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**Water Sharing in Central Asia:  
Bargaining, Institutions, and International Cooperation**

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## I. Introduction

Many scholars approach the study of cooperation on global environmental issues as a collective action problem where independent individual behavior leads to collectively suboptimal outcomes. In order to avert a "tragedy of the commons", environmental problems ranging from the local level to the international level require collective action and cooperation between individuals, communities, and nation-states.<sup>1</sup> Most of the world's aquifers and river systems are shared by more than one "user," which often leads to conflict between riparian states over access to and the quality of water. If one state dumps pollutants into a river or withdraws water unilaterally for irrigation, the consequences of these actions may not be noticed only locally, but may also cause unforeseen problems for neighboring and downstream states. So that water users receive an equitable and uncontaminated share of the water supply, governments have tried to negotiate agreements with neighboring states to regulate the use and distribution of water resources.

Shared water basins are one example of a large-scale common-pool resource (CPR). My research examines cooperation over large-scale CPRs at the international level. Large-scale CPRs differ from small-scale CPRs where the users are members of a well-defined and geographically limited community because at the international level, cooperation involves heterogeneous actors including sovereign nation-states.<sup>2</sup> In general, such CPRs are characterized by overuse and mismanagement because each user has an individual incentive to maintain a system predicated on open access.<sup>3</sup> CPRs, furthermore, differ from pure public or private goods because it is costly to exclude potential beneficiaries from gaining access to the resource, and each person's use subtracts resource units from those available to others.<sup>4</sup>

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<sup>1</sup>Garrett Hardin first applied this metaphor to the problem of overpopulation in "The Tragedy of the Commons" *Science* 162 (December 1968): 1243-48.

<sup>2</sup>In this context, heterogeneity refers to the asymmetries of power of the actors and states.

<sup>3</sup>Aquifers, irrigation systems, fisheries, and pastures are all examples of small scale common-pool resources.

<sup>4</sup>Elinor Ostrom, "Institutions and Common-Pool Resources" *Journal of Theoretical Politics* 43(1992): 243.

In attempting to solve the collective action problem of a shared resource, some scholars have argued that either a strong state or an exogenous force is needed, while others have asserted that individuals can create decentralized institutions to effectively regulate access to the shared resource.<sup>5</sup> Even when individuals decide among themselves on the mechanisms necessary to govern CPRs, the free-rider problem still presents difficulties in enforcing and monitoring these agreements.<sup>6</sup>

For shared water resources in new state systems, the obstacles to cooperation are magnified. The processes of imperial breakup and decolonization not only introduce new international actors, but also remove the central hegemon regulating water use, and change a previously integrated domestic water resource into an international CPR. The Central Asian water situation, therefore, resembles other river systems that were earlier under colonialism such as the Indus, Ganges, Jordan, and Nile in which decision making affecting water use was made by the colonial power.<sup>7</sup> The breakup of the Soviet Union creates many of the same problems that have accompanied other cases of breakup of empires, like the partition of India which divided a large-scale CPR in 1948.

At times, this geographical situation in South Asia has erupted into inter-state disputes over water rights concerning access to the Indus, Ganges and Brahmaputra river basins. Similarly, independence has transformed the water issue in Central Asia from a domestic problem of the Soviet Union to one of international relations as the region's newly created states begin to compete for resources. Now sovereign states must figure out a cooperative solution to water sharing in a situation in which demand is very heavy. As with most international rivers, the benefits of cooperation are highly unbalanced and asymmetrical.

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<sup>5</sup>See for example, Hardin, "The Tragedy of the Commons;" William Ophuls, *Ecology and the Politics of Scarcity* (San Francisco: W.H. Freeman and Co, 1977) and Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990).

<sup>6</sup>Mancur Olson, *The Logic of Collective Action* (Cambridge: Harvard University Press, 1965).

<sup>7</sup>See for example Miriam Lowi, *Water and Power: The Politics of a Scarce Resource in the Jordan River Basin* (Cambridge: Cambridge University Press, 1993) and John Waterbury, *Hydropolitics of the Nile Valley* (New York: Syracuse University Press, 1979).

The main institution for managing water distribution in the Soviet Union was the Ministry of Land Reclamation and Water Resources (Minvodkhoz) located in Moscow. It determined the timetables and the amount of water allocated for irrigation between the upstream and downstream republics. The breakup of the Soviet Union has left a management structure in place without a central political authority to guide it. The collapse of the Soviet Union has subsequently led to the demise of the central institution for managing the water basin in Central Asia.

As in other cases of empires, the colonial power by imposing its institutions upon the colonies mitigated collective action problems. With independence the new states may have more freedom in the decision making realm, but independence has brought with it the problem of dividing up rights. Moreover, in a normative sense, the centralized institutions of colonial powers usually provided the mechanism for final decision making, and at the same time they provided stability by resolving much of the internal conflict among the republics. The Aral Sea basin, therefore, provides us with a contemporary case study of the ways in which states negotiate agreements at the international level while they regulate water use and distribution at the domestic level.

## II. Research Project

At stake are two issues that are not mutually exclusive. First, there is the question of cooperation between riparian states. How do states work together to devise water sharing arrangements that are acceptable to all the riparian parties so that conflict over access to and use of the water networks can be mitigated? Second, how is it possible to ensure the long-term economic and ecological viability of the resource? These questions assume greater significance in periods of transition, especially when political and economic institutions are weak.

In this paper, I explain my research project on the problem of water sharing in Central Asia at two levels: theoretical and prescriptive. I intend to explore the various

political solutions to CPR dilemmas that focus on the debates between property rights, centralized regulation, outside intervention, and decentralized cooperation. The water situation in Central Asia presents us with a case study that emphasizes the different impediments to creating effective institutions for the management of large-scale CPRs. When discussing the Aral Sea basin case, I first explain what factors led to the present collective action problem and then why this environmental problem is a failure of past institutions and rules. Second, I attempt to prescribe what options are available to improve the current ecological and economic situation in Central Asia in light of the prevailing theoretical literature. Third, I discuss the outcomes and prescriptions on three dimensions: environment and health, conflict, and distributional consequences.

The dependent variable in my research is the success and failure of institutions to manage shared water resource dilemmas in new state systems. I intend to study institutional maintenance, persistence, and change regarding water sharing and cooperation. In addition, I am also concerned with the contrast between endogenous and exogenous institution formation and the way in which different type of property regimes affect resource management.

My research thus attempts to answer the following questions: How likely is it that six riparian states would regulate water use and withdrawal in the Aral Sea basin?<sup>8</sup> What type of new institutional arrangements have emerged for water resource management given the problems inherent in the organization and development of institutions? What level of coordination is required between the Central Asian states in order to regulate water distribution and use? What are the conditions that will determine the strategies available to the actors? Is there a role for international institutions to facilitate cooperation?

In order to undertake a study of the likelihood of water cooperation in Central Asia, I draw upon prior research on post-colonial irrigation basins in South Asia that were also transformed from domestic and centralized systems to international water basins with two

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<sup>8</sup>Besides the five Central Asian states, Afghanistan is also a riparian state on the Amu Darya river.

or more coriparians. In South Asia, as in Central Asia, water is increasingly scarce, while it remains essential to the region's economic and agricultural livelihood. One way in which states have cooperated over the management of large-scale CPRs has been through the negotiation of bilateral agreements between sovereign nation-states. By studying the success and failure of water basin agreements in South Asia, I isolate several key variables that determine the outcomes of water rights disputes in South Asia, and subsequently these variables help explain the collective action problem that the Central Asian states face as they continue to work out a new water sharing arrangement and address their environmental and health problems.

Although these states are now juridically sovereign, they are still weakly institutionalized states, and this will affect their capacity to regulate and monitor water distribution policies at the domestic and international levels. Hence the Central Asian case also requires an analysis that not only looks at the problems inherent in environmental management in weakly institutionalized states but also an analysis that considers the interaction of transnational links to the state building process.

### III. Literature Review

The theoretical literature relevant for the study of institutional arrangements for the management and regulation of shared water basins straddles the two subfields of comparative politics and international relations. Although both have emerged independently, the inherent theoretical assumptions within the literatures arise from similar research methods that use game theory and economic models to confront the pessimistic conclusions about the possibility of decentralized cooperation. These theories of cooperation focus on bargaining situations, the role of institutions, regimes, and non-state actors.

The literature in both subfields has approached water issues as a collective action problem in which water resources are held in common by all and over which well defined

property rights are absent.<sup>9</sup> Although water is a renewable resource, unlike oil, there are no substitutes, and it is difficult to redistribute economically. It is concluded and argued on the basis of economic assumptions that individuals are incapable of sustaining the commons because the commons is a free good that does not belong to anyone. Each individual will only pursue her own best interest, trying to use as much of the common good before anyone else can, and as a result, will contribute to the destruction of the commons.

Drawing from this literature, I survey several theoretical arguments that can be used to explain and prescribe solutions to common-pool resource dilemmas. I divide this literature up not only along the comparative politics/international relations dimension, but also between the literature on bargaining situations based on interests and the literature on institutions.<sup>10</sup> This second distinction indicates that CPR situations should not only be thought of as bargaining games about interests and power, but rather this distinction suggests that a study of the role of institutions at both the domestic and international levels is relevant for understanding how CPRs are governed.

#### A. Bargaining Situations

Large-scale CPRs reflect the power asymmetries between the upstream and downstream states. In most scenarios, it is difficult to imagine why an upstream state would want to alter the status quo, give up its natural advantage, and move to a different equilibrium. But in Central Asia, the upstream states -- Kyrgyzstan and Tajikistan -- have the greatest incentive to change the status quo since they do not possess control over their

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<sup>9</sup>See Daniel W. Bromley, *Environment and Economy: Property Rights and Public Policy* (Cambridge, MA: Basil Blackwell, 1991) for a discussion of the different types of property regimes.

<sup>10</sup>Both comparative politics and international relations address the role of institutions. Yet, confusion remains regarding the various definitions attributed to the concept of an institution. For the purposes of this paper, I will use a broad based definition of an institution that considers them to be "persistent and connected sets of rules and practices that prescribe behavioral roles, constrain activity, and shape expectation. They may take the form of bureaucratic organizations, regimes (rule structures that do not necessarily have organizations attached) or conventions (informal practices)." Peter M. Haas, Robert O. Keohane and Marc A. Levy, eds., *Institutions for the Earth: Sources of Effective International Environmental Protection* (Cambridge: MIT Press, 1993), p. 2.

water supply. At the same time, these upstream states have the least incentive to cooperate with the new arrangement since they will still draw the smallest benefits. As with most international rivers, the benefits of cooperation are highly unbalanced and asymmetrical, and as a result, the bargaining game between riparian states must not only factor in the water resource asymmetries but also asymmetries in political, economic, and information resources.

International relations theory points to certain factors that influence the structure of the bargaining game being played: the payoff structure, the number of players, iteration, information, institutions, and the issue of relative versus absolute gains.<sup>11</sup> The structure of the game influences the strategies of the actors resulting in the various outcomes. Bargaining strength is moreover determined by 1) the balance or asymmetry of capabilities and 2) the balance of interests of the two sides.

The bargaining game in Central Asia can moreover be thought of as attempting to produce a new stable configuration.<sup>12</sup> Broadly speaking, water systems are composed of waterways and the control mechanisms over the water flows. In order to define whether a stable configuration exists, it is necessary to specify where the rivers are and where the controls of the river flows are: thus a stable configuration is a product of the geographical situation, international boundaries and the location of the water works and their controls. One requirement for an internationally stable configuration is that any control over the water flow affecting a given country is located within that country. These considerations determine the strategies available to the actors and the payoffs to the actors from the possible outcomes.

The structure of the bargaining problem, then, consists of whether a state is an upstream or downstream user, extent to which the water supply is shared by more than

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<sup>11</sup>Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960) and David A. Baldwin, ed. *Neorealism and Neoliberalism: The Contemporary Debate* (New York: Columbia University Press, 1993).

<sup>12</sup>This can be thought of as similar to a Nash Equilibrium in the sense that a stable configuration exists when no one actor has an incentive to make a unilateral move to benefit his or herself.



one riparian, the relative military and economic strength of the state, and the availability of other sources of water supply, degree of scarcity, and location of the controls of the system.<sup>13</sup> These variables affect the strategies the players have and the effects of the strategies on the outcomes.<sup>14</sup>

Bargaining approaches that treat interests as given and institutions as byproducts of strategic bargaining ignore the fact that if the bargaining game is to yield a successful outcome, the outcome will have to be institutionalized. This suggests that institutions are not infinitely malleable over time. Consequently, the nature of institutional design also determines whether states can successfully manage and share their water resources in the long run. Individuals then choose certain rules with the anticipated effects on policy or economic outcomes. An approach that emphasizes institutional design does not deny that institutions reflect the underlying power and interests of the bargaining powers, but instead this approach does not treat interests as given and institutions as mere byproducts of bargaining. Accordingly, I argue that in order to understand the likelihood for water sharing in Central Asia, it is necessary to look at the nature of the institutions for the management of the water basin at both the domestic and international levels.

## B. Institutions

### 1. Domestic Level

In response to the argument that only an authoritarian power or hegemon can solve collective action problems<sup>15</sup>, a research paradigm has emerged within comparative politics and international relations that posits cooperation can develop endogenously. Within comparative politics, this approach is part of the literature called the "new institutionalism." This literature is, therefore, a natural place to go to for a discussion of cooperation over

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<sup>13</sup>Gleick, "Water and Conflict," p. 6.

<sup>14</sup>It is also important to think about how the water system works -- if there are in existence -- dams and gates that an upstream state can use to withhold or give water.

<sup>15</sup>Hardin, "The Tragedy of the Commons" and Ophuls, *Ecology and the Politics of Scarcity*.

shared water resources because it stresses such concepts as property rights, transaction costs, and collective action problems.<sup>16</sup> Moreover, by distinguishing between different types of property regimes -- state property, private property, common property, and nonproperty -- Daniel Bromley describes the way in which alternative institutional arrangements can lead to different resource management outcomes.<sup>17</sup>

Elinor Ostrom also provides a useful framework for analyzing successful and unsuccessful institutional arrangements for the governance and management of shared resources at the sub national level. By emphasizing the situational constraints different actors encounter in devising new institutional arrangements, she captures the complexity of the bargaining situation. Ostrom's solution for the management of common-pool resources stresses the costs of contracting and negotiating institutional arrangements, and as a result she shows it is possible for individuals to manage the commons without having to turn to centralized regulation or privatization. In her analysis she furthermore raises three puzzles: 1) the problem of supplying a new set of institutions, 2) the problem of making credible commitments, and 3) the problem of mutual monitoring. These same problems can be extended to the national and supra national levels when studying institutional maintenance and change following the collapse of an empire.

Ostrom along with Bromley demonstrate that institutional design can act as both an independent and dependent variable. Institutional design is a function of the following situational variables: 1) number of appropriators, 2) size of the CPR, 3) temporal and spatial variability of resource units, 4) current condition of CPR, 5) market conditions for resource units, 6) amount and type of conflict, 7) availability of recorded data on current conditions and historical appropriation patterns, 8) status quo rules in use, and 9) proposed

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<sup>16</sup>See for example, Daniel Bromley, *Environment and Economy*; Thráinn Eggertsson, *Economic Behavior and Institutions* (Cambridge: Cambridge University Press, 1990); Gary D. Libecap, *Contracting for Property Rights* (Cambridge: Cambridge University Press, 1989); Douglass C. North, *Institutions, Institutional Change and Economic Performance* (Cambridge: Cambridge University Press, 1990); Mancur Olson, *The Logic of Collective Action*; Elinor Ostrom, *Governing the Commons* and Oliver E. Williamson, *The Economic Institutions of Capitalism* (New York: The Free Press, 1985).

<sup>17</sup>Bromley, *Environment and Economy*.

rules.<sup>18</sup> Institutional design then correlates with institutional performance based on these variables when individuals are able to successfully overcome the free-rider problem.

## 2. International Level

In contrast to small-scale CPRs, many large-scale CPRs are shared by two or more riparian states. Rivers will originate in one state, but they flow through several states in which many diverse users depend upon these water sources. At the international level, we need to turn to other explanations to uncover why cooperation is possible when sovereign nation-states are involved. The transport of the CPR literature from the local level to the global level thus entails some revision because international cooperation involves heterogeneous and non-unitary actors.

In general when we look at international cooperation, we focus on relations between states, but previous cases show that external actors can also play an instrumental role in mitigating collective action problems.<sup>19</sup> Outside actors help states overcome the information and transaction costs of negotiating and monitoring institutional arrangements. An area of research that is germane for this project is the theoretical literature on the role of non-state actors and international organizations.<sup>20</sup> These actors and organizations facilitate cooperation by serving as mediators and third parties. Because third parties can alter the bargaining situation by providing selective incentives and resources to riparian states, this literature is fruitful for understanding why some sovereign nation-states are able to reach agreements over shared water basins.

Riparians can then get from the initial situation to a more stable situation in which no one riparian state has an incentive to withdraw or use additional water that would

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<sup>18</sup>Ostrom, *Governing the Commons*.

<sup>19</sup>My research on South Asia has shown that third parties such as the World Bank can help bring about a successful water agreement as in the case of the Indus Water Basin.

<sup>20</sup>For example, see Stephen D. Krasner ed., *International Regimes* (Ithaca: Cornell University Press, 1983); Haas, Keohane and Levy, eds., *Institutions for the Earth*; Karen Litfin, "Eco-Regimes: Playing Tug-of-War with the Nation State," Manuscript, 1991 and Oran Young, "Global Environmental Change and International Governance," *Millennium* 19 (Winter 1990).

potentially harm other riparians. Regarding the Indus water basin, it was feasible for an international agency, the World Bank, to move the initial post-partition plan to a more stable configuration with the 1960 Indus Water Agreement. With the Ganges water basin, however, it is not that no one is willing to compensate the riparian users, but that no one has figured out a stable configuration.

As long as it is impossible to create more water supplies and with no outside aid available to the parties, riparian states are involved in a zero-sum game. For instance, in the Ganges dispute between India and Bangladesh the upper riparian, India, wants more water and possesses the control mechanism within its territory. India, thus, gets the water it wants even though Bangladesh wants India to have less water. Unlike the Ganges, in the Punjab there is more usable water that could be divided between the coriparians. The structure of the Indus river system affects the distribution of control because it is possible to distinguish between the Indus and its five tributaries. Because of the geography of the Indus water system, it was then possible to divide the water supply of the six rivers between India and Pakistan so that India and Pakistan could each withdraw water from three rivers.

This is the point where the technical and political aspects mesh. States require technical capabilities and the financial resources to carry out water management systems, and international organizations can provide information and the foreign capital for water development programs. Thus, international institutions can manage to construct positive-sum games, leading to long-term agreements. The introduction of technological aid can increase the excess supply by providing side payments to create a positive sum game as in the Indus case.<sup>21</sup> At present there is no excess water in the Ganges water basin, but if Nepal undertakes the construction of storage sites at the headwaters of the Ganges, this could lead to a way of controlling the distribution of water among the riparian states.

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<sup>21</sup> Excess supply is the amount of water that can be harnessed and made usable from the amount of water flowing.

International institutions thus build confidence and decrease the incentives to defect. Second, through monitoring, they provide information to the involved parties. Third, they can offer positive and negative sanctions. If asymmetrical power relations exist, a third party in the role of an outside mediator brings incentives and resources to the bargaining table. The role of third party mediators prevents the more powerful actor from exploiting the less powerful state. By examining how institutions get supplied, how monitoring happens, and how credible commitments get made, we can therefore determine which situational variables contribute to effectively managing CPRs.

#### IV. The Aral Sea Basin

The two major rivers of Central Asia -- the Amu Darya and the Syr Darya rivers -- originate in the eastern mountains of Central Asia and flow through the desert before entering the Aral Sea. The largest drainage basins of the Aral Sea basin consist of the Syr Darya basin that originates in Kyrgyzstan and runs through small portions of Tajikistan, then through Uzbekistan into Kazakhstan, and the Amu Darya basin which is located within Tajikistan, Turkmenistan and Uzbekistan (including Karakalpakistan). Besides traversing the whole region of Central Asia, the headwaters of the Aral Sea basin are also located in Afghanistan, Iran and China. The total flow of all the rivers of the Aral Sea basin is approximately 125 cubic kilometers per year.<sup>22</sup> Until 1960, about 45 cubic kilometers of water annually reached the Aral Sea, but by the mid-1980s the rivers could no longer replenish the Aral due to the expansion of the irrigation networks.<sup>23</sup> Once the fourth largest lake in the world, the Aral has now shrunk to the sixth largest and has bifurcated into two separate water bodies.

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<sup>22</sup>Gregory Gleason, "The Struggle for Control over Water in Central Asia: Republican Sovereignty and Collective Action" *Report on the USSR* 3(June 21, 1991): 12.

<sup>23</sup>See Gleason, "The Struggle for Control over Water in Central Asia" for a description of the Soviet expansion of the irrigation networks in Central Asia which included the construction of the North Fergana Canal, the Andijan Canal and the Namangan Canal in the Fergana Valley along with the Karakum Canal in Turkmenistan. p. 13.

Water mismanagement has resulted in an array of ecological and economic problems for downstream users in Kazakhstan and Uzbekistan.<sup>24</sup> The poor health and environmental conditions that exist especially in Karakalpakistan and in Kazakhstan near the Aral Sea illustrate the failure of the previous institutions and rules to manage this common-pool resource.

Prior to the collapse of the Soviet Union, the river basins of the Amu and Syr Daryas were an example of an overused and exploited water resource. Overuse of the irrigation system was a byproduct of the system of cotton monoculture which throughout the Soviet period replaced other traditional forms of agricultural production. Whereas pre-Soviet irrigation systems relied on institutional arrangements that were primarily local and bound to a particular water source, the Soviet system linked previously separate sources. During the Soviet period, the old institutional mechanisms and infrastructural constructs were superceded, and it now appears impossible to break these links and return to the traditional irrigation management system. As a result, the new Central Asian states inherited economically irrational water policies from the Soviet system and its institutions.

Because of the way decisions were made under central planning, the Soviets allocated most resources in Central Asia to develop an economy based on the creation of a cotton monoculture. Other segments of the economy were sacrificed to sustain high cotton yields, and most Central Asian states' income still remains highly dependent on the revenue they procure from the sale of cotton.<sup>25</sup> Boris Rumer finds that cotton production made up two-thirds of Central Asia's gross output. Due to a situation that tolerated externalities as

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<sup>24</sup>For details concerning the ecological and social conditions from the desiccation of the Aral Sea see Philip P. Micklin, "Touring the Aral: Visit to an Ecological Disaster Zone" *Soviet Geography* 32 (1991); Philip P. Micklin, "The Aral Crisis: Introduction to the Special Issue" *Post-Soviet Geography* 33 (1992): 269-82; David R. Smith, "Growing Pollution and Health Concerns in the Lower Amu Dar'Ya Basin, Uzbekistan" *Soviet Geography* 32 (1991): 553-65; David R. Smith, "Salinization in Uzbekistan" *Post-Soviet Geography* 33 (1992): 21-33 and David R. Smith, "Change and Variability in Climate and Ecosystem Decline in Aral Sea Basin Deltas" *Post-Soviet Geography* 35 (1994): 142-65

<sup>25</sup>For details regarding the Soviet expansion of cotton cultivation in Central Asia see Boris Rumer, "Central Asia's Cotton Economy" in William Fierman, ed. *Soviet Central Asia: The Failed Transformation* (Boulder: Westview Press, 1991), pp. 62-89.

long as production goals were met, the center continually raised the incentives for growing cotton.

In addition, this monoculture system of agriculture provided for a system of social control.<sup>26</sup> Cotton monoculture created a personal system of rule by which the leader dispenses resources through a system of patronage. The state relies upon patronage as a way of mitigating conflict and procuring revenue for the state. In Central Asia, the cotton industry is linked to a system of patronage involving the state elites, farm managers and workers. Such a system usually leads to corruption. As long as production goals were met, the center continually raised the incentives for growing cotton. Even when cotton yields actually declined, the Uzbekistan clients falsified production data to keep up with demands for more cotton from the center. The came to light in the mid-80s when the cotton scandal in Central Asia broke out, involving the entire nomenklatura, power elites of Uzbekistan, and close family members of Brezhnev in the center.<sup>27</sup>

Economic reform as part of the transition away from central planning would not only require introducing markets to improve economic efficiency, but any reform that would shift the current mode of production in Central Asia away from cotton would also directly affect the way water is used and distributed. Since economic reform would also undermine the current mechanism of social control that maintains order, the power structure of the informal networks created around the cotton industry continues to block market reform. Subsequently, the different governments reflect these informal power networks, and as a result these patronage networks are one type of constraint shaping the new water management framework at the domestic level.

Cotton is moreover an input intensive crop requiring large quantities of fertilizers and water to maintain high yields. Since the Soviets were primarily concerned with

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<sup>26</sup>This process is similar to what Robert Bates describes in his study of markets in Tropical Africa. See Robert Bates, *Markets and States in Tropical Africa* (Berkeley and Los Angeles: University of California Press, 1981).

<sup>27</sup>See Gregory Gleason, "Nationalism or Organized Crime? The Case of the 'Cotton Scandal' in the USSR." *Corruption and Reform* 5 (1990): 87-108.

quantity planning rather than the quality of the cotton supply or the costs of environmental externalities, few restrictions were placed upon the amounts of water utilized. Water was considered a free good, and the state allowed various segments of the population open access to water use without having to pay for it. As a consequence, state farms had no incentives to use water prudently. The Soviets then invested substantial amounts of capital in the 1950s to expand the irrigation networks in Central Asia. Presently, 170, 000 kilometers of canals irrigate 4.2 million hectares of land in Uzbekistan.<sup>28</sup> Water is withdrawn from the Syr and Amu Daryas to irrigate approximately 75% of agriculture in the region through these irrigation canals.<sup>29</sup> Yet, large quantities of water are lost in the unlined irrigation canals; approximately 20-40 percent of the water withdrawn for irrigation never reaches the fields.<sup>30</sup> Fewer than ten percent of canals were lined in Uzbekistan as of 1987, and in Turkmenistan the percentage is even lower.<sup>31</sup>

Following the breakup of the Soviet Union, the new Central Asian states each claimed total jurisdiction over this natural resource. Independence thus altered the previous institutional arrangement regulating water use and distribution in the Aral Sea basin. At present, these states are attempting to replace the centralized administrative structures of the Soviet regime with new interstate agreements. This task requires the new governments to rank their priorities for water use and decide to what extent they should attempt to mitigate the desiccation of the Aral Sea or continue to support a water intensive economic system based on cotton monoculture.

Will the Central Asian water system resemble either the Ganges water basin or the Indus river basin? Unlike South Asia, in which India is the more powerful actor as she is the upper riparian and the possessor of the control works in both cases, most of the water supply in Central Asia is located in the mountainous regions of Tajikistan (Pamir) and

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<sup>28</sup>*Economic Review: Uzbekistan*, (Washington, DC.: International Monetary Fund, May 1992), p. 1.

<sup>29</sup>Gleason, "The Struggle for Control over Water in Central Asia," p. 12.

<sup>30</sup>Philip Micklin, *Water Management in Soviet Central Asia: Problems and Prospects*. Conference Paper from "IV World Congress for Soviet and East European Studies" July 1990, p. 7.

<sup>31</sup>Francheska Chalidze, "Aral Sea Crisis: A Legacy of Soviet Rule," *Central Asia Monitor*. (1992): 31.



Kyrgyzstan (Tien-Shan). By contrast, Uzbekistan, Kazakhstan and Turkmenistan, which constitute most of the region's land area, have access to only the lower reaches of the water network. One of the more pressing issues for Kyrgyzstan (and potentially for Tajikistan), as upper riparians, is whether they will have enough leverage to exercise sovereignty over the upper reaches of the water systems since the administrative headquarters of the control works are still located in the downstream state of Uzbekistan. The regional center for the distribution of water from the Amu Darya is located in Urgench, Uzbekistan and for the Syr Darya in Tashkent, Uzbekistan. In theory, these centers (BVOs) continue to control and monitor the flow of the rivers and allocate river water to irrigation canals and direct users in the region.

Most of the water of the Amu Darya that flows through Uzbekistan and of the Syr Darya that flows across Kazakhstan does not originate on the territory of those two states, but rather in the upstream republics of Kyrgyzstan and Tajikistan. Furthermore, the republics that are really water poor, Uzbekistan and Turkmenistan, are also the ones most dependent on these water resources for agriculture. With independence has come the realization that Kyrgyzstan, unlike Uzbekistan, has a large surplus of water in its territory. Although Turkmenistan has even fewer water resources, it has a much smaller population than Uzbekistan. In addition, the water rich republics are also the energy poor ones. Independence has, thus, created a potential for conflict over water and the potential to build linkages over issue areas. The Kyrgyzstan government has suggested that they should be able to sell water as Turkmenistan sells them gas and oil. In contrast, Kyrgyzstan has no direct interest in the Aral and may then be reluctant to finance programs to replenish the Aral Sea. Hence, Kyrgyzstan could have under its control an enormous hydro-electric energy asset.

Acute water shortages, moreover, plague the region; the main use of water is agriculture. In Turkmenistan about 88% of water used is for agriculture. In Uzbekistan, 85% of available water is used for agriculture, 12% for industry, with the remaining 3%

goes toward municipal and household uses.<sup>32</sup> Agricultural water users then must directly compete with users of water for municipal and industrial purposes. Shortages appear because prices are not charged for water used in crop irrigation. No flow meters exist on the feeders, and there is no way to monitor the exact amount drawn by each user. Consequently, the volume of water used exceeded the amount needed. In some cases, irrigational water use in Uzbekistan exceeds the necessary amount by 160%, in Turkmenistan by 170% and in Kazakhstan by 20%.<sup>33</sup>

The process of creating institutions to manage water use will likewise result in conflicts around the development of new property regimes that could lead to domestic distributional conflicts around the introduction of water rights. This entails deciding who has access to resource flows. In Central Asia, the distributional conflicts appear to be between upstream and downstream users who each face different sets of constraints. The distributional conflicts reflect the power asymmetries in the bargaining game between the different water users at the domestic and international levels. These underlying power asymmetries will have a large impact on the nature of the property regimes and institutions to manage the shared water resources of the region. Uzbekistan, moreover, appears to have the greatest interest in devising a new institutional arrangement since both rivers flow through its territory, and its different regions depend upon the irrigation networks for cotton and industry.

From Ostrom's work on local CPRs we can ascertain that the Central Asian governments will have to design new institutions to manage their common-pool resources and to solve the problems of supply, commitment and monitoring. Yet nearly a thousand local irrigation networks exist in Central Asia that were previously managed by the central authorities. Although each successor state now has jurisdiction over the natural resources

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<sup>32</sup>Jayant Sathaye, "Final Draft: Energy and Environment in Turkmenistan and Uzbekistan." United Nations Development Program, 1992, p. 8.

<sup>33</sup>Ibid.

within its territorial boundaries, including property rights over water, no viable alternative institutions have been created to replace the central institutions of the Soviet period.

The Central Asian states continue to pursue inefficient water policies because it remains unclear to whom the water now belongs. Prices are not charged for water used in crop irrigation, and farmers presently can pump or draw water from several canals at certain times of the year for a specified period based on the flow of the river.<sup>34</sup> Yet, it appears that payments for water will be one of the first areas addressed to deal with improving water management and economic restructuring. In 1992 Kazakhstan passed a law on payments for water use, and Kyrgyzstan is considering similar legislation.

At the local level, institutions for solving the problems of monitoring, enforcement and local governance must be created. However Ostrom suggests that outside intervention can lead to unsuccessful institutions. This appears to contradict the findings on third party intervention at the international level. Yet, this really is not the case because international organizations can only assume the role of an international compensating agency and shift the players' strategies when a stable international configuration exists. A stable international configuration is similar to Ostrom's emphasis on the nature of institutional design. Thus the design of the institutions and sharing configurations affect whether states or communities can successfully agree to manage their common-pool resources at both the domestic and international levels.

Accordingly, one way international organizations can help facilitate cooperation is to offer side payments in the form of alternative development projects to the communities who might lose their natural upstream advantage. In the Andes Inge Bolin finds that when international organizations sponsor development projects that benefit the downstream communities, this will often upset the power balance and allow for conflicts to arise over the inequitable distribution of benefits, whereas before they only arose in competition over

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<sup>34</sup>Rumer cites an experiment in Kyrgyzstan where fees were charged for water use on various sovkhozy and kolkhozy. When the fees were charged, wasteful consumption noticeably dropped in 1989, p. 99.

water.<sup>35</sup> This example shows how change in resource availability through international development can disturb the local balance of power as the upstream villages lose control over their water supplies and thus their bargaining power with the downstream communities.

For outside intervention to work at the local level, external actors need to incorporate local knowledge and community relationships into their calculations in order to obtain the assurance that local groups will cooperate in the future over their shared water resources. The norms and rules that exist at the local level can then be nested into interstate agreements for coordination. Both Rita Hilton and Elinor Ostrom observe that knowledge of local rules and norms plays an important role in the creation of effective institutions, and the more successful institutions appear where there are well-defined communities of users and clear, easily enforced rules to constrain resource use.<sup>36</sup> Hilton, furthermore, argues that the more control farmers have in system decisions at the local level, the more likely it is they will mobilize to maintain the resource.

It appears necessary to then build upon local institutions and knowledge when coordinating research and planning at the interstate level in order to fill the institutional vacuum left behind by the collapse of the Soviet Union. In place of Minvodhoz, attempts are being made to create new institutions to facilitate cooperation. For instance, the Central Asian states have recently agreed upon the creation of an inter-state body that would have the authority to allocate the water resources of the Amu and Syr Daryas among the basin states. The Inter-state Water Management Coordinating Commission (IWMCC) was created in February 1992 with its main objective the implementation of coordinated water management policy. Over the last year, members of the Commission of the five states have

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<sup>35</sup>Inge Bolin, "Upsetting the Power Balance: Cooperation, Competition, and Conflict along an Andean Irrigation System" *Human Organization* 49 (Summer 1990): 140-48.

<sup>36</sup>Rita M. Hilton, "Institutional Incentives for Resource Mobilization: An Analysis of Irrigation Systems in Nepal" *Journal of Theoretical Politics* 4 (July 1992): 283-308. This issue was specifically devoted to the study of institutions and common-pool resources.

been meeting periodically to work out the new terms of a water-sharing agreement and to coordinate water withdrawals.

The respective water ministries of the five Central Asian states signed this agreement on February 18, 1992 which obligates the Central Asian states to work together to solve the ecological problems associated with the desiccation of the Aral Sea. The agreement guarantees that 8 cubic kilometers of water flow reaches the Aral Sea each year regardless of the level of flow at the headwaters in a given year. The water flow has ranged from 3 to 14 cubic kilometers during the past several years; thus any remaining water would be divided between the other water users.<sup>37</sup> The Central Asian states have also established two River Basin Commissions for allocating water, monitoring water use and quality, and for data collection, analysis, management, and forecasting.<sup>38</sup> Interstate water disputes are to be settled by the Commission, with help of a neutral arbitrator if necessary.

This Commission along with the regional centers for distribution (BVOs) will be largely responsible for making and implementing decisions regarding water sharing. According to the recent agreements, the Inter-state Commission will basically define the water management policy for the region and decide how to distribute the water from the studies and proposals prepared by the BVOs. Once the Commission figures out the plan for water distribution, the decisions are then sent back to the BVOs for implementation. The BVOs will thus answer only to the Commission; they are not responsible to any government. Yet the BVOs from the Amu Darya and for the Syr Darya are still located in Uzbekistan. If the water decisions continue to emerge from these centers, the Uzbekistan government in Tashkent will retain a disproportionate amount of bargaining leverage in relation to the other Central Asian states. Finally, the agreement does not include the other riparian states -- China, Afghanistan or Iran.

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<sup>37</sup>Sathaye, "Final Draft: Energy and Environment in Turkmenistan and Uzbekistan," pp. 11-12.

<sup>38</sup>Internal World Bank Documents: Country Economic Memorandum, November, 1992.

Even with this new international agreement, competition over this common-pool resource could still result at both the international and domestic levels. The geographic structure of the water system in Central Asia could lead to conflicts over water quality and supply between upstream and downstream users.<sup>39</sup> Since 1989, all violent conflict attributed to ethnic differences revolve around conflict over access to resources.<sup>40</sup> Regarding water resources, Kyrgyz and Tajiks have previously clashed over access to the limited supply of land and water rights.<sup>41</sup> Disputes also exist between Uzbekistan and Turkmenistan over the amount of withdrawals from the Amu Darya.<sup>42</sup> These incidents over access to resources could serve as a predecessor of future conflicts over natural resources.

Thus the likelihood of a state agreeing to a new international arrangement for the regulation of water use and withdrawal is not only linked to whether a state is upstream or downstream and has access to the controls of its water supply because in the Central Asian case Kyrgyzstan and Tajikistan are upstream users, but are economically and militarily weaker than the downstream users - Uzbekistan, Turkmenistan and Kazakhstan. Since the controls over the water supply are still located in Uzbekistan, this raises the question of whether the Uzbek government can implement decisions about water distribution in the other states outside of Uzbekistan.<sup>43</sup>

Moreover, shortages of water are gravest in the downstream parts of Uzbekistan and Kazakhstan near the Aral Sea, and the situation is complicated by the region's

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<sup>39</sup>See Gleason, "The Struggle for Control over Water in Central Asia," p. 16 for a complete breakdown of the upstream and downstream users of water in Central Asia. For example in the Syr Darya basin, Fergana is upstream to the Golodnaya Steppe which is upstream from the Aral Sea region in Kazakhstan. With the Amu Darya basin, upstream users withdraw water for agriculture at various points including the Karakum Canal at Kerki which has deleterious effects for downstream users in Turkmenistan, Khorezm Oblast in Uzbekistan and in Karakalpakistan.

<sup>40</sup>See Robin Wright, "Report from Turkestan." *The New Yorker* (6 April 1992) for details of ethnic clashes in Central Asia. Nonetheless, no violence has reoccurred since independence.

<sup>41</sup>Ibid.

<sup>42</sup>Micklin, 1992, p. 277 and David Smith, "Culture and Water" *Cultural Survival Quarterly* (Winter 1992): 52. This appears to be the area most ripe for conflict over water withdrawals.

<sup>43</sup>It remains unclear to what extent this could also result in the distortion of information concerning water distribution in the Aral Sea basin.

dependence on cotton monoculture. Even within Uzbekistan, there is an unequal division of water between users in the cotton growing Fergana Valley and in downstream Karakalpakistan. Furthermore, the only alternative means of harnessing additional water supplies from the diversion of the Siberian rivers was abrogated when in 1986, Gorbachev canceled the plan to divert the Siberian rivers - Irtysh and Ob - to supplement Central Asian rivers for irrigation.<sup>44</sup> Since the Siberian water diversion is no longer an option, the policy most likely to increase excess water supply is conservation methods and the improvement of the technical capacity of the irrigation networks. Unlike in the Indus water basin where India and Pakistan were able to divide Punjab's rivers, no similar situation exists that could lead to a stable configuration.

So is there a role for international organizations and outside actors? In May of 1992, the World Bank sent an evaluation team to Central Asia to assess the water situation. Conclusions from the World Bank study suggest that the Central Asian states need to diversify their crops, while also improving the living conditions of the populations surrounding the Aral Sea. The question remains whether the World Bank will play the same role as an international compensating agency in Central Asia as it did in South Asia. At present it appears unlikely that the World Bank will provide the necessary financial and technical aid to compensate the Central Asian states for moving their economies away from cotton monoculture and for the upgrading of their irrigation methods.<sup>45</sup> The Bank is taking a wait and see position and has chosen to stay out of the negotiating process. The Bank is not offering any incentives, and instead is forcing the Central Asian governments to first agree on a new institutional framework among themselves and a list of priorities before the World Bank will intervene to mitigate the water situation.<sup>46</sup>

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<sup>44</sup>For a history of the Sibiral Project that would transfer water from the North to the Southern rivers, see Boris Runer, *Soviet Central Asia*, 1989 pp. 85-104.

<sup>45</sup>This year the World Bank has already once postponed an international donors conference to raise money for its program in Central Asia.

<sup>46</sup>Interview with World Bank Water Economist, November, 1993.

## V. Conclusion

The study of the politics of water sharing is an extremely important and relevant issue in arid regions because of the potential for conflict over the access to these resources. Conflict usually surrounds the construction of development projects such as irrigation facilities, hydroelectric works, and flood-control reservoirs as these projects often cause population displacements, loss of control over local resources and shortages for downstream users.<sup>47</sup> Competition over water resources results in domestic disputes between different ethnic groups, while at the international level, conflict may emerge between riparian states over how to share large-scale CPRs. Focusing on the factors that lead to the negotiation of agreements between coriparians to share water basins contributes to an understanding of what the necessary preconditions are at the international and domestic levels to reduce the potential for conflict over water resources and facilitate cooperation over large-scale CPRs.

Depending on how the problems of water use and management are resolved, the shared water system of the Aral Sea basin is an example of an environmental issue with the potential for both conflict and cooperation. In addition, the shape of the institutions for water management is also a potential source of both conflict and cooperation. Water is, moreover, key to the security of the region because it is linked in many ways to the political-economy and social structure of the region. The transaction costs in restructuring an economy based on cotton monoculture are extremely high, and as a result, the demands to support a monocrop economy continue to encourage overuse and mismanagement.

At the same time competing interests are emerging regarding the way in which to address the desiccation of the Aral Sea. Tajikistan and Kyrgyzstan, the upstream states, have expressed little interest in mitigating the ecological and health situation near the Aral. They remain largely unaffected by what is happening to the Aral, and they are facing more

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<sup>47</sup>Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict" *International Security* 16 (Fall 1991).



pressing and immediate problems such as civil war and economic collapse. Furthermore, the regions most affected -- Karakalpakistan in Uzbekistan, Dashowuz in Turkmenistan, and Aralsk in Kazakhstan -- are the most removed from the capitals and cotton growing regions.

To understand the way in which riparian states collectively manage shared water resources, work together to devise water sharing arrangements, and ensure the long-term economic and ecological viability of the resource, the literature on the new institutionalism and the literature on international institutions and organizations must then be connected in order to account for cooperation over large-scale CPRs. Duncan Snidal finds the CPR literature and the international institutions/regime literature to be complementary in that "each explores how self-interested actors regulate their behavior in mutually beneficial ways through rules and institutions that sit between the unregulated "self-help" behavior of anarchy on the one hand, and the strong central regulation of the state or world government on the other."<sup>48</sup>

The study of institutions at both the domestic and international levels thus supplements the bargaining literature that focuses primarily on interests. Moreover, the new institutionalism literature unlike the international relations literature on institutions, stresses the correlation between institutional design and institutional success for solving collective action problems. It does not just matter whether an institution exists to manage shared water resources, but the nature of the institutional design and the existing rules determine the way in which credible commitments are made and the way in which monitoring takes place.

Still there are areas in the institutions literature where disagreements exist between the findings on cooperation at the domestic level and cooperation at the international level. Issues such as the question of heterogeneity and the number of players need to be further

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<sup>48</sup>Duncan Snidal, "The Politics of Scope: Endogenous Actors, Heterogeneity and Institutions" Draft paper presented at Columbia University, January 1994, p. 8.

developed. Ostrom suggests that heterogeneity complicates attempts to achieve cooperation due to different preference orderings. Yet, in the international relations literature, asymmetries of power can actually be a good thing because they encourage issue linkages and side-payments which can allow for bargains and deals to be made. Given a large-scale CPR in Central Asia, possible tradeoffs for equitable sharing already exist between irrigation rights, hydropower development, gas resources and cooperation.

The Aral Sea basin case shows that in bargaining situations interests and capabilities matter, but that bargaining takes place within certain institutional constraints. Previous institutional arrangements in Central Asia continue to limit the choices available for creating new institutions for water sharing. However, initial signs of endogenous cooperation between the states are emerging, but it remains unclear what types of linkages and tradeoffs will take place and the extent to which international organizations will play a role in helping these riparian states reach a more cooperative outcome.