To cooperate or defect?: The role of Water Users Associations in Mitigating the "Tragedy of the Commons"[1] (Part II)

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Introduction:

Kyrgyz farmers have been placed in the position of needing to coordinate inter-community irrigation systems through the creation of locally managed "Water Users Associations" (WUA). This past summer I set out to study patterns of conflict and cooperation between farmers in the water scarce oblasts of southern Kyrgyzstan. My pre-dissertation research contained three major objectives. First, I wanted to reach a better understanding of the general problems faced in the management of irrigation water and the factors that explain the varying degrees of success among Water User Associations in Southern Kyrgyzstan. In addition, I began conducting an initial comparison and program evaluation of WUAs based on or supported by "community mobilization" or "institutional development" programs with WUAs that are supported and reinforced by programs which focus on infrastructure and rehabilitation. Second, I aimed to study the effect of ethnic heterogeneity on common-pool resource management. Finally, I wanted to emerge from this preliminary research with a clearer picture of the methods and data that I could utilize and attain for my dissertation research.

Throughout Kyrgyzstan, Irrigation Management Transfer has led to the creation of 462 community-based Water User Associations (WUA) for the governance of irrigation systems and equitable distribution of irrigation water among farmers. [2] These WUAs have been, in part, developed and implemented in an attempt to solve the fundamental problems of coordination and cooperation that have long been associated with public goods management and often result in what scholars label the "tragedy of the commons." Consequently, WUAs have been designed with several institutional principles which are intended to address "collective action problems" by transforming incentives for farmers and thereby motivating them to cooperate and coordinate in the provision of the public good of irrigation water.

Research Methodology & Plan

My preliminary research was completed during a 16 week stay in Kyrgyzstan. The following analysis is based on written records, semi-structured interviews, micro-level case analysis and field notes from four months of research in Southern Kyrgyzstan. I attempted to attain a broad-based understanding of water management in Kyrgyzstan by conducting interviews with individuals from a variety of organizations and geographic areas. This included interviews in Bishkek, Osh, Jalalabad and Batken with government officials, Non-governmental organizations, International organizations, local farmers, academics, community members, and the leadership and management of WUAs. Due to concerns over irrigation water scarcity and the presence of tension over scarce water resources, Southern Kyrgyzstan was chosen as the location of my research study.[3]

Section 1:

[1] This paper represents an extension of a previous paper submitted to the Social Research Center of the American University in Central Asia. The topic, title, and body of the original paper remain intact within this updated version. However, there are significant descriptive and analytical additions to the new document.

[2] Kyrgyz Republic Ministry of Agriculture and Water; Department of Support and Regulation for Water User's Associations, 2007 Yearly Report, Bishkek 2008

[3] There are significant topographical, economic, and hydrological differences between Southern and Northern Kyrgyzstan which diminish any useful comparisons between WUA programs in the two regions.

Irrigation Management Transfer:

"The final necessary step, has been to throw ourselves full force into developing water user associations. I must confess that in the old days I used to wonder why developing a strong centralized irrigation authority, which honestly and competently delivered water according to the schedules posted on the big billboards at junctions of country roads, wouldn't work better than mucking about with hundreds of cantankerous water user associations. I saw the debate between the two as largely ideological, which means philosophically appealing on the one hand to Indian Civil Servants in Lucknow, or on the other to some bearded anthropologist living in Bethesda. Well, when you have virtually no money, the debate is over. With no money we may as well forget about the impressive Malaysian Drainage and Irrigation Department of the 1970s. We need farmers' money, we need their shovels, we need them to operate gates and police their neighbors' abstractractions, we need their oversight of contractors, we need them to take over their irrigation systems." [4]

During the period of the Soviet Union, irrigation management was administratively centralized and focused on river basin management among the 5 Central Asian republics. For approximately 70 years, Moscow organized, managed, and subsidized the entire Central Asian irrigation system. The region represented the Soviet "cotton belt" and the cultivation of cotton required the development of an extensive and highly sophisticated irrigation system for the arid Central Asian states.[5]

Following the collapse of the Soviet Union, the newly independent Central Asian states were left in control of the operation and maintenance responsibilities of their territorially/administratively designated part of the irrigation system. The problems faced by the Kyrgyz government following the collapse of the USSR were generic to the irrigation service problems faced across the developing world and especially post-Soviet counties. These problems included infrastructure deterioration, persistently inefficient water services, persistently low collection of irrigation fees, chronic underinvestment in maintenance, poor productivity and declining crop yields, an unabated cycle of irrigation system deterioration and consequently poor incomes of farmers.[6] In 1994, Kyrgyzstan began a rather ambitious land reform process which further complicated the task of operating and maintaining the irrigation system. This land privatization involved dividing up the previous kolxoz and sovxoz into multiple small agricultural units which were distributed to the members of the kolxoz and sovxoz. This resulted in a large number of small land plots held by individuals without any previous farming experience, along with, more complicated cropping pattern and irrigation requirements.

Due to a lack of government funds for operation & maintenance (O&M), the Kyrgyz government was unable to provide the necessary service and rehabilitation for the irrigation infrastructure. Consequently, in order to reduce the financial burden of irrigation governance on the national budget, Kyrgyzstan embarked on an irrigation sector reform in 1999. This process, known as Irrigation Management Transfer (IMT), entailed the complete devolution and transfer of management, maintenance, and irrigation investment tasks from government/public institutions to private community based farmer's organizations- in the form of Water Users Associations. IMT requires that WUAs become responsible for fulfilling tasks previously undertaken by the national authorities, including: O & M, resource and organizational management and dispute resolution.

Since the 1960s, IMT has been undertaken in more than 60 countries across 5 continents and currently represents the global paradigm and model for irrigation sector reform. The fundamental theoretical justification behind IMT is that good water governance is based on the principle of subsidiary. There is an assumption that participation and empowerment will be sufficient incentives for getting farmers to participate and take on the high cost of irrigation management. Since the 1990s, the "language" of and program theory behind IMT clearly reflects three influential trends that were moving together

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[4] "Assisting Irrigation in Central Asia," Presentation by Joseph Goldberg, Sector Manager, ECA, World Bank

[5] Mehmood Ul Hassan, Ralf Starkloff and Nargiza Nizamedinkhodjaeva, "Inadequacies in the Water Reforms in the Kyrgyz Republic," Research Report 81, International Water Management Institute, 2004,p. 1

[6] Eduardo Araral p. 1-2 Chaos, Cheating, and Cooperation

during the development of IMT. These include liberalism, natural resource management and participatory approaches.[7]

The Collective Action Problem & Tragedy of the Commons:

The problems that arise from the operation and maintenance (O & M) of an irrigation system provide text-book examples of Mancur Olson's collective action problem and, correspondingly, Garret Hardin's "tragedy of the commons." These two issues have become fundamental topics of research and debate across the social science and public policy disciplines and have had a tremendous impact on the development of numerous public policies.

In order to illustrate the "tragedy of the commons," Hardin provides the example of a pasture system that is used by multiple herders for grazing their livestock. Each individual herder has a strong incentive to graze his livestock in a larger area of the pasture and for a longer period of time because the more well-fed livestock will allow the herder to reap greater economic returns. Consequently, when all herders pursue their purely rational strategies of maximizing their livestock's access to the pasture, the end result is a depleted pasture that can no longer provide sustenance for any of the livestock. Thus, the individually rational and optimal strategy has yielded results that initially make the collective much worse off and eventually make the individual worse off.[8]

Like the pasture system mentioned above, an irrigation system and its water represent common-pool resources. These common pool resources can be defined as public goods that are "non-excludable" and "rival." First, the incredibly high cost of regulating access to a resource such as water means that you cannot *exclude* individuals within a group from using the resource.[9] Second, the use of one unit of the resource by one member of society reduces its availability for another, thus there is competition among users. These two characteristics lead to the "tragedy of the commons" described above where each individual's rational "over-use" or non-optimal use of a resource eventually decreases the quality and/or quantity of the resource. The final result is that the "collective" becomes much worse due to the degradation or depletion of the resource. [10]

In the case of irrigation systems, each farmer's pursuit of strategies to maximize their own water supply leads to social costs and a reduced water supply which reduces individual incentives to contribute to the upkeep and maintenance of the irrigation system. Since farmers can not be excluded from using the irrigation system, *free-riders* use the source without contributing to the provision of the resource. Thus, the infrastructure and volume of water eventually deteriorates to the detriment of all of the farmers; and has an especially deleterious effect on the farmers located at the end of a canal system.

This issue of free-riders leads us into a more specific discussion of the collective action problem that arises during the governance of common-pool resources. We can define collective action as the pursuit of a goal or set of goals by more than one person. A collective action problem is a situation where individuals in a given group have a choice between (a) participating in the provision of a goal or resource or (b) non-participating ("free-riding") and thereby allowing other members of the group to fulfill the goal.[11] For example, in the pasture example, the collective action task would be the development of and adherence to an equitable management system for the pasture that will allow each herder to graze his livestock for a defined period of time and thus not contribute to the deterioration of the pasture. The problem that would arise in this collective action arrangement would be the potential for an individual to

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[7] Carlos Garces-Restrepo, Douglas Vermillion, Giovanni Muñoz, "Irrigation Management Transfer: Worldwide efforts and results, (Food and Agricultural Organization of the United Nations; Food & Water Reports; Rome; 2007) pp. 1-6

[8] Garrett Hardin, "The Tragedy of the Commons," Science, 162(1968):1243-1248.

[9] This is not true in cases where the irrigation water is supplied by the use of a pumping system to individual farmers. In that case, it is possible to exclude individual farmers from irrigation water by simply not pumping water onto their fields.

[10] Ashok Subramanian, N. Vijay Jagannathan, Ruth Meinzen-Dick "User organizations for sustainable water services", p. 16-17

[11] Olson, Mancur [1965] (1971). *The Logic of Collective Action: Public Goods and the Theory of Groups*, Revised edition, Harvard University Press.

not restrict his use of the pasture with the justification that all the other members will adhere to the grazing schedule and thus his extra use would not be noticed or detrimental to the pasture. This is defined as the free-rider dilemma.

Finally, as many scholars have noted in the past, the Prisoner's Dilemma from Game Theory provides a useful though incredibly simplistic conceptual method for understanding the dynamics of the "tragedy of the commons" and collective action problem. The Prisoner's Dilemma represents a game where in order for both prisoners to achieve the maximum payout, they must trust each other.

	Player 2 Cooperate	Player 2 Defect
Player 1 Cooperate	4,4	6,0
Player 1 Defect	6,0	2,2

The classic story of the prisoner's dilemma is that two prisoners have a choice after arrest of (1) Cooperation- refusing indict or provide any information about the other player to the prosecutor or (2) Defect- they provide information to the prosecutor about the other player's involvement in the crime. As the matrix above shows, the pay-out for cooperation leaves each player with 4. However, there is an incentive for both players to provide information to the prosecutor and thus receive 6. Also motivating the choice of defection is a lack of trust by both prisoners who recognize the potential for the other prisoner to defect. As a result, the most rational choice of action for each player is to maximize their individual gains, and, thus, the "Pareto Optimal Outcome" is for both players to defect which provides each player with 2-- a worse outcome than if they had both cooperated and not provided any information to the prosecutor. [12] Thus, the dominant or optimal strategy for each individual player creates the worst possible joint outcome.

Water User's Associations: A solution to the "tragedy of the commons"?

With regards to irrigation management in the developing world, policy makers involved in international development seek to design collective action regimes which promote the cooperation and coordination of individuals who are responsible for the collective management of a resource in order to "solve" or minimize the "tragedy of the commons" and promote cooperation in a "prisoner's dilemma. This regime is generally defined as a set of institutional arrangements that govern a shared resource or activity. Institutional economics and game theory stress the importance of individual incentives in creating and sustaining cooperation mechanisms. Thus, in order to "solve" the "collective action problem" or free-rider dilemma, the regime must provide sufficient incentives to motivate individual participation.[13]

Water User's Associations represent a method for institutionalizing collective action for the management of irrigation systems and water. WUAs are formal institutions that are supported by a legal system and legal statues and are designed with a set of rules, concrete organizational structure, and specific procedures that are aimed at constraining and shaping human interactions or behavior. The incentive structure that WUAs create for water users[14] is argued to produce better irrigation management, governance and maintenance than can be provided by public agencies and decentralized uncoordinated individual control. For WUAs to be effective they must change the incentives of water users, and in particular farmers, with regards to cooperating and coordinating on irrigation system management. They must have the capacity, organizational structure, and proper utilization of social norms to restructure individual interactions.[15] The success of the WUA institution relies critically on coordination and cooperation. Operating, maintaining and rehabilitating irrigation canals and enforcing equitable rules for

[12] Ibid
[13] White, T. and C. Runge.Common property and collective, action: Lessons fromcooperative watershed management in Haiti. *Economic Development and CulturalChange,1994,* 43:1:1-41.
[14] For the purposes of this paper, the "water users" are represented by the farmers who are members of the WUAs.
[15] Ashok Subramanian, N. Vijay Jagannathan, Ruth Meinzen-Dick "User organizations for sustainable water services", pp. 21-24

irrigation cycles requires cooperation at multiple levels. This includes between farmers within a WUA, between WUA sharing a water source, and between WUAs and the local water supplier.[16]

In Kyrgyzstan, a Water User Association represents a non-governmental non-profit association of farmers or water users. The administrative boundaries of the local governments and former boundaries of the kolkhoz and sovkhoz currently represent the boundaries of the overwhelming majority of WUAs in Kyrgyzstan. [17]According to the policy designs for WUAs, these organizations are supposed to be community based, farmer managed, and operating in a democratic and transparent manner. A WUA is charged with the operation and maintenance of the irrigation and drainage network within its territory. In the case of Kyrgyzstan, water resources are the property of the state and therefore WUAs represent independent organizations that must purchase water from the state.[18] Consequently, one of the primary jobs of the WUAs is to determine the amount of water needed through demand aggregation. After the amount of water is determined and purchased from the state water organizations, the WUA must then distribute the water among its members. WUAs are also responsible for policing and minimizing irrigation conflict between farmers.[19]

The obligations of WUA Members include the payment of WUA fees which include the Irrigation Service Fee(ISF) for the supply of water to the WUA from the local water authority. Members are also responsible for caring for the equipment used or owned by the WUA and paying for the costs of repair or replacement for any equipment that might have been damaged as a result of intentional action *or* neglectful non-action. Finally, members are responsible for holding to the irrigation schedule and receiving their water only at the times dictated by this schedule.[20]

Institutional Model of WUA:

The Institutional model for the governance and management of WUAs provides for a clear separation of the functions of governance by General Assembly and the functions of management by the Director. The executive structure is responsible for managing the irrigation services, while the governance structure is "intended to be the community's mechanism for ownership and control,"[21] The Council and Chairman are responsible for employing and supervising the Director and all salaried staff.

[16] Murab Yakubov and Mehmood Ul Hassan, "Mainstreaming Rural Poor in Water Resources Management: Preliminary Lessons of a Bottom-up WUA development Approach in Central Asia," Irrigation and Drainage, 56: 261-276 (2007)

[17] Ideally, water management systems should be based on hydrological principles and not be administratively or territorially defined.

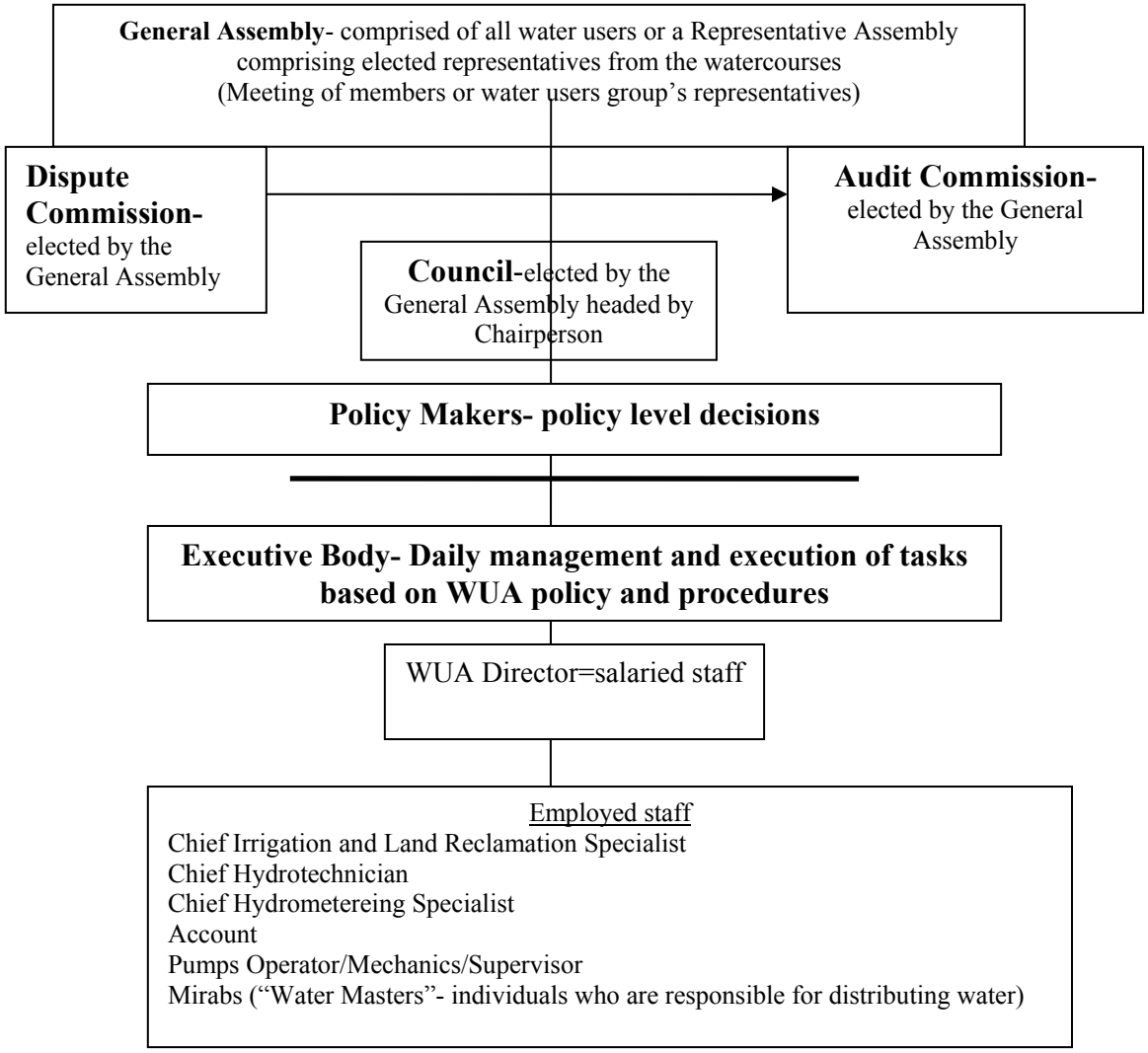
[18] Please see the 2001 Kyrgyz Water Law

[19] Food and Agricultural Organization of the United Nations, "FAO Water," FAO 2008, http://www.fao.org/nr/water/topics_irrig_reform.html

[20] "How to establish a Water User's Association?: Practical Steps for Social Mobilizers", Integrated Water Resources Management in Ferghana Valley March 2003, p. 18

[21] Mehmood Ul Hassan, Ralf Starkloff and Nargiza Nizamedinkhodjaeva, "Inadequacies in the Water Reforms in the Kyrgyz Republic," Research Report 81, International Water Management Institute, 2004. p. 34

WUA Management structure



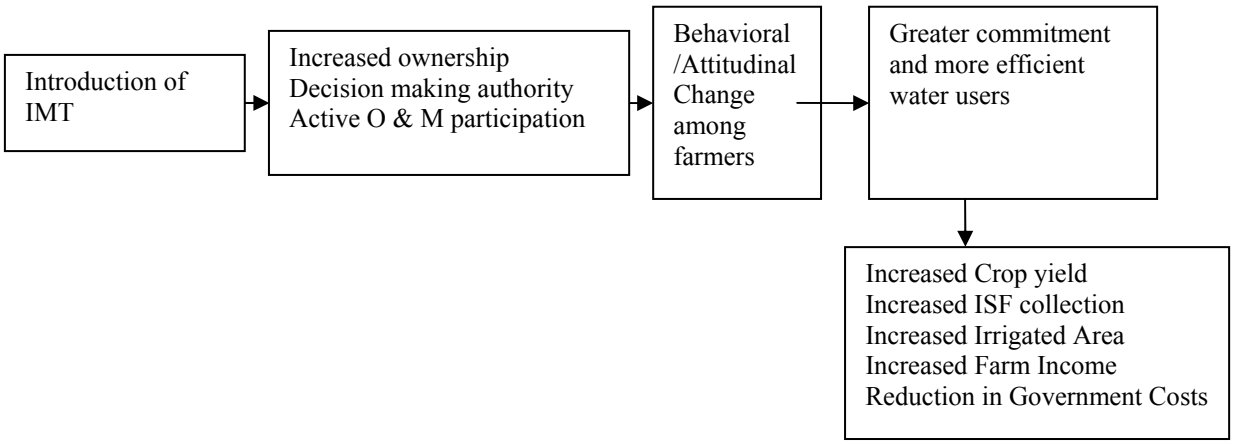
According to the program theory behind IMT, WUAs create a sense of ownership among water users within an irrigation system because of the mandatory irrigation service fee requirement and participatory/democratic nature of irrigation management. Since farmers must pay for their supply of water and cover the cost of system repairs, the claim is that they will be more likely to play an active role in the management of the system and monitoring of the condition of irrigation infrastructure. Consequently farmers will be less likely to damage the irrigation structures and will want to acquire more information about water distribution and irrigation management.[22] Some of the important incentives for motivating farmers to actively participate include the following:[23]

- Physical improvement of the irrigation system as a result of well-maintained canals which reduce water losses
- Less water theft/stealing
- Quick dispute resolution at the local level
- More reliable water supply

[22] Ruth Meinzen-Dick and Anna Knox, "Collective Action, Property Rights, and Devolution of Natural Resource Management: A Conceptual Framework" Workshop Draft 1999, p. 19-21

[23] "How to establish a Water User's Association?: Practical Steps for Social Mobilizers", Integrated Water Resources Management in Ferghana Valley March 2003, p. 3

- Equitable water distributing among farmers regardless of their location in the system or the size of their farm
- More efficient and reliable water delivery
- Control over water
- Augmented farm productivity and farm income
- Empowerment through participation and involvement in key decision-making
- Any possible indirect benefits that might accrue to the organization



WUAs are implemented, in part, to decrease the large transaction costs that occur when there is decentralized coordination of an activity among a group of individuals. In particular, WUAs are argued to promote diminished transaction costs between individuals once these organizations have acquired a certain degree of stability and legitimacy, thus promoting consistency of water user behavior and reducing the uncertainty of outcomes of exchange. Without a coordinating mechanism such as a WUA, water users would have to negotiate with each individual user to try and figure out the best schedule/system for governing and maintaining the irrigation system.[24] Thus, WUAs provide a coordination mechanism or "structured bargaining forum" which decreases the transaction or coordination costs and consequently enables individuals to more efficiently and effectively organize their actions for the successful governance and maintenance of irrigation systems. It provides the "rules of the game" for interactions among farmers and structures the incentives for exchange. [25]

Water User's Associations: Some Problems…

As discussed above, there is a strong theoretical basis for replacing the central management and decision-making center of irrigation systems with user-based WUAs.[26] However, empirical results indicate that many WUAs are not fulfilling their intended role.[27] In the following section, I will outline the fundamental problems that arise in the management and governance of common pool resources like irrigation systems and will delineate some of the constraints and obstacles that hinder the success of WUAs, and in many cases, lead to their failure.

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[24] Ashok Subramanian, N. Vijay Jagannathan, Ruth Meinzen-Dick "User organizations for sustainable water services", p. 19

[25]Douglas North, *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, 1990 p. 182

[26]World Bank Technical Paper No. 354 "User organizations for sustainable water services"; edited by Ashok Subramanian, N. Vijay Jagannathan, Ruth Meinzen-Dick (World Bank; Washington D.C.; 1997) pp. 3-15

[27] Jenniver Sehring, "The Pitfalls of Irrigation Water Pricing in Kyrgyzstan and Tajikistan," (2008 Society for International Development; Development 2008, 51, (130-134);

Despite a sound theoretical foundation for the implementation of WUAs, empirical studies have yet to provide strong and consistent evidence that WUAs are helping to alleviate the "tragedy of the commons" and resolve collective action dilemmas across the developing world. In 2007, the Food and Agricultural Organization of the UNDP published the results of a comprehensive 6 year study on Irrigation Management Transfer (IMT). The authors of the FAO report compiled a list of common outstanding policy or institutional issues and a list of common implementation problems related to IMT reform in developing countries. The overall results of the FAO report, along with most analysis of IMT, are not wholly encouraging. The authors find that the "results of the IMT process undertaken across the globe can be perceived as a mixture of successes and failures."[28] Despite a history of IMT implementation that stretches more than 40 years and regardless of millions of dollars of international donor funding that has enabled and pushed forward the IMT process across the developing world--there is still a lack of Monitoring and Impact Evaluation for IMT projects. There is currently an absence of rigorous scientific impact evaluations showing that IMT policies are effective in delivering many of the desired outcomes.

In the following section, I will discuss the specific problems that one encounters in an analysis of WUAs in Kyrgyzstan within an analytical framework developed by the social scientist, Elinor Ostrom, who is well known for her work on institutional development and collective action.[29]As a result of the interviews and observations made during my summer research, I will also argue that these fundamental program deficiencies of WUAs arise from their flawed implementation. According to the Kyrgyz Law on Water Users Associations, all WUAs are to have the same institutional structure and, therefore, on-paper all WUAs have identical institutional designs. Nevertheless, in Kyrgyzstan[30], most WUAs have been established through a top-down approach.

In 2004, the World Bank identified the overwhelmingly top-down implementation procedures as a major hindrance to the future success of IMT and set up the World Bank's On-Farm Irrigation Support Program which was charged with re-registering the WUA's across the country and managing/monitoring their institutional and infrastructure development. The World Bank currently works with the largest number of WUAs followed by the Asian Development Bank (ADB). Nevertheless, other NGOs have begun implementing their own support programs for WUAs across Kyrgyzstan and there are significant differences in the implementation of these projects between such organizations as the Swiss Development Council (SDC), ADB, World Bank, Mercy Corp and Winrock International.[31] In my assessment of the projects undertaken by these organizations, the World Bank and ADB continue to represent organizations with a top down approach to establishing WUAs. Despite a policy rhetoric which emphasizes community mobilization and the importance of institutional factors, the focus "on-the ground" is one of infrastructure and technical rehabilitation. On the other side of the spectrum, lie the SDC and Winrock International with projects representing bottom-up approaches to the establishing of WUAs. The difference in methods between the World Bank WUA support project and Winrock support program can be characterized as a difference in the level of institutional development or community development.

My hypothesis is that the fundamental problem is found within the top-down versus bottom up approach to the establishment of WUAs. This is not a new contention and has been voiced by several researchers over the past several years.[32] During the course of my research, I observed and studied the differences between the typical top-down approach with what I label the "treatment program" of an implementation scheme that focuses on a bottom-up mobilization approach. In the following section, I intend to provide a theoretically informed and grounded analysis of community mobilization programs versus the infrastructure programs through the use of Elinor Ostrom's 8 design principles.[33]

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[28] Carlos Garces-Restrepo, Douglas Vermillion, Giovanni Muñoz, "Irrigation Management Transfer: Worldwide efforts and results", (Food and Agricultural Organization of the United Nations; Food & Water Reports; Rome; 2007) p. 45

[29] Elinor Ostrom, 1992, Crafting Institutions for Self-governing Irrigation Systems, ICS Press, San Francisco, CA (1992). In this paper, Ostrom oulines 8 design principles which she deems fundamental for understanding collective action regimes and instances of institutional success and failure.

[30] This is also true for the majority of WUAs that have been established across the developing world.

[31] WB interview with WUASP Coordinator and ADB interview with program director.

[32] Please see Jenniver Sehring (2008), Aida Aimbaeva (2004),

[33] Thus far, there have been no empirical tests of differences in the program efficiency and effectiveness of these two implementation approaches.

Elinor Ostrom's eight design principles:

Design Principle (1):

"Before the trainings, people didn't understand what the WUA was…trainings were held on water management and they learned that too much water lead to a decrease in crops and they learned how to distribute the water. They constructed water sluice gates because with them, it makes scheduling the water easier. Before, they (the farmers) manually regulated the water, now, they use sluice gates. People would destroy the home-made devices. Now, water delivery has improved for end users and their yields have improved."[34]

Clearly defined boundaries- In the case of irrigation systems, this would mean that there is an understanding of the specific land that is under the management of an irrigation system and that water users have a clear understanding of their water and property rights. Other important elements that should be included within this design principle are clear water and property rights and specific and understood responsibilities and authority among WUA management. [35]

A major theoretical advantage of the community mobilization programs vs. infrastructure programs is found within the educational component of the former. Education and Leadership are critical factors in the successful emergence of cooperation because they help to ensure that the benefits of cooperation are well understood. Individual rationality dictates that an irrigator will most likely only voluntarily join in a cooperative arrangement if it is perceived to be profitable or beneficial over time. As one member of a WUA involved in the Winrock program states, *"50% of success is awareness. You should mobilize them. They have to understand the ownership. They should feel the ownership of the canal."*[36] When a cooperative arrangement is established in a top-down fashion, there is a higher probability that the benefits of cooperation and the impact of individual actions on the common pool of natural resources will be misunderstood.

For each WUA, Winrock dedicates between 3 and 6 months, depending on the size of the population of the WUA, to community mobilization. In comparison, the World Bank's trainings and seminars for the institutional development of WUA varies between 1 day to 2 weeks (depending on the WB OIP Support Program office) and is focused on the leadership of the WUA- the director, management, council and revision committees. Following the institutional development work, Winrock also begins "cement and stone" infrastructure/rehabilitation work. However, whereas Winrock spends approximately 3 million som (apprx. 86,000 USD) on each Water User Association, the World Bank spends approximately 22 million som (apprx 630,000 USD) on each Water User Association.

Winrock's community mobilization process involves an intensive training and information campaign. In particular, the community mobilizer seeks to build relations and trust with the local community. This basically involves the mobilizer living in the community or spending extending periods of time in the community. A mobilizer will, in some cases, "literally go door-to-door, visiting *every* farmer in a community" and holding discussions about (1) the substance and goals of WUA (2) the Kyrgyz Law on WUA (3) What problems their community faces with regards to water (4) how to develop plans on improving the water conditions. After working at the level of the individual, the mobilizers begin organizing groups of farmers. These groups are generally based on where the future 'representative zones' will be for the WUA and they contain individuals who the mobilizer deems to be the "most active." After the mobilizer feels that these groups are sufficiently trained, he sends them out to gather and train more farmer's- thereby creating a snowball effect.

These collective trainings, meetings and group discussion sessions are potential means to achieving a critical mass of cooperators which, according to theoretical literature, could be an important

[34] WUA Тамчы-Булак- July 22, 2008- Director
[35] Vermillion (1994)
[36] WUA Boz-Ad- July 22, 2008-Council Director

step towards launching successful cooperation.[37]The external leadership and education driven by institutional development programs such as Winrock can reduce the costs of interaction and organization and act as a catalyst for the emergence of cooperation.[38]

The fruits of the education component manifest themselves through increased awareness, increased activity and in many cases, through changes in leadership as a result of re-elections. *"Most people think that the WUA is part of the government, once they find out more about the WUAs the first thing that they do is usually replacethe management."*One theme that was especially prevalent was a lack of awareness about the institutional structure of the WUA prior to the mobilization program. The majority of WUA members do not understand the functioning of the WUA as an independent, self-sufficient and voluntary organization.[39] *"The Farmers did not understand the concept of WUA. They didn't understand the responsibility of the leadership and of the individualfarmers. Many didn't even know of the existence of the WUA."* In some cases, active leaders or individuals set up a WUA, registered the WUA with the justice department and then became the leadership of the WUA. In other cases, government officials traveled across the country registering WUA and appointing preliminary directors and council who were often the previous leadership of the kolxoz or sovxoz.

Another theme that emerged was an apparent lack of understanding about the institutional structure of the WUA and amount of power that could/should be in the hands of the Director, mirabs, and zonal representatives. The misbalance in power between the strong Director and weak Council has often been sighted as a major weakness of WUAs. In many cases, the elected zonal representatives of the WUA are not aware of their powers and responsibilities and, consequently, do not fulfill many of their designated tasks. One of the primary responsibilities of these individuals is to act as information bearers between the WUA Directorship and Council to the WUA members residing within their respective zones. There are multiple cases of farmers lacking information about decisions instituted by the Leadership as a result of a lack of awareness by the zonal reps or the lack of information transfer by the zonal reps to their "constituents."

Based on my interviews, the mobilization program seems to have provided a solution to this problem. In many of the WUAs, farmers, the present directors and the current council representatives provided similar answers to my questions on this topic. In most of the Winrock WUASPs there was a power change at some level of the management."*People started having meetings and realized that the Council was the "supreme power and respected the council. First, they only respected the Director and the mirabs but after the trainings they realized that the Council was superior."*[40] There were also many statements regarding changes made for mirabs. *"Mirabs make all the decisions-they are well respected and people listen to their decisions. The earlier mirabs were different. Then they had elections in each zone for a mirab and all mirabs water their own land last. Mirabls also help each other."*

Design Principle (2): Proportional Equivalence between Benefits and Costs- Ostrom argues that the support of institutional change will depend on individuals' cost-benefit analysis. This is arguably the most fundamental principle for determining the success of collective action arrangements. That is, the benefits of participating in and following the rules of WUAs must outweigh the costs of continuing a decentralized decision-making process for irrigation system management. Ostrom argued that an individual's cost-benefit analysis is affected by (1) social norms (2) internal discount rates and (3) situation variables. Situational variables include things like user group characteristics, history and informal rule and traditions, the resource in question and the socio-economic environment.

The solutions proposed by economists and social scientists to the "tragedy of the commons" fall into three broad categories (1) privatization (2) reciprocity and (3) the existence of an external coercive authority with the power to monitor and enforce the adherence to rules. [41] In the case of WUAs, privatization is not possible due to the "non-excludability" of irrigation water and, since the collapse of the Soviet Union, there is no potential for an external authority to monitor and govern the Kyrgyz system

[37] Baland and Platteau 1994
[38] Seabright 1994
[39] 2007 Annual Report- WUA Support Department, p. 38
[40] Isafara Mariyam- Batken Kadamjai; July 9th, 2008
[41] Lansing, p. 68

or the individual WUAs. Moreover, direct reciprocity is not a solution in the case of WUAs since there is no real incentive for the upstream farmers to maintain a cooperative arrangement because there is no way for the farmers located at the tail-end of a system to directly reciprocate.

For WUAs, it is the collection of irrigation service fees in order to purchase water from the government which provides the downstream farmer with a bargaining lever and therefore has the potential to promote a pattern of cooperation that enables the WUA to function. One could argue that the interactions and transactions that occur within Water Users Associations can be represented as repeated games that present players with a situation where cooperation and "social-capital" can pay-off in the future and contribute to institutional stability. Recurrent acts of cooperation between individuals can build a sense of trust which can spill over into other spheres of activity. As the political scientist Elinor Ostrom states, "at a more general level, our experiments, along with field research and theoretical efforts, lead us to posit that the crucial variables to enhance cooperation in regard to common-pool resources and other forms of collective action are those that enhance reciprocity, individual reputations, and trust."[42] This is reinforced by the work of game theorists which has shown that within situations that require or enable reciprocity, the mutual defection outcome no longer becomes the guaranteed outcome.

Cooperation determines the success of a WUA and is promoted when both the up-stream and down-stream farmers receive a real benefit from their membership in the WUA. The use of fees by the members of the WUA is supposed to solve or mitigate the free-riding of the head-end farmer because, in theory, the head-end farmer will try to share the WUA costs with as many farmers as possible so that their share of the cost of irrigation water is as low as possible. "*If water costs can be defrayed by maximizing the number of members within the WUA, the head-end user will have a strong financial incentive to keep tail-end users happy and contributing funds to the WUA.*"[43] Theoretically and empirically, in most cases, tail-enders who do not receive water, or receive an insignificant amount will refuse to contribute. "*There was no change with the upper collection rates. But there was a change with the downstream farmers. Some did not pay at all and now there is an increase because they have water. They always owed money before but now there is no debt held by the WUA. There was about a 20% increase from last year."*[44]

[45] "*Charging WUAs for the water that they receive may be the most powerful incentive for farmers to organize into WUAs and to actively participate in the management of the organization."*[46] The collection of fees and implementation of maintenance projects near the head end which requires large labor reserves forces the up-stream farmer to become somewhat dependent on the labor or money of the downstreamers. In theory, the head-enders will police themselves and initiate strong sanctions against water abusers and those that do not contribute to water charges to ensure the continued contributions of the tail-enders so that (1) their payment will be lowered (2) there is no threat of loosing irrigation water to the whole WUA.

Nevertheless, research reports indicate that the biggest obstacle towards cost recovery in irrigation management is the non-payment of irrigation service fees by farmers and that "water theft is so common that it can be described as a local institution itself as it represents a widely non-confronted rule of behavior."[47]When WUAs are lacking in the institutional capacity to enforce laws and rules, the outcomes for upstream versus downstream farmers will be inefficient. There will be strong incentives for upstream farmers to take unsanctioned supplies of water and for water users to not contribute to the payment of irrigation service fees for infrastructure maintenance and water supply.

The case studies that I conducted throughout the summer provided the same evidence as previous studies regarding the "problem of the head-ender." "*If a head end farmer can obtain water at little to no*

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[42] Elinor Ostrom, Workshop in Political Theory and Policy Analysis, Department of Political Science, Indiana University, 513 North Park, Bloomington, IN 47408-3895, USA

[43] Interview with John Baxter

[44] Kara Dobo- Batken Kadamjai July 8th, 2008

[45] Information gathered from an interview with Agronimist John Baxter

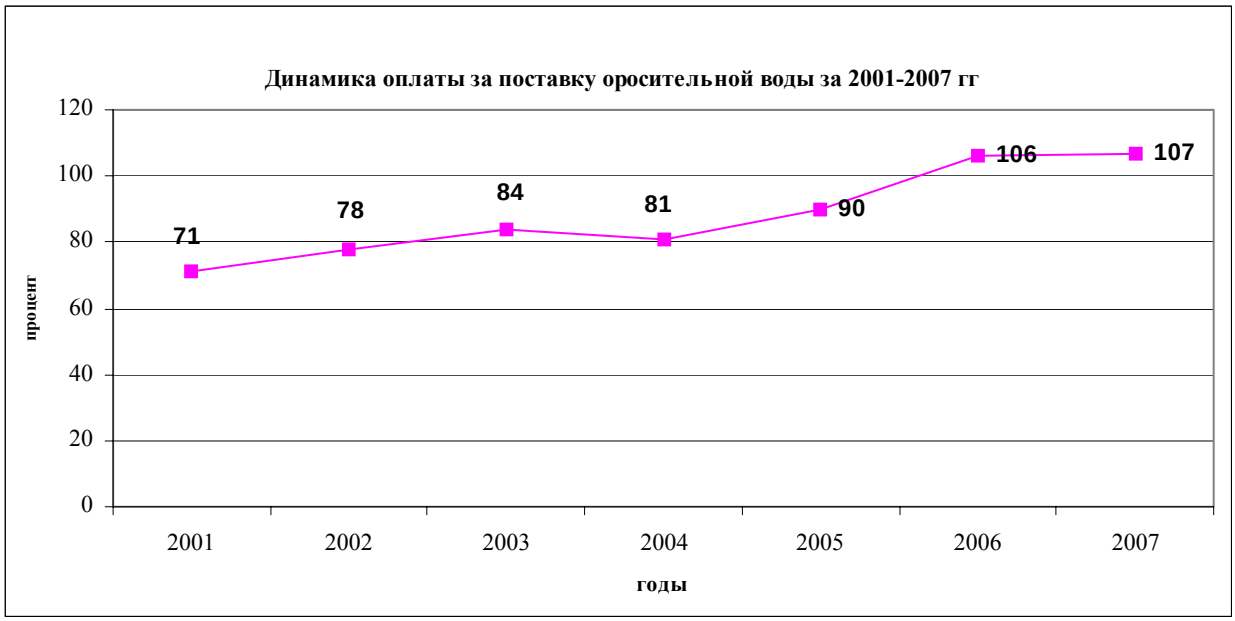
[46] John Baxter interview

[47] Sehring 2003, p. 33

cost (labor or money), he will have no interest in sharing water with down stream users, and he will have no interest in cooperating with a WUA. In fact, he may work to destroy cooperative efforts of downstream users to obtain water – water that he might loose control of."[48] As the overall "water scarcity" of southern Kyrgyzstan has increased over past two decades, upstream farmers continue to take the water that they need in unsanctioned portions and/or at unsanctioned times. This behavior has lead to increasing water scarcity for downstream farmers. As many have argued, this non-cooperative behavior on the part of individual farmers is rational since "they cannot rely on the system to be equitable and fair" and because there is an almost complete lack of monitoring and enforcement mechanisms in place.[49]

Two fundamental and pervasive problems include the low ISF rate charged to farmers and the low payment levels of the irrigation service fees among farmers. More specifically, throughout Kyrgyzstan the service of supplying irrigation water has been set at the tariff or rate of 21 to 659 som for one hectare of land.[50] According to international and national experts, in order to effectively cover the expenses for the O & M of the irrigation system the service rate charged to water users would need to be no less than 10 USD or 350 som per hectare.

An initial glance at the ISF payment rates for 2007 in the three Southern Oblasts provides encouraging results- with Batken reaching 112%, Osh 128%, and Jalalabat-100%. The diagram below shows the national average of ISF collection rates in percentages from 2001 to 2007 with a steadily rising trend line. Nevertheless, approximately 42% of the ISFs are paid in-kind through the provision of goods or labor. According to the 2007 Annual Report compiled by the WUA Support Program, 58% of ISF payments are hard currency, 33% are crops and 9% of fees are paid by labor.[51] There is a continued inability of the overwhelming majority of WUAs to collect enough funds to cover water service supply and staff salaries much less to have excess funds for O & M, cost recovery, and equipment purchases. More than 400 WUAs are without the technical and financial base to complete many of their designated tasks. This ranges from a lack of heavy farming equipment, such as excavators, to transport equipment, which is necessary for the day to day activities of the WUA, including cars, bicycles, and motorcycles.



My qualitative research results provide evidence that the WUAs involved the Winrock WUASP have had steadily increasing ISF collection rates over the past several years. The directors and councilmen in all of the 13 WUAs that I interviewed noted an increase in the collection rates. *"Before the*

[48] John Baxter, Problems Facing Water User Associations in Uzbekistan, presentation prepared by John Baxter for the USAID Natural Resources Management Project

[49] Mehmood Ul Hassan, Ralf Starkloff and Nargiza Nizamedinkhodjaeva, "Inadequacies in the Water Reforms in the Kyrgyz Republic," Research Report 81, International Water Management Institute, 2004. p. 21

[50] The August 2008 exchange rate is approximately 35 som for one USD.

[51] The Kyrgyz Republic Department of Agriculture and Water- Support Department for WUA 2007 Annual Report, Bishkek 2008, p. 35

implementation of the program, the mirabs had to visit each farmer to try and collect the fees but now they bring the money here and it is the middle of the year and we have about a 50% collection rate. Last year we had a total collection rate of 50%"[52] A deeper analysis of the ISF collection rates for infrastructure and community mobilization projects represents a core part of my future dissertation research and I will discuss these plans later on in this paper.

Design Principle 3: Collective Choice Arrangements- This refers to water users' ability to set and modify rules. Collective choice arrangements should be designed to allow the democratic participation of a majority of water users. Although there will be a limit on the number of individuals who can actually be involved in direct decision-making, each WUA should have election and assembly procedures that enables each member to express their desires.

By law, all WUA are designed to operate in a democratic and transparent manner. WUAs are to be divided into "representative zones" based on the size and distribution of the population along the canal. Each of these "zones" is responsible for electing "zonal representatives" and "mirabs." The number of zonal representatives depends on the population within the zone. The zonal representatives are then charged with electing the Council and Management. In order to ensure balance and equal representation across the WUA, at least one mirab must be elected from each zone.[53]

Design Principle 4: Monitoring- There is a need for effective monitoring and supervision of the irrigation system in order to detect instances of "defection" among the users. Monitoring is impacted by the size of WUAs, distance between irrigators, recurrent interactions between farmers and mirabs and farmers, and the homogeneity of irrigation activities among water users.It is important that individuals who fulfill this role are *accountable* to the users or are themselves a user. In theory mirabs are responsible for monitoring the extraction of water during the irrigation periods.[54] However, given the size of the WUA and the large number of small plots in Kyrgyzstan, it is virtually impossible for one mirab to monitor the water extractions of one hundred or even several hundred farmers. Needless to say, it is also not financially feasible to institute a water measuring system for individual farmers in Kyrgyzstan. Even among relatively "successful" WUAs in Kyrgyzstan, monitoring remains very weak.

Design Principle 5: Graduated Sanctions- Punishment must be credible or else individual farmers can gain short-run extra benefits from deviating from the cooperative agreement. In order to stop "water-theft" and the deliberate destruction of irrigation infrastructure for self-gains, offenders who break such rules must incur sanctions. These sanctions must be differentiated to reflect varying levels of "dis-respect" for collective rules. Without clear rules and clear sanctions for "rule-breakage," the authority of the WUA will be significantly diminished.[55]

Among WUAs in Kyrgyzstan, the current means of sanctioning individuals for irrigating out-of-turn include:

1. Reducing water supplies for individual canals
2. Stopping water supplies for individual canals
3. Social pressure or 'shaming'
4. Imposing a fine
5. Delaying an individual's "irrigation turn" for previous misconduct

Nevertheless, the effective sanctioning of offenders seems to be a primary WUA weakness. In many cases, there is an absence of sanctioning mechanisms which are imperative for making WUAs credible to water users. There are financial and social considerations and incentives for WUA staff to *not* effectively sanction any offenders. For example, with regards to water-theft, kinship ties and intervention by village elders have been show to limit or stop the application of punishment to violators. There is also the element of corruption which can be especially pernicious during times of water scarcity. In particular,

[52] Field Day Batken Kadamjai- First visit Akbulak-Dikan in Kyzlir July 8th, 2008
[53] The number of murabs is also based on the size of the zone in proportion to other zones. The mirabs are responsible for unlocking the water gates to enable irrigation.
[54] From about mid June through September, most of southern Kyrgyzstan is on a "strict watering schedule." This means that (functioning) WUAs develop and post a water schedule with specific dates and times for watering.
[55] *Water Governance in the Kygryz Agricultural Sector,* pp. 126-131

decision making on water allocations can be guided by bribery and personal contacts. This seems to be especially evident in the case of the low-paid mirabs or "water masters" who have a large amount of discretionary power with regards to water distribution.[56] Moreover, in order for the threat of punishment to be credible, there must be a sufficient monitoring system to detect violators along with a legitimate system for enforcing rules through sanctions. Consequently, a weak monitoring system among many of Kyrgyzstan's WUAs compounds the weakness of this design principle.

The enforcement of a punishment regime is influenced by the perceived gains from the cooperation regime, the role of the leadership, the legal system, and cultural and behavioral norms. When institutions such as WUAs do not have the capacity to enforce rules that govern a common pool resource, scholars argue that the outcome will be inefficient and inequitable because these institutional weaknesses diminish an individual's incentives to cooperate and coordinate in the management of water resources. Consequently, the free-rider problem emerges and upstream farmers may direct extra water resources to their fields, thereby reducing the available irrigation water for downstream farmers. Also, water users may not contribute their share of the necessary irrigation service fees (ISF) which provide for the O & M of the irrigation system. Over time, a lack of resources and rehabilitation will lead to the deterioration of the system. [57]

Indeed, punishment and monitoring are very weak in the Kyrgyz setting. However, the social traditions in many communities are quite strong. As Elinor Ostrom argues, trust and reciprocity can enable actors to forego short-run for longer-run interests that are better than rational.[58]There are strong traditions of respect and kinship among the villagers which I argue in many cases compensate for the lack of formal monitoring measures and stringent punishment regime. Although, many scholars and practitioners of organizational management argue that in order to make punishment credible it is often necessary to punish any individual who fails to punish violators, I contend that in a setting like Kyrgyzstan, there are not only technical and financial obstacles, but more importantly social limitations for implementing draconian punishment measures such as completely cutting off individuals' water for non-compliance with WUA rules.

This was clearly a theme that emerged throughout my interviews. Individuals responsible for implementing and strengthening WUAs noted that it would not be "human" to implement such stringent punishment measures among the "poor farmers." *"The farmers would complete their first rehabilitation projects—but they would do it incorrectly and it is so difficult to tell them that they need to redo it or pay for the corrections. We can see that the farmer is so proud of his work and you feel bad about making him pay or re-do the work."*[59] Consequently, the importance of this design principle could raise some very legitimate concerns about some community mobilization programs. Due to the extended time that the Winrock mobilizers spent in each community and their level of engagement, they develop very close relations with the individual farmers and WUA leadership. The mobilizers do not just influence behavioral/attitudinal changes in the community but are they themselves impacted by the plights/struggles of the villagers and become protective of them. This is not conducive for the development and enforcement of a strict punishment regime.

In most cases, rule-breaking consists of out-of turn irrigation or the non-payment of the ISF. Farmers receive several warnings for their mis-conduct and if the matter is not settled, the issue is taken to the aksakals or dispute resolution committee (see next section). Significantly, I have surveyed the 2006 and 2007 yearly reports and have found no evidence of the application of fines in *any* WUA in Kyrgyzstan.

Design Principle 6: Conflict Resolution Mechanisms- There must be conflict-resolution procedures and mechanisms in place that are affordable and accessible. Recognized and entrenched conflict-resolution mechanisms are a signal of the level of development of a WUA Among other factors, conflicts over water

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[56] Ibid

[57] J. Stephen Lansing, "Perfect Order: Recognizing Complexity in Bali," (Princeton University Press; Princeton; 2006)

[58] Elinor Ostrom, "A Behavioral Approach to the Rational Choice Theory for Collective Action APSR vol. 92, no. I March 1998 pp. 1-22

[59] Interview with Winrock engineer

can arise from water scarcity, water theft, unequal water distribution, and arbitrary or inequitable conflict resolution. Dispute resolution involves high transaction costs and WUAs are supposed to provide farmers with a platform for resolving tensions and thus cutting down on financial/social costs. The argument is that the initial participation of farmers in decisions that have a large impact on them will diminish the number of potential water disputes. *"There is of course conflict. Before the introduction of the WUA there was chaos. Now there is a committee of three people who study and decide the difficult questions."*

Kyrgyzstan's WUA Law requires the institutionalization of a conflict resolution committee. Nevertheless, conflict/dispute resolution mechanisms are a fundamental weakness of most WUAs in Kyrgystan. There are many cases where these associations only exist on paper or are not recognized by the farmers as legitimate institutions for conflict resolution.[60] Thus, formal dispute settlement mechanisms are often absent in WUAs[61] and survey research has show that farmers do not perceive WUAs as legitimate organizations for resolving water conflicts.[62] Even in cases where WUAs reach a formal decision, informal mechanisms such as bribery or water stealing can be employed due to weaknesses in capacity and enforcement.

Despite numerous reports regarding the lack of power among WUAs for resolving conflict issues and the lack of legitimacy of WUAs, there is evidence that in many of the WUAs which have received the community mobilization "treatment" have been able to map local dispute resolution mechanisms onto their institutional framework, thus making it more simple to find solutions to water-related issues. In particular, the zonal representatives of the WUAs have elected the village elders (aksakals) to become members of the Dispute Resolution Committee. *"The aksakals make decisions about problematic issues. It is our mentality."*[63] Within the villages, the aksakals hold the legitimate dispute resolution power. Consequently, in cases where there is no connection between the WUA and aksakals, the WUA is not perceived as a source for solving disputes.

Design Principle 7: Minimal Recognition of rights to organize- This means that water users do not need to be overly concerned with interference by external governmental authorities. There does not seem to be any evidence of interference by the national government into the workings of the WUA. Nevertheless, it is not uncommon to find reports discussing instances where local government officials have exerted undue pressure and influence on the day-to-day activities and decision-making of the WUA.

Design Principle 8: Nested enterprises (federations)- WUAs should be organized into federations where governance and management activities are interdependent and spread across multiple villages and rayons. For all organizations involved with WUAs in Kyrygzstan, the issue of creating Federations is on the agenda. However, thus far, there appears to be a minimal amount of actual progress in this area.

Future Research Plans

WUAs have been implemented to change the behavior of farmers by creating a negative or positive set of incentives. WUAs must create an incentive structure for farmers and water users that promotes the collective distribution of water and infrastructure maintenance over the purely rational pursuit of water supply. The present difficulties faced by WUAs in achieving their organizational mandate are related to multiple factors including flaws in the institutional design of WUAs, situational variables-such as socio-economic conditions, and a breakdown between theory and practice that occurs during the implementation of WUAs.

[60] Mehmood Ul Hassan, Ralf Starkloff and Nargiza Nizamedinkhodjaeva, "Inadequacies in the Water Reforms in the Kyrgyz Republic," Research Report 81, International Water Management Institute, 2004. p. 32
[61] Sehring 2003, 32
[62] Sehring 2003, 128
[63] Interview with WB OIP Support Program Coordinator, Bishkek April 2008

Of course, the introduction of formal rules is not a guarantee for their implementation in practice, and in most cases, there is a weak adherence to the rules instituted by WUAs.[64] Through my future research, I would like to answer the question of whether or not WUAs based on or supported by "community mobilization" or "institutional development" programs are more successful and effective at managing irrigation water and promoting cooperation among farmers than WUAs that are supported or implemented by programs which focus on infrastructure and rehabilitation. My hypothesis, based on the qualitative data gathered this summer, is that the community mobilization schemes represent a successful program model for implementing WUA. This hypothesis will be tested through an analysis of the quantitative data gathered in August and the data which will be gathered in November.

[64] "Privatization/Transfer of Irrigation Management in Central Asia," (Department for International Development Knowledge and Research Services Contract R8025 Final Report; Mott MacDonald Limited; Cambridge 2003); See also Sehring, 2003.