

This paper shall use these two criterions (***uniformity*** and ***equity*** of water delivery) to assess the impact of interventions on the canal management.

The data used for this purpose is picked-up from the canal operators' reports and assumed they are accurate and represent the real situations. This data has been collected during the period of 2000 -2005. The IWRM Ferghana project started in 2002 and continues promotes institutional reforms to date. Water deliveries were measured 3 times a day. Daily averages were calculated based on arithmetic averages of the measured water deliveries.

The existing seasonal planning system in Central Asia is based on 10-day periods (called a 'decade'). Each month is divided into 3 decades. The irrigation season lasts from April to September, with a total of 18 decades. For the purposes of this study, actual decadal water deliveries were compared against the planned decadal water deliveries over the full or part of the irrigation season of study periods (2000-2005).

Descriptive statistics of spatial variations of DPR by Water User Associations (WUA) before interventions 2003 and post interventions (2005) are also given in *Tab. 2* in head to tail order This table indicates that project interventions has made significant impact. Only the first half of the vegetation periods, where first crop is cultivated has being used in this table and figures. This is just due to processing and computerizing delays of the data from the original sources by the time of preparing this paper and not for any other reasons. The averages of the water distribution coefficients of the Aravan Akbura Canal (AAK) for two periods are 0.49 and 0.97, respectively. The temporal distribution shows that compared with 2003, DPR remained within the moderate water distribution range ± 20% of the planned (between 0.87 and 1.16) through out the season 2005 (Tab 2.), whereas this was achieved only once (0.17 - 0.90) during 2003.

Location WUA Name	Year 2003	April 1	 2	 3	May 1	 2	 3	June 1	 2	 3	MEAN (3 Months)
"Japalak"		0.27	0.24	0.29	0.41	0.49	0.31	0.70	0.52	0.56	0.42
"Jana Arik"		0.11	0.40	0.43	0.45	0.28	0.20	0.42	1.05	0.82	0.46
"Kerme-To"		0.13	0.20	0.22	0.22	0.92	0.45	0.68	1.07	0.87	0.53
Total AAK		**0.17**	**0.23**	**0.26**	**0.30**	**0.73**	**0.39**	**0.67**	**0.90**	**0.77**	**0.49**
	2005										
"Japalak"		0.53	0.59	0.08	0.95	0.87	0.84	0.41	0.33	0.35	0.55
"Jana Arik"		0.94	0.61	0.13	0.87	1.01	0.91	0.67	0.70	0.60	0.72
"Kerme-To"		0.29	0.64	1.20	0.39	1.30	0.71	0.90	0.87	1.04	0.81
Total AAK		**1.16**	**0.99**	**0.98**	**0.89**	**0.89**	**0.87**	**1.01**	**0.92**	**1.03**	**0.97**

Tab. 2. Spatial and temporal distribution of DPR for Aravan Akbura Canal, Kyrgyzstan

For visualization purposes, this information is presented in the *Figure 3a & 3b***.** The *Fig. 3b* shows improvement of *equity* among the users. It is important to note that Japalak WUA is using more than stated amount of water due to reuse of drainage water from other users. Japalak management is of the view that they are accountable (should pay) only for the water received from the supply canal and not for the water taken from drainage canal. Hence, records indicate only the irrigation canal supply. However, during the personal discussions, the Japalak management accepted that the situation has improved drastically since, 2003 with user interventions in the canal management.

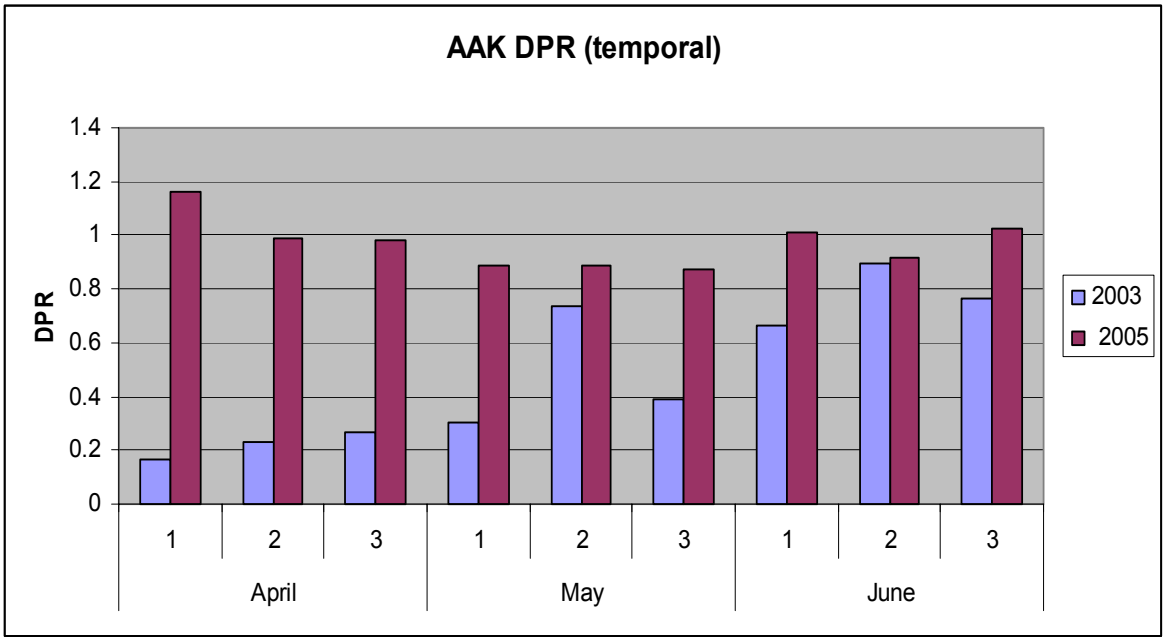


Fig. 3a. Temporal distribution of DPR of Aravan-Akbura Canal pre intervention (2003) and post intervention (2005) periods

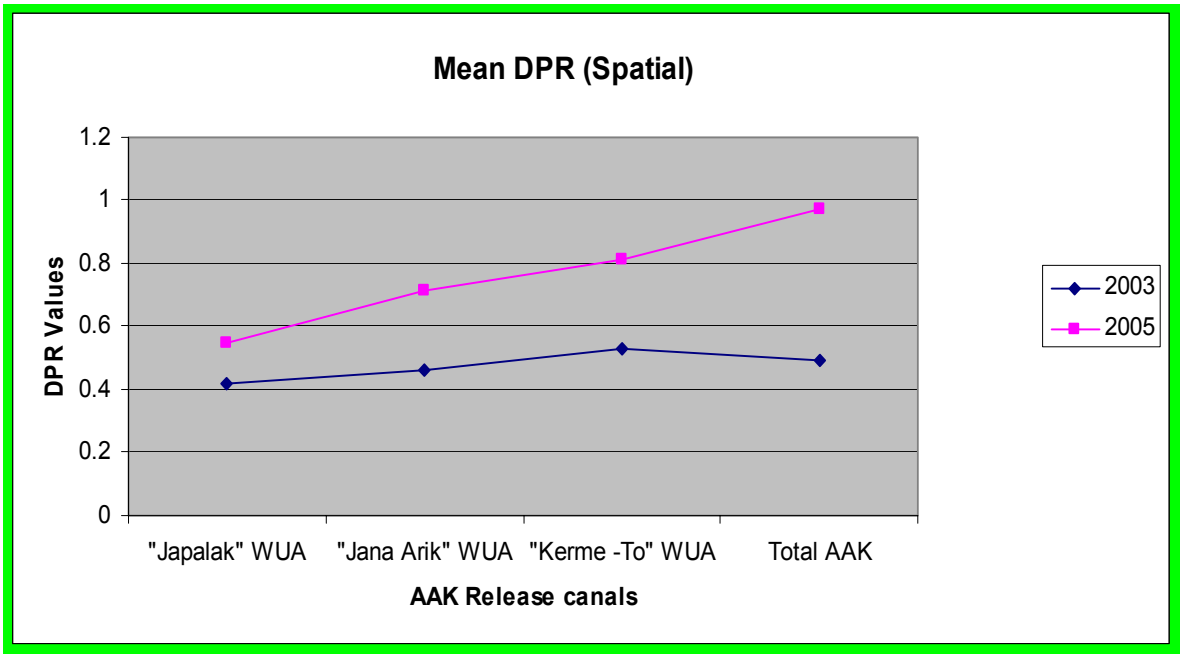


Fig. 3b Spatial distribution of DPR of Aravan Akbura Canal pre intervention (2003) and post intervention (2005) periods

These are clear indications, where users influence on the operation of the canal. They got the canal management to operate at least close to the agreed plan. Of course these are just first ever experiences in the users participation in canal governance. Both the parties, users as well as canal managers have to get used to 'each others', the new situations and be responsive to the hydrologic situations. These improvements within first two years indicate that the direction of change is correct. The new 'canal governance body' is now taking appropriate actions to improve the fee collection rates to finance the infrastructure rehabilitations, which will make the management easy and more uniform and equitable. It is important to remember, that Aravan - Akbura Canal has being the most progressed canal in terms of legalizing and operationalizing the user involvement in canal governance.

The reforms introduced to SFC management, have a positive impact on water distribution. All 8 large hydro units of SFC, from which the water is now delivered to the primary water users i.e. WUAs indicates that there is a clear difference between the periods of pre and post reforms / interventions.

The following analysis was done by IWMI researchers (Iskandar, et al. unpublished (2006)). The band in (Fig. 4) shows the moderate water distribution with ± 20% of the planned. The actual distribution has remained close to this range since the intervention. The pre-intervention (2000-2002) period is characterized by over supply of water, even during the water shortage year of 2000 in Central Asia. During the intervention period there were two cases with extremely low DPR – 0.21 (September 2004) and 0.16 (September 2005). They occurred at the end of the cropping season (Fig. 4). Hence, did not have any impact on the irrigation water users but might have negatively impacted on non-agricultural water users.

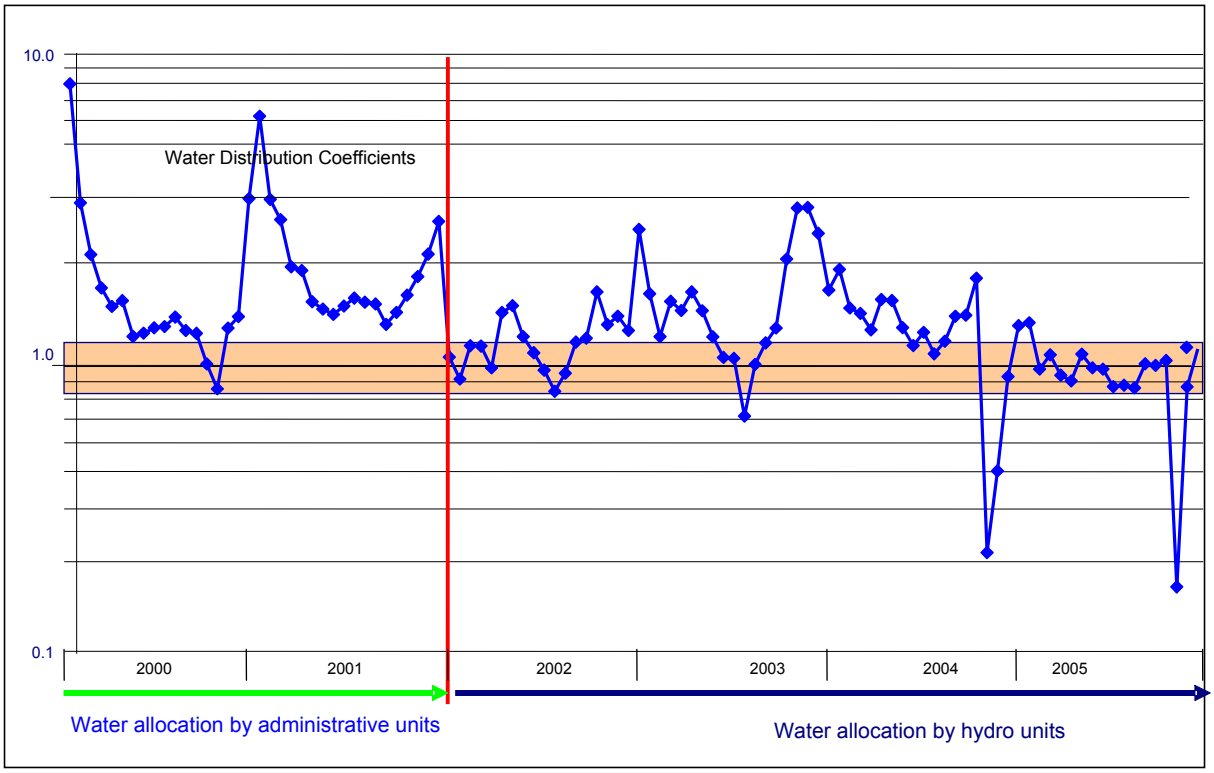


Fig. 4 Temporal variations of average water distribution coefficients (adopted from (Iskandar, et al. (2006)

The spatial DPR (equity) analysis of the pre intervention (administrative districts) and the project intervention period (hydro units) shows significant differences (*Tab. 3a &b*). The weighted averages of the water distribution coefficients for two periods are 1.97 and 1.2, respectively.

The mean DPRs for the pre-intervention period are relatively homogeneous, ranging 1.08-1.46 until the Kuva Raivodhoz (Ferghana), which is located at the middle of the SFC. For the Kuva Raivodhoz DPR equals to 2.52, Okunbabaev WMO again reduces it to 0.97 and then reaches it is highest values in Oltiarik, Fargona and Yozyovon districts - 2.23, 4.28, and 3.07 respectively. This indicates that the water distribution among the administrative districts located along the canal was not equal during the pre-intervention period. (See Fig. 4 also) However, the unequal water distribution did not result in impaired water delivery to the tail end districts. Rather, the tail end users received more water than planned.

However, the picture has changed to a more equitable distribution, as a result of the unification of the canal for the hydrographical management and the active role, which water users started to play in SFC through their representation in the Canal Water Committee (CWC). This is clearly visible in the Tab. 3b.

Tab 3a. Observation Period	Raivodhoz	DPR Mean Value
Pre intervention period 2000-2001	Khujaabod	1.46
	Bulakbashi	1.45
	Markhamat	1.44
	Aravan	1.72
	Kuva	1.42
	Tashlak	1.08
	Kuvasay	2.52
	Okhunbabaev	0.97
	Oltiarik	2.23
	Fargona	4.28
	Ezyovon	3.07

Tab 3b. Observation Period	Hydro units	DPR Mean Value
Post intervention period 2002-2005	Hydro unit 1	1.06
	Hydro unit 2	1.13
	Hydro unit 3	1.53
	Hydro unit 4	1.06
	Hydro unit 5	1.10
	Hydro unit 6	1.35
	Hydro unit 7	1.00
	Hydro unit 8	1.34

Tab 3a & 3b. Spatial distribution of DPR along the SFC in different periods

Canal is now managed as units/sections under unified management and not under admin area based. Hence the Fig. **5a** & **5b** has two different axis's. Nevertheless, spatial distribution has evened out, cutting down the excessive supplies to the users. In 2005 another revelation occurred. That is around 6000 ha of lands earlier unreported through the system but irrigated has being identified. However, Fig. 5b shows that there is more room for improvement on spatial distribution.

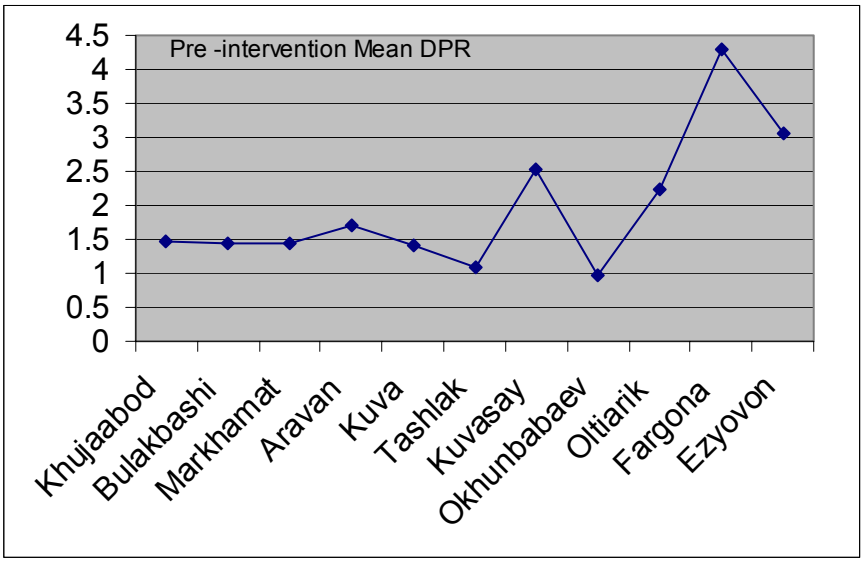


Fig 5a. Spatial distribution of DPR as per 2000

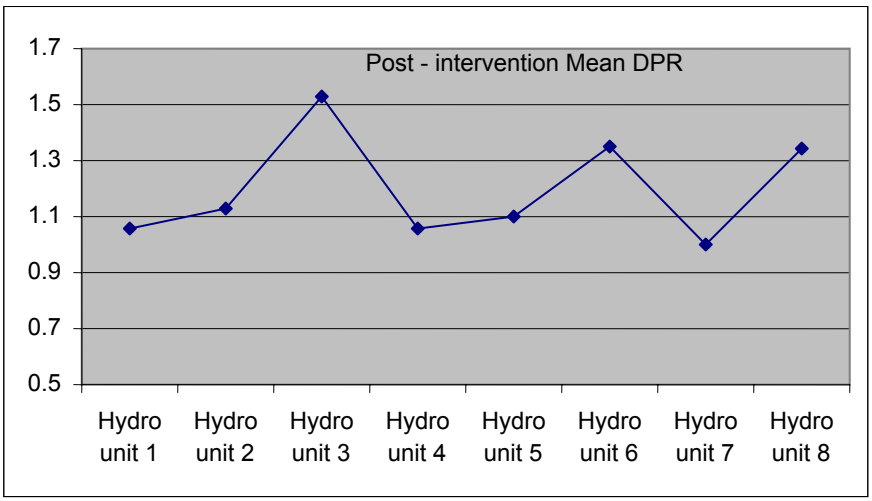


Fig 5b. Spatial distribution of DPR as per 2005

In 2000-2002, when the canal was managed territorially with no water user representation, water supply was excessive. Hence, the pre intervention period can be characterized by very high DPR both spatially and temporally, indicating the over supply of the water from the SFC. The overall water distribution performance during the intervention period can be measured as a moderate and in 2005 was mostly optimal. The pattern of spatial & temporal changes of water distribution clearly mirrors the interventions in SFC. The above analysis indicates that there have been improvements in the water distribution.

The data on Hoji-Bakirgan canal of Tajikistan were not ready for processing by the time of preparing this paper. There is no doubt that the situation there too, has being improved though legal aspects of user participation as in SFC is yet to be formalized. Moreover, along the total canal length there are still large old cooperative farms (kolhozes), which were yet to be dismantled. Some of the newly created WUAs are dependent on these cooperative farms for their water as the delivery canals are passing through them. Nevertheless, users are already making in roads to the Canal management.

Conclusion

It is obvious from the above analysis that canals management has improved its performance against what it was before the reform. The equity and uniformity of water distribution has improved with the users' involvement in the governance. DPR is reaching the levels of moderate distribution. There are other evidence like user fee collection rate, user satisfaction surveys, etc (though this information is not provided here) to prove that the reforms are on the correct path. However, there is more distance to go.

Managing the canal as hydraulically one unit and thereby created a fair and just distribution of available water between all sections of the canal. This has reduced the political and administrative interference on the operations of canal for water releases. Involvement of users has brought two main advantages: a) users are contributing to much needed financial resources for the maintenance of the system; b) transparency of water availability and self-control of the users, which has being the root cause for admin interference and thereby reduced the conflicts.

We conclude that the reforms on canal management to include users' participation in all three countries have led to an improved performance (a reduction of excessive water delivery and increased the prevalence of moderate water distribution). Overall assessment of the situation for the pre- intervention and intervention periods shows that IWRM project interventions had a positive impact on equity and uniformity of water distribution.

References:

1. Abernethy, C.L. (1988). The concept of flexibility in irrigation systems. Paper presented at the Irrigation Management Conference, Wuhan, China
2. ADB (2004) Country Strategy and Program Update 2005-2006. Tajikistan.
3. ADB (2005) Agriculture Sector Review and Planning. Volume 1: Main Report. Current Status and Outlook for the Agricultural Sector.
4. Bos M.G, M.A. Burton and D.J. Molden. (2005) Irrigation and drainage performance assessment: practical guidelines. CABI Publishing. 158 pp
5. Bos M.G., Murray- Rust, D.H., Merrey, D.J., Johnson, H.C. and Snellen, W.B. (1994) Methodologies for assessing performance of irrigation and drainage management. Irrigation and Drainage Systems 7, 231-262 pp.
6. Burt, C.M and Styles .S (1997) Irrigation Modernization Study, appendix "Irrigation Indicators', Washington, DC: World Bank-IPTRID –IIMI.
7. DFID (2001) Sustainable Livelihood Analysis. Sustainable Livelihoods for Livestock Producing Communities in Kyrgyzstan
8. Herrfahrdt, E., Kipping, M., Pickardt, T., Polak, M., Rohrer, C. and Wolff C.F. (2005) Water Management in the Kyrgyz Agricultural Sector: On its way to IWRM? Final Report of the Country Working Group Kyrgyzstan. German Development Institute. Bonn
9. Horst, L. (1990) Interactions between technical infrastructure and management. Network paper 90/3b, Irrigation Management Network. London: Overseas Development Institute.
10. Institutional Reforms at Main Canal Level and its Water Management Implications: Case from South Ferghana Canal, Uzbekistan (unpublished 2006) Iskandar Abdullaev, Jusipbek Kazbekov, Herath Manthrithilake, Kahramon Jumaboev, Murat Yakubov
11. Integrated Water Resources Management in the Ferghana Valley. (2002) Institutional Analysis of Water Management in the Ferghana Valley. Project Document. Tashkent: International Water Management Institute, Scientific Information Center of the Interstate Commission for Water Coordination and Swiss Development Cooperation.
12. IWMI.2002. Integrated Water Management in the Ferghana Valley Project (IWMFVP) (WA 300701). Institutional Situation Analysis of Water Management in the Ferghana Valley
13. Mehmood, H., R. Starkloff and N. Nizamedinkhodjaeva. (2004). Inadequacies in the Water Reforms in the Kyrgyz Republic. An Institutional Analysis. Research Report 81. Tashkent: International Water Management Institute.
14. Murray – Rust, D.H and Snellen W.B. (1993) Irrigation system performance assessment and diagnosis. Joint IIMI/ILRI/IHEE publication International Irrigation Institue, Colombo, Sri Lanka.

15. Pomfret, R. (2003) Central Asia since 1991: the experience of the new independent states. Working papers no 212. OECD Development Centre
16. Resolution № 320 (21.07.2003) of the Cabinet of Ministers of Uzbekistan. 2003. «On improvement of organization of water management system», Tashkent, Uzbekistan
17. SDC. (2005) Integrated Water Resources Management Project in the Ferghana Valley. External Review of Phase II and Recommendations for Phase III. Final Report prepared by PA Consultant Services, Inc.
18. Small. , L and Svendsen, M. (1992) A Framework for Assessing Irrigation Performance. IFPRI Working papers on Irrigation Performance #1. International Food Policy Research Institute. Washington. DC.
19. Wolters, W. (1992). Influences on the Efficiency of Irrigation Water Use. ILRI publication #51. International Institute for Land Reclamation and Improvement, Wagnigen, the Netherlands.