Ties that bind: the traditional irrigation systems of Uzbekistan social capital and implications for current successful management

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THE TIES THAT BIND:
THE TRADITIONAL IRRIGATION SYSTEMS OF
UZBEKISTAN, SOCIAL CAPITAL, AND IMPLICATIONS
FOR CURRENT, SUCCESSFUL MANAGEMENT

by

Patrick James Conti
B.S. The Evergreen State College, 2000

presented in partial fulfillment of the requirements
for the degree of
Master of Arts
The University of Montana
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Approved by:
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12-20-04

Date
The 2002 government-mandated formation of water user associations across Uzbekistan has greatly transformed water management in the country. Such a transfer in management is only capable of happening with a large stock of social capital to facilitate cooperative management. In order to assess the potential for successful management of water by the water users, this study examines traditional water rights and land tenure, modes of water management, and the operations and maintenance of the irrigation system. The degree to which social capital was present in the system is evaluated by looking at the following functions: decision making, resource mobilization, coordination and communication, and conflict resolution.

Through examining the historical accounts by visitors to the region, it becomes clear that social capital played a major role in the success of the traditional irrigation systems. Decision making was locally based, and the knowledge and the ideas of the farmers were respected and taken into account. Resource mobilization happened through both intra- and inter-village cooperation. By connecting water rights to maintenance, not only was free riding not an option, but also, networks were developed and fortified through collective action each spring. Coordination and communication occurred through formal and informal networks that allowed information to travel in both directions vertically as well as horizontally. Conflict resolution occurred at the scale in which the problems developed. Most conflicts were resolved through consensus.

The networks and trust that facilitated the successful management of water in the traditional communities of Central Asia have been squandered by changes instituted first by the Russians and then the Soviets. Changes in the economy and a shift from small to large-scale farming have served to diminish social capital. Technical and legal reforms will not work without representative, open and responsive communities. As such, the adoption of water user associations must involve the development of households and villages independent of the legacy of collective and state farms in the countryside.
ACKNOWLEDGEMENTS

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CHAPTER ONE

INTRODUCTION

Yer-dehqanning jani; suv-unii qani. (Land is the farmer's soul; water is his lifeblood.)
- Uzbek Proverb

The 2002 government mandated formation of water user associations (WUAs) across Uzbekistan has greatly transformed water management in the country. With this mandate, much of the maintenance and operation of irrigation systems has been moved from the government to the local farmers. This transfer of responsibility is expected to improve water usage, rehabilitate irrigation and drainage systems (I&D), and restore soil health and crop yields. Recent attempts to engineer WUAs elsewhere in the world have produced a very mixed record owing farmers not participating as the elites had hoped. Failures to comprehend how farmers behave and react to changes in irrigation systems has created a need for studies that focus upon social capital—the social features that allow participants to pursue shared objectives—and the performance of irrigation systems. In order to improve the chances for success of WUAs in Uzbekistan, this thesis examines the historical record of operations and maintenance (O&M) of the irrigation system in Uzbekistan along with the modes of organization. Through this study, how social capital has been developed and used is highlighted, and conclusions drawn on what the barriers to a successful transfer of water management might be.

1 Taken from Jonathan Michael Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present (Bloomington, Indiana, Indiana University, 1999).

Background

The collapse of the Soviet Union in 1991 and Uzbekistan's subsequent, though unasked for, independence led many within Uzbekistan, as well as the world, to feel hopeful for an improvement in the country's irrigated agriculture and the health of the Aral Sea Basin. Unfortunately, reform in Uzbekistan's water management has been complicated by the country's over reliance upon agriculture to drive its economy—agriculture constitutes over thirty percent of the country's gross domestic product (GDP)—and employ its largely rural population—over forty percent of the jobs are in agriculture. Over the past ten years this already decrepit irrigation system has suffered because the Government of Uzbekistan (GOU) lacks the equipment, expertise and financing to maintain its canals, pumping stations, diversion head-works, drainage facilities and dams. This has led to a continuing degradation of the water management regime and all of its subsequent effects as water continues to become more scarce and polluted and farm yields dwindle.

Up until 2003, Uzbekistan's irrigation system remained very similar to the centralized and hierarchical top-down system put in place by the Soviets, but all this changed in 2002 when the GOU passed resolution No. 8, which mandated the formation

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of WUAs throughout the country.\textsuperscript{7} The associations, which consist of farmers who work cooperatively to manage and maintain their irrigation systems,\textsuperscript{8} are envisaged by the government to increase the efficiency of on-farm water use, and promote rehabilitation of the irrigation and drainage systems. These self-governing associations are commonly found in both developed and developing countries—for example India, the Philippines, and the United States. They have a mixed record of success.\textsuperscript{9} Resolution No. 8 led to the rapid formation of over 100 WUAs in the following twelve months. This dramatic and important change in the organization of water management has enthusiastically been supported by the international community, which has pushed for such reforms in the basin since 1997.\textsuperscript{10} More recently, in December of 2003, the United States Agency for International Development (USAID) set aside $25 million to support the formation of the WUAs.\textsuperscript{11}

These WUAs are hastily being viewed as a panacea to the myriad causes and subsequent effects of water mismanagement in the Aral Sea Basin:

Management of water by a WUA inherently results in water savings and solves the [problems of water losses, soil salinization, water logged soils and diminishing crop yields], because it is the users who manage the resource, and


\textsuperscript{10} Micklin, Managing Water in Central Asia, 55.

\textsuperscript{11} USAID, Acquisition and Assistance Offer: Request for Applications (RFA) Number EW176-04-002 Water User Associations Support Program, 11.
who enforce cost recovery policies. This leads to increased crop yields, improving the livelihoods of farmers within the WUA. Therefore, maximizing our investment in WUA development and related policies will help improve the welfare of participating farmers.\textsuperscript{12}

This optimistic take on the power and potential of transferring the responsibility of O&M from the state to the farmers comes despite the WUAs' repeated economic,\textsuperscript{13} social\textsuperscript{14} and environmental\textsuperscript{15} failures in Central Asia.

Any major change to a large-scale irrigation system cannot be successfully accomplished without learning from the lessons of the past. Starting in the nineteenth and extending into the twentieth century, colonial powers began replacing traditional irrigation systems with large, centralized operations. These new systems were a testament to human's ability to transform natural environments by delivering huge amounts of water to arid landscapes. Central Asia is no exception to this pattern. The modernization of Central Asia, which was started under the Tsar and continued by the Soviets, saw the destruction of the environment and local cultures as the socio-economic adaptations developed over millennia by the local peoples "gave way to non-sustainable economic activity" and development.\textsuperscript{16} The Soviets transformed all aspects of the

\textsuperscript{12} Ibid., 12.


\textsuperscript{14} Wegerich, Water User Associations in Uzbekistan and Kyrgyzstan: Study on Conditions for Sustainable Development.


irrigation system by implementing nomothetic understandings of water management. At the same time, the Soviets considered their cultural adaptations formed in the northern woodlands of Europe to be superior to the local adaptations formed in the dry deserts and steppes of Central Asia.

The current attempt to transfer water management is best understood as a concern of nature-society relations. In an attempt to anticipate the problems that might frustrate a transfer of water management to user associations, this thesis examines the historical modes of organization and O&M of irrigation systems in Uzbekistan. Although numerous studies have examined the role that Soviet disruptions have played in the current water crisis in the region, no studies have looked at how social capital has been developed and used in the indigenous irrigation systems. In fact, Eric Sievers asserts that despite social capital's en vogue status no studies have looked at how this capital has historically been developed in Central Asia, and its implications for current projects in the region. This study examines the development of social capital in the pre-Soviet era in the water management system in order to examine ways in which local-level collective action was fostered and utilized, and how this might shed light on the potential problems for the adoption of WUAs in Uzbekistan.

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Literature Review

This literature review is divided into three sections. The first section examines the recent literature on the interdisciplinary nature of irrigation studies, and focuses upon how irrigation studies have too often left the social aspects of water management out of the equation. The second part of this review focuses upon the usefulness of social capital in evaluating irrigation systems. This section concludes with four variables through which Uzbekistan’s irrigation history and potentials can be evaluated. The final section of the literature review examines the theories and expectations of self-governing systems in resource management, focusing upon WUAs. Through reviewing the theoretical and historical literature of irrigation practices and water management, this review highlights the interdisciplinary as well as the nascent nature of irrigation and water management studies.

Broadened Understandings of Water Management and Irrigation

The twentieth century witnessed the rapid development of large-scale irrigation systems throughout both the developing and developed world. At first, the design and operation of such systems were merely understood in terms of engineering, all but ignoring the peoples, histories and their roles in irrigation systems. This section of the literature review examines the progression of water management, focusing on the behavioralist approach adopted by geographers to understand the complexities surrounding problems of irrigated agriculture and water management. Specifically, this section reviews the role of both political and technological change and their implications with regards to farmers and water use.
Irrigation systems are normally comprehended as being either physical, organizational, or social systems. The physical view of an irrigation system focuses upon the infrastructure itself, and is thought of as a technocracy. The second view considers an irrigation system as little more than an organizational construct. In this view, one is concerned with the politics and bureaucracy of the management of water. The third way irrigation systems are normally examined is as a social sphere. In this view, irrigation is seen as a social activity with different users with different interests interacting within the system.  

This study, however, in following with recent trends in irrigation studies, views an irrigation system as constituting all three spheres—the technical, organizational, and social—and includes all three components when the term irrigation system is used.

With this definition of an irrigation system, irrigation is understood as an interdisciplinary study that incorporates economics, politics, sociology, hydrology and geography. Traditionally, however, western development agencies and academia have largely developed, analyzed and treated irrigation projects solely in terms of hydrology, engineering and law, all but ignoring the individuals and social aspects involved in water management and agriculture.

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Starting with Gilbert White, water resources geography expanded the variables through which water management was understood to include the role of perception, decision making, and human adjustment. As technology changed the scale and manner of irrigation during the twentieth century, Gilbert White noticed a growing gap between the "knowledge and performance" in irrigation and water-resource management. As traditional modes of water management were replaced by more technologically advanced ones, farmers and their roles in these systems were ignored. White's early work on water-resources geography paved the way for later geographers to apply a behavioralist approach to understanding water management and irrigation systems. Currently geographers bring an interdisciplinary framework "to the assessment, interpretation and remediation of problems involving the human use of water as a resource," and thus remain at the forefront of an integrated approach to irrigation studies.

Despite the early recognition of the social variable to the effective development and operation of irrigation systems, large scale water engineering projects in the twentieth century have been designed and maintained without much emphasis placed upon the farmers, their social structure or historical context. This lack of appreciating


24 Mustafa, State, Property and Power in the Geography of Access to Irrigation Water and Vulnerability to Flood Hazard in Pakistan, 19.


26 Ibid., 7.

farmers in the design and maintenance of large scale irrigation projects has led to their characterization as inefficient and failing to meet production goals. Geographers and other social scientists have now come to see these disappointing results partially as a product of governments and development agencies failing to take into account how farmers and water users respond to new and technologically sophisticated irrigation systems.28

A defining feature of large scale irrigation systems, such as that found in the Aral Sea Basin, is their hierarchical and centralized bureaucratic arrangement. This arrangement results in elites—water managers, engineers, and public officials—being too far removed from the “on-farm situation to know the conditions of efficient use... and are bound by inflexible operating rules of water allocation.”29 These engineers and bureaucratic officials are not only too far removed from the on-site conditions, but they also lack the skills to understand the processes of social change that results from the implementation of large centralized irrigation systems.30 Failure of these water projects has led to a more ecological perspective that looks at the “interplay between rules and patterns of behavior and the natural and engineered environments in which these rules... occur.”31 This ecological perspective, which intends to bring together both the physical

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and social variables necessary for successful water management,\(^\text{32}\) calls for an analysis of human-environmental interactions and the impacts of social organization on the management of natural resources.\(^\text{33}\)

**Social Capital and Successful Management of Natural Resources**

The broadened and multifaceted understanding of irrigation and water management has brought the role of social capital into water-resource management. The following section reviews the literature on social capital by defining the term, offering a brief history of its development and application in resource management, and examines the ways it can be used to comprehend irrigation projects.

Since its popularization by political scientist Robert Putnam in 1993, social capital has quickly become a tool for comprehending development projects and group behavior.\(^\text{34}\) Despite its recent surge in popularity, social capital still remains vaguely defined in the literature.\(^\text{35}\) One commonly referred to definition,\(^\text{36}\) however, defines


social capital as the "features of social life—networks, norms and trust—that enable participants to act together more effectively to pursue shared objectives."\(^{37}\)

The interest of social capital to geographers is its ability to influence social relations and group behavior and values.\(^{38}\) Before going further, it is important to briefly highlight the distinction between social capital and other forms of capital such as human and human-made capital. Capital is understood as an asset that produces streams of benefits.\(^{39}\) As used in economics, capital has traditionally referred to natural resources, physical capital (human-made capital), and the capacity of individuals to utilize and produce capital (human capital).\(^{40}\) What separates social capital from these more traditional forms of capital is that social capital produces benefits first and foremost for the collective group, and not merely for individuals.\(^{41}\) In this sense, social capital is seen as the functional value of social relations.\(^{42}\)

Geographers and other social scientists have invested so much effort into social capital owing to its ability to maximize efficient use of resources and the environment by


[^40]: Ibid.


shaping norms and rules that facilitate group behavior. This understanding has led to the viewing of social capital as something that can be stored, invested, and spent not unlike human-made or human capital. Thus, in water management, social capital has come to be understood as a way to maximize efficiency of water use and encourage rehabilitation of irrigation systems.

Social capital is applicable to the study of irrigation systems for three distinct reasons. First, the switch in focus of water management from technical to social variables places emphasis upon the role that social capital has had upon the performance of irrigation systems, as well as social capital's ability to transform water management in the future. Second, despite water's importance in arid landscapes, it has traditionally not been used effectively. Allocation of water is normally dominated by those with political and geographical advantages. This produces shortages for some and overuse for others. This discrepancy in access causes water logging and salinity, as well as crop failure. Social capital, though, has the potential to facilitate adaptive collective behavior, and thus minimize these management problems. Finally, social capital allows


\footnotesize{44} Perreault, Bebbington, and Carroll, "Indigenous Irrigation Organizations and the Formation of Social Capital in Northern Highland Ecuador," 2.

\footnotesize{45} Ostrom, Crafting Institutions for Self-Governing Irrigation Systems, 13.


for site-specific examination of development projects, which accounts for the discrepancy in both the space and time of projects.48

In order to understand how social capital can improve water management, the functioning of social capital must be understood. The key terms of social capital are trust; reciprocity and exchange; rules and norms; and organizational roles and connectedness. The following are brief definitions of the above terms:

- **Trust** enables group behavior, which lubricates interaction and reduces transaction costs.49

- **Reciprocity** can come in two forms. The first is specific reciprocity where things of equal value are exchanged. Diffuse reciprocity, on the other hand, is the continuous relationship of exchange.50

- **Rules** are the formal regulations put out by authority figures and norms are the preferences and terms of acceptance by a group that facilitate group behavior.51

- **Connectedness** is the ease with which ideas and capital are exchanged within a community. Connectedness exists on both a micro and macro level. On the micro level, there are both connections within a local group such as members of a church, and connections between local groups, such as between a church and a school. At the macro level, there are connections between local groups and external agencies, such as a group of farmers and a development agency, and between external agencies, such as between a development agency and the state.52

Working with social capital, Norman Uphoff has established four basic functions of irrigation management that can be evaluated for performance by farmers and

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50 Ibid.

51 Ibid.

52 Ibid.: 212.
managers. These functions are decision making, resource mobilization and management, communication and coordination, and conflict resolution. 53

-Decision making and planning are facilitated by farmers and managers who have clear rules, precedents, and procedures that steer how participants strategize and behave in a group setting. In order for this to happen, rules and norms must be clearly understood by all, and these rules must be enforceable.

-Resource mobilization involves the delivery of sufficient water, maintenance of the irrigation system, and the technical operation of the system. In order for this to be accomplished, designated roles supported by rules must be in place to ensure the water gets to where it is needed by the farmers.

-Coordination and communication is necessary for fostering democratic participation through which rules and roles are established and communicated that coordinate activities necessary for the irrigation system.

-Conflict resolution must be quickly and equitably achieved to ensure that collective action is not impeded. In order to accomplish this, rules and precedents must be established that facilitate the resolution of conflicts in a manner perceived to be fair by all.

These four indicators provide a framework for assessing the ability of an organization to manage its water resources, and thus these indicators measure the amount and to what extent social capital has been constructed in a place. 54 It is important to note that these functions can be accomplished through both formal and informal roles and mechanisms. 55


Theory to Self-governing Irrigation Systems

Self-governing irrigation systems are the application of social capital to the management of water. This section of the literature review focuses upon the theories of self-governing modes of organization and the keys to successful transformation of water management from the state to local user associations. The section starts with a definition of common property and successful management. The section then continues by examining what is necessary in a user association in order for there to be successful management of its resources.

Natural resource theorists feel that social capital can be manipulated so individuals perform increased duties and management practices when property, defined not as an object but rather a "social relation that defines the property holder with respect to something of value,"\(^{56}\) is distributed amongst users of the natural resource. The distribution of property and thus responsibility to the farmers promotes cooperation and compliance because the owners feel invested to maintain value of their property.\(^ {57}\) Shared resources can be successfully managed—defined as when "the natural resource has not been squandered, that some level of investment in the natural resource has occurred, and that the co-owners of the resource are not in a perpetual state of anarchy"\(^ {58}\)—when each user is allotted responsibility that comes in tow with ownership. In order for water to be successfully managed, entitlements and costs must be clearly identified. In a common-property regime, such as farmers sharing an irrigation system,


\(^{57}\) Ibid.: 3.

\(^{58}\) Ibid.: 2.
competition for scarce water is displaced by “compliance in that each irrigator cooperates
by complying with the internal rules of water allocation among competing interests.
Farmers cooperate for the simple reason that in the absence of this shared structure of
rights and duties there would be anarchy.”  

Common-property theory and the call for more social aspects being integrated in
water management have been realized in the increasing promotion of WUAs by donor
agencies and national governments. The persistent problems in the latter half of the
twentieth century of the “design, construction, operation, management and use of
irrigation projects” have encouraged donor agencies, national governments, and NGOS to
focus upon the importance of “organizing farmers to make the most effective use of the
capital investment” to correct these irrigation systems. This shift from investing in
physical capital to social capital relies upon the belief that organizing people to facilitate
action/participation can alleviate a legacy of poor design and maintenance.

WUAs can facilitate the rehabilitation of irrigated agriculture through incentives
to the farmers to better manage the system, and the fact that the management is locally
situated. With the ownership shifted from the state to the farmer, the system is better
managed because the farmers have more incentive to participate in management, and
have the ability to do so in a timelier manner. At the same time, the fact that the

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59 Ibid.: 3.
60 Ostrom, Crafting Institutions for Self-Governing Irrigation Systems, 8.
61 Ibid., 13.
62 Robert C. Hunt, "Organizational Control over Water: The Positive Identification of a Social
Constraint on Farmer Participation," in Social, Economic, and Institutional Issues in Third World Irrigation
irrigation system is locally managed "empowers [farmers] to select meaningful slices of generalized science and put them to work in their particular social and ecological niches," and this promotes the appropriate management and operation procedures of the irrigation systems.

In order for WUAs to be successful, members must first and foremost receive benefits from working together, and these benefits must exceed the costs associated with collective management. In addition to benefits, the following factors are important to successful management of water resources by WUAs:

- emergence through grassroots reaction to mismanagement of water resources
- clear understanding and ability to enforce rules
- a local mechanism to resolve disputes.

The success of WUAs is limited by the interest and participation in a collective management system by the members themselves. If members actively form the WUA, they are more likely to take an active role in membership and be proactive in pursuing the goals of the association to improve water management as well as irrigation and drainage systems. On the other hand, if the organization is not established by members


65 Kolavalli and Brewer, "Facilitating User Participation in Irrigation Management," 255.

66 Ibid.: 252-3.

disappointed with how water was being managed, they will likely see a transfer of management from the state to themselves not as an opportunity, but instead as a burden.\(^6\)

Clear physical boundaries for WUAs must be established and rules put in place to ensure that free riding is not an option.\(^6\) Members must feel that their membership and active participation is necessary in order to receive the benefits of belonging to the association. Free riding though is a real problem, given the legacy of such behavior under the Soviet system.\(^7\)

Finally, WUAs must be able to settle disputes that arise between members.\(^7\) The resolving of disputes must result in negative behaviors being punished. Again, if members do not feel that the association is capable of managing disputes, then they will feel that the organization is weak and incapable of protecting their vested interests in the association.

If successful collective management is not realized by the WUA, the physical system of water management, as well a subsequent decline in farm yields, will result.\(^7\) This decline in the association’s ability to manage the water will then spiral out of control as benefits of membership are lost, and thus members lose incentive to participate and belong to the WUA. Given the already poor state of the irrigation system in Uzbekistan,


\(^7\) Thurman, *Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present*, 16.

\(^7\) Khouzam, "Collective Action in Irrigation," 295.

\(^7\) Kolavalli and Brewer, "Facilitating User Participation in Irrigation Management," 262.
a further deterioration in the system from a failed adoption of WUAs could have a
disastrous effect on the welfare of the farmers, ecological health of the basin, the
country's economy, and, ultimately, the political stability of the country.

**Purpose**

With the transfer of intra-farm O&M of the irrigation and drainage systems from
the state to local associations of farmers, the GOU, World Bank, and USAID, not to
mention the rural farmers, hope that the long legacy of water waste and its subsequent
environmental damage will improve. Because the institutions and economics that
produced the water crisis are still in place,\(^73\) this thesis suspects that WUAs will be a
destabilizing force only capable of affecting marginal changes, and thus improvements,
in the irrigated agriculture in Uzbekistan. This study, however, intends to examine the
historical role of O&M and modes of organization of the irrigation system to gain insight
into how social capital has been developed in the region. This understanding of social
capital will then be used to consider the changes that have taken place in the irrigation
system during the past few hundred years in order to offer an insight into the problems
the farmers will face in participating in WUAs.

Although development agencies are already examining the barriers to the
adoption of WUAs in the region,\(^74\) they are looking predominantly at the irrigation
system in a technocratic manner, all but ignoring the historical and social context. At the
same time, any studies on irrigation in the region completed by development agencies

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\(^73\) Wegerich, "Water: The Difficult Path to a Sustainable Future for Central Asia," 258.

\(^74\) For example, USAID Natural Resources Management Project, *Problems Facing Water User
Associations in Uzbekistan*. 
need to be looked at with a suspicious eye. Development agencies and the GOU have pushed for the implementation of WUAs for nearly ten years. The outcome of any research they conduct will be affected by the finances and politics intertwined with the development and support of WUAs already underway in Uzbekistan. For these reasons, it is vital that independent research is undertaken that examines the development and application of social capital to water management in the region.

**Methodology**

The development of social capital and its implications for the on-going transfer of water management in Uzbekistan today will be accomplished through examining books, journal articles and newspapers to draw out the patterns of the irrigation system at the
time of the arrival of the Russians in Central Asia in the mid nineteenth century. The primary focus of the study examines irrigated agriculture and the water-management system set within the larger context of the economic, social, and political setting at the time. With the primary focus upon the irrigation system before interruption by the Russians, changes that occurred under the Russians and Soviets will be drawn upon to highlight aspects of the traditional system.

The irrigation system is examined through three different spheres: land tenure, management and O&M. These spheres are each explored in their own chapter. The examination of land tenure in the nineteenth century provides an understanding of how the land was controlled, used, and understood by the farmers. The chapter on water management shows how decisions were made in the system, who controlled the system, and where responsibility for decisions was located. The chapter on O&M focuses upon the nature and traditions of irrigated agriculture, and how the farmer fit into the irrigation system as a whole. The patterns of land tenure, management, and O&M are then used to draw conclusions on the formation and utilization of social capital based upon the four indicators established in the literature review: decision making, resource mobilization, coordination and communication, and conflict resolution.

In terms of setting, the historical context will be focused loosely upon the current political extent of Uzbekistan. Prior to the arrival of the Russians, the steppes and deserts of modern-day Uzbekistan were largely under the domain of three Khanates: Khiva, Bukhara, and Kokand. Land tenure, administration and O&M were similar among the three Khanates. Owing to the similarities and the majority of the historical information focusing on Bukhara and Kokand, this study will focus primarily on those two, and then
highlight differences that existed between the khanates when appropriate. With the limitations in the sources of material and the changes in political boundaries in the region over the past two hundred years, however, some information will be included that applies to the Aral Sea basin as a whole, and not specifically to the area represented by modern-day Uzbekistan.

The study begins by examining the nature and extent of the current irrigation system in Uzbekistan. Special attention is given to the problems associated with the system. The next chapter examines the nature of water use and its connections with land tenure and Islam. After this, the material focuses upon the administrative aspects of the irrigation system and taxation. The final historical section examines O&M of the system, and the role that the farmers played in the system. This section also examines the implications of changes in the technology developed from site-specific adaptations versus nomothetic views of irrigation. These chapters then culminate in an examination of the development of social capital and its implications for the current transfer of water management.
CHAPTER TWO

THE ARAL SEA TRAGEDY:
CAUSES, EFFECTS, AND RESPONSES

You cannot fill the Aral with tears.
-Mukhammed Salikh

Water management in Uzbekistan today is largely defined and limited by the desiccation of the Aral Sea. Thus, any study of water management in the region must be well-grounded in the history, causes, and implications of the Aral Sea tragedy. This chapter takes a broad view of the desiccation of the Aral Sea, examining it as the most striking symptom of water mismanagement under the Soviets. From such a vantage, the chapter explores the numerous social and environmental costs associated with the desiccation. Following the costs, the complex and layered nature of the causes of the desiccation, along with obstacles to improvement, is explored. The chapter then concludes with an examination of recent trends in attempts to ameliorate the environmental damage sown in the basin’s landscape. It should be noted that the literature focusing upon the Aral Sea is extensive, and this chapter is by no means an exhaustive review. Instead, this chapter attempts to offer a background to the current situation in Uzbekistan by briefly examining the causes and effects of the desiccation of the Aral Sea, and current as well as previous responses to the environmental tragedy. By doing this, both the dire need for improvement in water management and the major obstacles to improvement will be drawn out, and the problems facing the basin today offer context to the history of water management in the previous century that will be explored in the proceeding chapters.
Effects from the Desiccation of the Aral Sea

The current political borders of Central Asia roughly follow the boundaries of the Aral Sea Basin. All of Turkmenistan, Tajikistan and Uzbekistan lie within the basin. Southern Kazakhstan and most of Kyrgyzstan do as well too (see Fig. 2). These five countries, forming the politically defined heart of Central Asia, account for ninety-two percent of the basin's area. Afghanistan and Iran account for about eight percent of the basin, and China a one percent.

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75 Dukhovny and Sokolov, *Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin*. 

Fig. 2. The Aral Sea Basin. Taken from Mathieu Bousquet and Karen Frenken, *Irrigation in the Countries of the Former Soviet Unions in Figures* (Rome, Italy: FAO, 1997).
Much of the surface water in this basin drains into the Aral Sea. Once covering over 60,000 square kilometers (km\(^2\)), it was the fourth largest sea in terms of surface area, and more important than its size was the integral role it played in the social, ecological, and economic life of the region. The Aral Sea though has shrunk over the past forty years, forming two lakes that together cover only 24,000 km\(^2\), constituting roughly one-third of the sea’s original surface area. The sea continues to diminish in size as water continues to be diverted from the rivers feeding the sea to irrigate the crops of the basin. According to UNESCO, it is optimistic to think 10 km\(^3\) of water reaches the sea today. When one compares this number with Wegerich’s assertion that 23 km\(^3\) of water needs to reach the sea to sustain its current extent, the terrifying rate at which this sea continues to shrink becomes apparent. This gross disappearance of a sea has quickly and justifiably been called one of the most pressing human induced environmental disasters. The Aral Sea, lying at the bottom of the basin, stands atop the totem of misuse and mismanagement of the Central Asian environment under Soviet control.

The Aral Sea began shrinking in the 1960s, as ever increasing amounts of water were diverted from the rivers of the basin to irrigate the cotton fields. The Soviets saw Central Asia’s hot and long growing season with fertile soils as the perfect place to grow

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the cotton for their textile industry in the north. The only thing that stood in the way of turning the region into a giant cotton plantation was the aridity. In the nineteenth century, the tsar started taking over land and developing irrigation projects to allow for the sowing of cotton across the deserts. What the tsar started the Soviets finished: the development of a massive and complex irrigation system to facilitate the opening of “virgin lands” to be sown with cotton. This centralized system was as big as it was inefficient, and broke a long tradition of small-scale, local irrigation that had developed in the oases of Central Asia over thousands of years.

Located in the heart of the arid lands that dominate Inner Asia, Uzbekistan is a country predominantly consisting of deserts and steppe. The arid nature of this region has limited the economy and settlement throughout history. Despite the dry conditions that limit agriculture, fertile soils and a long growing season with an abundance of solar input have always given the region a natural propensity to supporting permanent agricultural settlements. Accordingly, Central Asia has a long and productive history of oasis settlements, supported by irrigated fields, dating back to the sixth millennium BC.\footnote{D.R. Harris; V.M. Masson; Y.E. Berezkin; M.P. Charles; C. Gosden; G.C. Hillman; A.K. Kasparov; G.F. Korobkova; K. Kurbansakhatov; A.J. Legge; S. Limbrey., "Investigating Early Agriculture in Central Asia: New Research at Jeitun, Turkmenistan," Antiquity 67, no. 255 (1993): 324.}

The historical record shows sophisticated and extensive irrigation systems that supported “proto-urban” civilizations in the third century BC.\footnote{M.A.; Shahmirzadi Joyenda, S. Malek and Tosi, M., "The Bronze Age in Iran and Afghanistan," in History of Civilizations of Central Asia, ed. A.H. Dani and V.M. Masson (Paris: UNESCO Publishing, 1996), 222.} The extent and maintenance of these systems ebbed and flowed over time as conflicts and politics impacted the settlements and cities. Despite the fluctuations to the irrigation systems of the Aral Sea Basin, they persisted throughout time and remained a necessary component to the local
economies. The archaeological record shows little evidence of human-induced salinization, and the International Merv Project failed to find any indication of salinization near Merv. The archaeological record shows little evidence of human-induced salinization, and the International Merv Project failed to find any indication of salinization near Merv. Under Soviet control, however, irrigation systems and farming practices radically changed, and with them so too did the environmental health of the basin.

Much as the shrinking lake serves best as a symbol of the Soviet’s mismanagement of the environment, the visible scar of a disappearing lake serves as a shocking pronouncement of the grave, “creeping environmental problems” the region now faces. The recklessly inefficient agricultural plan and irrigation system causing the Aral Sea crisis is also contributing to various other environmental problems that together form a web of disasters that endanger the people and limit the newly formed governments’ abilities to make quick and successful transformations from the Soviet era to the next. Overexploitation of the basin’s water resources to satisfy the thirsty cotton that covers the landscape has resulted in, but is not limited to, soil degradation, loss of fisheries, decline in human health, and desertification.

Soil degradation is clearly seen in the prevalence of water-logged soils and salinization throughout Uzbekistan. Over seventy-five percent of the land is salinized in downstream provinces in Uzbekistan, such as Bukhara, Khorezm and the autonomous

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83 Glantz, "Creeping Environmental Problems in the Aral Sea Basin."

84 In addition to the listed creeping environmental problems, the destruction of hydrological regimes and the disruption of climatic conditions are major concerns for the health of the basin. For an excellent review of the environmental problems in the Aral Sea Basin see Michael H. Glantz, "Sustainable Development and Creeping Environmental Problems in the Aral Sea Basin," in *Creeping Environmental Problems and Sustainable Development in the Aral Sea Basin*, ed. Michael H. Glantz (New York: Cambridge University Press, 1999).
The soils in Uzbekistan are naturally saline. Overuse of water, poor site selection for fields, heavy seepage from unlined canals, a lack of adequate drainage systems and an increase in the salinity of the irrigation water, however, have caused the salt concentration to build up to unhealthy levels in the soils. The accumulation of salts produces secondary salinization by downstream farmers using brackish water to irrigate their crops. Secondary salinization is responsible for the lower part of the basin experiencing the most degraded soils (see Fig. 3). The decline in soil fertility is a major contributing factor to diminishing cotton yields. In 1979, scientists estimated the loss of cotton crop due to salinization to be about half a million tons for Uzbekistan—nine percent of that year's actual yield. The cotton crop peaked in 1981, and has continued to plummet since. Also, soil salinity has been, and continues to be, overcome by applying excessive amounts of water to flush the salts out of the root zone for the duration of the growing season. This excessive use of water increases both the scarcity of water in the basin and the prevalence of salts in the soil in the long run.

The desiccation of the Aral Sea has caused the destruction of fish spawning grounds, while the increased salinity in the sea has killed off all of the fisheries. In addition to the fisheries, efforts to maintain a cotton monoculture have also resulted in the loss of the trapping, transportation, tourism, and food-crop economies. The loss of these other economic sectors makes the basin’s economy especially susceptible to disruption.

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and because of this it is now that much more difficult to try to scale back or reduce cotton production in the region.

Heavy use of pesticides and a lack of water to flush them down are responsible for numerous public health problems in the basin. These problems include, but are not limited to, an infant mortality rate of 100 per 1,000 (one of the highest in Asia), an increase in cancers owing to poisoned water and particulate matter from the exposed seabed, and the contamination of mother's milk. Because of pollutants in breast milk in

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88 Thomas R. McCray, "Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems" (Lawrence, Kansas, University of Kansas, 1998), 68.
Karakalpakstan, mothers are advised not to breast feed their children. These conditions, among others, have led to the reduction of life expectancy around the Aral Sea by nearly twenty years. Unfortunately, with the health concerns predominantly affecting the marginalized Karakalpak minority group in remote Karakalpakstan, physical and political considerations have limited attempts to improve these problems.

One of the most frightening and underexposed results of desiccation in the basin is desertification. According to the Uzbek Academy of Sciences, a new desert is forming south and east of the Aral Sea at a rate faster than the expansion of the Sahara. The desert is referred to as the Oqkum, or White Desert, because of the toxic salt pans that cover its surface. Scientists fear that the Oqkum will continue to grow and completely overtake all of Central Asia.

Causes of the Desiccation

Starting with glasnost and increasing with the dissolution of the Soviet Union, the environmental problems in the Aral Sea Basin have attracted considerable attention and corresponding efforts to deal with this catastrophe. The majority of attention has focused

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upon the legacy of irrigated agriculture, as it is the main use of water in the basin, \(^95\) and more specifically, cotton, which requires ten times more water than wheat. \(^96\) Within the basin, Uzbekistan is responsible for over fifty-four percent of all irrigation, \(^97\) and grows over sixty-eight percent of the basin’s cotton. \(^98\) In Uzbekistan alone, over ninety-one percent of the water used is for irrigation. \(^99\) Thus, as this environmental crisis is water-led owing to profligate irrigation practices, Uzbekistan, as the largest water user, must reform its water use practices if the economic viability of the basin is to be restored.

It is important to note that despite the Aral Sea being a water-led crisis, this is not to say that the Aral Sea Basin suffers from water scarcity, where water scarcity is understood as 2000 people or more sharing one million cubic meters (m\(^3\)) of water a year. \(^100\) In terms of population to water available, the worst-off state in the basin, Uzbekistan, has only 192 inhabitants per one million m\(^3\) of water. \(^101\) This distinction accentuates the role water management (or mismanagement) and Soviet planning have played in creating the current crisis. The worst aspects to Soviet water and agricultural management include,


\(^96\) McCray, "Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems", 118.

\(^97\) Micklin, \textit{Managing Water in Central Asia}, 37.

\(^98\) Glantz, "Creeping Environmental Problems in the Aral Sea Basin," 43.


\(^100\) Wegerich, "Water: The Difficult Path to a Sustainable Future for Central Asia," 256.

Fig. 4. Sector Water Use in Uzbekistan. Note that the difference between this figure and the statistic found on the previous page derives from 94% of the water being used by agriculture, of which 91% is used for irrigation. For further clarification, see Sokolov, “Integrated Water Resources Management in Uzbekistan”. Figure taken from Wegerich, “Institutional Change in Water Management at the Local and Provincial Levels in Uzbekistan”, 90.

but are not limited to, a lack of water pricing, which instilled a culture of water waste; an absence of crop rotation;\(^\text{102}\) poorly leveled fields;\(^\text{103}\) overuse of pesticides;\(^\text{104}\) and a “low quality... of design, construction and operation of irrigation systems.”\(^\text{105}\) As a result, Uzbekistan now suffers from “water losses from evaporation, infiltration, and deep percolation; water logged soils; soil erosion both from irrigation and wind, with a loss of topsoil; and a decline in fertility.”\(^\text{106}\) Complementing the region’s environmental

\(^{102}\) Kotlyakov et al., "Concept for Preserving and Restoring the Aral Sea and Normalizing the Ecological, Public Health and Socioeconomic Situation in the Aral Region," 285.

\(^{103}\) Micklin, Managing Water in Central Asia, 38.

\(^{104}\) Wegerich, ”Water: The Difficult Path to a Sustainable Future for Central Asia,” 254.

\(^{105}\) Kotlyakov et al., "Concept for Preserving and Restoring the Aral Sea and Normalizing the Ecological, Public Health and Socioeconomic Situation in the Aral Region," 286.

problems, competition for deficient amounts of water and anger over water quality are responsible for transboundary and local conflicts.  

Although it is easy to identify a shortage in terms of the quantity and quality of water as being responsible for the desiccation and all of its ensuing costs, it is not quite so simple to pinpoint how humans have fostered this problem, and even more difficult to identify how to ameliorate the situation. McKinney, however, identifies two popular explanations for the environmental destruction of the Aral Sea: failures in economic planning and increased water losses owing to changes in farming and irrigation practices.  

The first explanation, predominantly backed by former Soviet water planners and economists, believe that the Aral tragedy stems from a poor regional economic plan. This group considers the narrow goals and shortsightedness of the Soviet economic planners responsible for the current environmental and socio-economic problems. By instituting a regional economic plan that favored national interests—increased cotton production—without considering the regional costs, poor planning led to the shrinking of the sea from ever-increasing water shortages. This economic plan required greater amounts of water to be diverted from the rivers to supply the expanding fields, which led to the environmental destruction, as well as competition over water and economic vulnerability.  

110 McKinney, Sustainable Water Management in the Aral Sea Basin.
On the other hand, Wheeler and Micklin point to the loss of traditional farms and irrigation practices after the Bolshevik Revolution as being responsible for the current shortage of water. Driven by their belief that technology and collectivization would improve crop yields and lessen the burden of the Central Asian farmer, the Soviets quickly transformed irrigation systems with large canals that fed large, collective farms. In doing this, modern technology and farming techniques supplanted the traditional practices that had developed in the region over thousands of years.\textsuperscript{111} The profound changes to how the farms operated and the irrigation system was managed served to destabilize irrigated agriculture in the region. Micklin considers this disruption of traditional irrigation methods to have started the region down a path of unsustainable water use, as ever-increasing amounts of water were lost through poor design and a culture of water waste that the system encouraged.\textsuperscript{112} From this view, any attempt to rectify water shortages in the basin cannot deal solely with the infrastructure, management, or culture of water management, but must, instead, deal with the major changes that occurred to all three under Soviet control. The role that changes in technology played in the irrigation systems is covered in depth in chapter five.

The destruction of the Aral Sea is complex. Not unlike its effects, the causes of the desiccation are many. Institutional changes resulting from technology as well as ideological changes in Central Asia have played a major role in water shortages. At the same time, economic plans that considered water an inexhaustible resource of the Aral Sea Basin allowed for ever-greater amounts of water to be diverted from the rivers to the


\textsuperscript{112}Micklin, \textit{Managing Water in Central Asia}, 38.
fields, all in the name of the good of the nation. Although McKinney identified these two ways to explain how water shortages arose, this is not to say that only one is correct. Both factors are responsible for the condition of the Aral Sea, and any attempt to improve the basin’s ecological health must address the large-scale irrigation system as well as the relics of the Soviet command economy. Unfortunately, amelioration of the Aral Sea is not only compounded by the coalition of factors causing water scarcity, but also by Uzbekistan’s troubled political and economic conditions.

With irrigation accounting for over ninety-one percent of the water used in Uzbekistan, the most meaningful and significant water savings must come from a reduction in irrigated lands and cotton production. At this time, because of Uzbekistan’s heavy reliance upon cotton production, any reduction in irrigated lands is both politically and economically unfeasible. Since 1992, Uzbekistan has been the world’s second largest exporter of cotton. Based upon 1998 estimates, over forty-one percent of Uzbekistan’s $2.83 billion in exports were cotton. The next largest export was gold at nine percent. Last year, cotton accounted for thirty-six percent of the nation’s $44 billion GDP. These statistics underscore the importance and domination of the cotton monoculture to the country’s financial standing, but these numbers only represent the importance in terms of dollars.

Uzbekistan’s agricultural sector, largely made up of cotton production, continues to be the largest source of employment in Uzbekistan, where thirty percent of the

\[\text{Ibid.}\]

\[\text{Ibid.}\]
population is either unemployed (ten percent) or underemployed (twenty percent). Of these agricultural jobs, the labor-intensive nature of Uzbekistan’s largely unmechanized cotton production provides thirty times more jobs than grain production and three times more than fruit picking. There are no obvious replacement jobs for the millions of workers who would be displaced by any substantial scaling back of cotton production. Moreover, Uzbekistan’s rural workforce is expected to increase by eighty percent in the next five years. This increase in the rural workforce will make cotton-picking jobs that much more valuable in the rural areas.

Intertwined with cotton’s importance to the national economy, the GOU is also interested in maintaining cotton production for political reasons. According to Weinthal, decisions concerning cotton production at the state level have been affected by a desire to keep people on the farms picking cotton as a means to maintain the state’s social and political power. Cotton production sustains the state at the top of the hierarchy, with regionally based patronages operating underneath it. In this, the strength and stability of the state is maintained simply by not trying to transform the largest sector of employment, and the social and political networks that have developed around it.

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116 Ibid.
117 Ibid.
118 McCray, Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems, 123.
119 Ibid., 119.
The political and economic trends of Uzbekistan’s irrigated agriculture over the past one hundred years shape and limit future developments in the basin. Reduction of agriculture, especially cotton, simply is not an option at this time, just as is any attempt to return to the way things were before the Russians arrived in Central Asia. Despite the enormity of the problems and obstacles to reform, the years since independence have seen numerous efforts to improve the social, economic, and, of course, the environmental health of the region.

**Trends in Amelioration Efforts**

Since the break up of the Soviet Union, efforts to improve the quantity and quality of water in the Aral Sea Basin have been largely envisaged through three avenues:

1. The reduction of the irrigated area.
2. Improved efficiency of agriculture and irrigation.
3. A shift to crops requiring less water.\(^{121}\)

As explained above, with Uzbekistan’s political and economic reliance on cotton—not to mention the increased demand for grain production as the country tries to regain its food self sufficiency—a reduction in irrigated area or a major shift in crops is not realistic at this time. This has left an improvement in efficiency of water use and agriculture production as the main way to improve Uzbekistan’s agricultural prospects while simultaneously limiting its environmental liabilities. These goals are predominantly pursued through the dissemination of welfare by nongovernmental and foreign assistance agencies, and economic and land policy reform.

Nongovernmental organizations (NGOs) and foreign assistance agencies have had a presence in Uzbekistan since its independence. These agencies focus upon identifying and then treating many of the country's agro-liabilities. Organizations such as USAID, the Japan Grant Fund, and the European Union finance myriad studies executed both by international and national experts monitoring key irrigation and other agricultural problems. Unfortunately, the shift from monitoring to action is a difficult one owing to the exorbitant costs associated with the improvement in the efficiency of the irrigation system itself. The Uzbek government estimates costs to improve efficiency through lining canals and putting in place an adequate drainage system for irrigated fields at $4,000/ha. This leaves most efforts to improve irrigated agriculture to the dissemination of welfare, such as the donation of tractors and other agricultural equipment with the hope of improving efficiency and productivity on farms, and this, in turn, leading to a reduction in the use of water. In this, most of the aid contributed to farms and farmers is superficial at best. While these efforts do little to actually treat the root causes to the problems facing the irrigated agricultural sector, they do harm in reinforcing the notion that the international community will fix the Aral Basin. This undermines the GOU's political and financial support for efforts to ameliorate conditions in the country.

The majority of efforts by international organizations, such as the World Bank, and the Uzbek government to improve the efficiency of irrigated agriculture involves

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122 McCray, "Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems," 238.


Some economists believe a change in land and economic policies, such as privatization and an end to free water, will increase the personal involvement and responsibility of the farmers, and this will help facilitate an introduction of greater technology and agricultural practices. By imposing more economic responsibility upon the farmers, the hope is that they will accordingly run their farms in a more efficient manner. Despite the potential and promise of such reforms, the government has been slow in instituting change, as inertia combined with political and economic risks has prevented the government from being more aggressive in pursuing reforms.

Despite the expanded understanding of irrigated agriculture by academia during the past twenty years, this has not carried over to the international community’s nor the GOU’s response to water and soil problems in Uzbekistan. Thus far, all economic and land-policy reforms have been instituted in a top-down manner. These policy reforms assume that the farmers will be rational actors in a Western, free-market sense. The government and NGOs hope that external, institutional changes will prod the farmers to

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act more efficiently as the theories and Western logic indicate they will. It is this belief and faith in privatization that has allowed for the singular examination of the economic factors behind water use in the Aral Sea Basin as a way to revamp irrigation. Focusing upon economics, the GOU and the organizations involved in the basin have viewed, and subsequently treated, the farmers and water managers as passive pawns who have no personal connection to the land and its health, but merely the ability to respond to economic considerations. This view of the farmers and water managers is unfortunate given the limited resources of the Uzbek government and its hesitancy in adopting land and economic policy reforms.

Political and economic changes, as well as the adoption of more adaptive technologies, are necessary for irrigated agriculture to continue in the Aral Sea Basin, but these changes are expensive in terms of cost and effort and will take time to be implemented. New less expensive reforms in terms of capital, investment, time and risk need to be explored. Less expensive reforms are needed to both serve as a first response to this water-led environmental disaster and as a way to augment the larger policy reforms being pursued.\(^{129}\)

Land and economic reforms need to be supported through an improvement in the practices of water and land use through an increased understanding and a cultural shift of the farmers and villagers who directly rely upon the land and water for their livelihood. In this, a thorough examination of the attitudes and understandings of the water crisis, water conservation, and management could help bridge the gap between elites who manage and set up the rules administering water usage and the farmers and

\(^{129}\) McCray, □Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems□, 4.
water managers who asked to respond accordingly. In his 1998 dissertation, McCray points out the willingness of the farm managers, irrigators, and workers to implement measures that would promote water conservation and soil health, but indicates that they seemingly do not do so because they are not told to.\textsuperscript{130} O’Hara and Hannan noticed a lack of understanding by many farm managers of the connection between over-watering and soil salinity, and call for on-farm practical training as a first response to the destructive cultural legacy still present from the Soviet system.\textsuperscript{131} This is echoed by Usmanova stating that the villagers’ concern and understanding of the water-led environmental crisis needs to be raised.\textsuperscript{132} Micklin states that increased information such, as topographic and soil maps, as well as competent advice on proper land and water management practices, are key to improving land and water use in the Aral Sea Basin.\textsuperscript{133}

**Conclusion**

Lying at the bottom of the Aral Sea Basin, the Aral Sea is where the legacy of misuse and abuse to the Central Asian landscape concentrates. This concentration of environmental liabilities is most clearly seen in the desiccation of the sea itself, but it is important to recognize that the disappearance of the sea, as large of a tragedy it is in its own right, is merely the most visible of a long list of problems that can all be traced back to the cotton monoculture instituted by the Soviets on the steppes and in the deserts of Central Asia. The effects of the water shortage in the basin include, but are not limited

\textsuperscript{130} Ibid., 3, 192.


\textsuperscript{132} Usmanova, “Aral Sea and Sustainable Development,” 45.

\textsuperscript{133} Micklin, *Managing Water in Central Asia*, 59.
to, the destruction of hydrological regimes; disruption of the climatic regime; degradation in public health, with a reduced life expectancy; rapid desertification; the complete loss of fisheries; and a vast expanse of degraded and salinized soils. As grave and dire as the effects listed in the literature on the Aral Sea are, these accounts do not and cannot accurately depict the social, environmental, and economic liabilities of the basin. Regardless, the depiction of the problems present in the literature effectively communicates the justification for past and continuing efforts to ameliorate this destruction.

Although it is obvious and accurate to say that the destruction and problems in the Aral Sea Basin are from a shortage in water, pinning down a singular cause for the shortage in water is not so easy. Many scholars and scientists from the Soviet era point to the economic plan implemented in the late 1950s as the cause of desiccation. This economic plan failed to consider the local costs of water shortage, but instead focused upon the benefits to the nation from increased cotton production. Through failing to consider the limited resources of water in the basin and the associated costs, water became scarce as more and more water was diverted from the rivers to the fields. The other predominant causal hypothesis for the basin’s water shortage is that the abandonment in traditional, sustainable methods led to an irrigation system and culture of exorbitant water losses. It is important to note that finding a singular explanation is neither important nor necessary. Instead, scholars, scientists, and workers in the region must recognize the complexities to the causes of desiccation, and the subsequent obstacles to ameliorating the social, economic, and environmental damage.
The complex and layered nature to the causes of desiccation in the Aral Sea Basin make a quick, simple, or cheap fix elusive. Since independence, serious, ambitious efforts to improve the health and condition of the basin have been stymied by high costs. This has left many attempts to be superficial at best, trying to merely put band aids on the irrigation system and not truly trying to overhaul and improve the system. More comprehensive attempts at improvement have largely centered upon reforming economic and land policies. Unfortunately, despite all of their good intentions and rhetoric, economic and land-policy reforms have been both slow in adoption and in results.

The destruction of the Aral Sea, despite all of the efforts of the past fifteen years, continues today. The economic and political inertia in the region ensures that unhealthy and unsustainable amounts of water will continue to be diverted to the fields from the rivers of the basin. The forced adoption of WUAs in Uzbekistan appears to be yet the latest attempt to engineer an improvement in the country’s irrigated agriculture. Although a return to the sustainable and time tested land and water policies and farming practices found in the region prior to the Soviet period is not possible, a look at the history of water management can offer insight into what some of the key principles to developing sustainable water management in the region will be (McKinney 1997, 3).
CHAPTER THREE

LAND TENURE AND WATER RIGHTS

"The [Soviets] confiscated the land and the water from the rightful owners, obliged many [farmers] to plant cotton and forbade them to plant corn, with the result that in many districts there was no bread to be had, even for as much as three roubles a pound."

-Ibrahim Beg\textsuperscript{134}

Any attempt to understand the social processes at play in water management and social capital in an arid region must address how farmers, workers and laborers view the land that they work and the water they use.\textsuperscript{135} This chapter looks at the role land tenure played in connecting/disconnecting farmers from the land, water, the state, and one another in the three khanates.\textsuperscript{136} It also briefly covers the major changes to tenure under the Soviets, and then those made since independence. Accordingly, this chapter will examine the background, history, and changes to land tenure and water rights in the region at the time of the arrival of the Russians in the mid-nineteenth century. Although much attention has been paid to land tenure in the khanates, a clear understanding of tenure and where and how the farmer related to the land remains elusive.

Part of the reason that a firm understanding has eluded historians thus far is the failure to set land tenure appropriately in the larger context of Islam within the khanates. In the literature, Islam and its role in shaping both the legal structure of tenure, as well as influencing the culture of farmers and villages, has too often been neglected. Historians and political scientists have invested much energy in examining the role that Islam played


\textsuperscript{135} White, \textit{The Changing Role of Water in Arid Lands}, 13.

\textsuperscript{136} A khanate is an area ruled by a khan. Khan was a title for feudal leaders in Asia.
in determining diplomatic conflict between the khanates and the tsar. Geographers and travelers, on the other hand, have neglected the khanates’ Islamic legacy. This disconnect has produced a literature on the history of Turkistan that considers religion and water management to be completely separate, despite Islam serving as the main social force in the mid-nineteenth century. For this reason, in addition to focusing upon land tenure itself, the chapter also looks at the history and role of Islam in relation to the farmers. This information, as well as the theme of Islam as a social force in irrigated agriculture and water management, will be brought up and explored further in the following chapters.

The khanates all shared a tax farming land-tenure system. To better set the background for the tenure system and the subsequent chapters, this chapter starts with a brief history of the khanates and their relations to one another. This is followed by a brief review of Islam, its role in the khanates, and how religion shaped land tenure in the region. By no means should this examination be thought of as exhaustive. The chapter then looks at the land-tenure system, as well as the contradictions and problems in understanding the system. It then concludes with an examination of the changing nature to the tenure system during the nineteenth and twentieth centuries.

The sources regarding land tenure in this chapter are predominantly Western travelers to the region and twentieth-century historians. Men like O. Olufsen, Eugene Schuyler, and Arminius Vambéry offer detailed accounts of the tenure system in the region from the last century. Many Russians did too, but unfortunately these accounts remain predominantly untranslated in archives in Tashkent and Moscow. Although this chapter would certainly benefit from accounts by the Russians, the Western travelers,
who certainly had biases and difficulties comprehending the local tenure systems, remained more or less free of the political biases that most of the Russians carried with them. One source this study was not able to use, unfortunately, was V. V. Barthold’s *A history of Irrigation in Turkistan*. Given the current interest and importance attached to water use in the history of Central Asia, it is amazing that this work has yet to be translated into English. The lack of a translation of this work is especially noteworthy considering Barthold stands apart in Western academia from his Russian patriots for the strength and enduring quality to his studies.\(^{137}\)

**Uzbek and the Development of Khiva, Bukhara and Kokand**

To more fully appreciate and understand the land-tenure system and water use that European and American travelers were observing in Central Asia during the mid-nineteenth century, it is helpful to briefly discuss the history of the Uzbeks and their move into Transoxiana. In the modern sense, “Uzbek” is thought of as an ethnicity despite its historical meaning belying such a narrow understanding. Soviet ethnographers thought of Uzbek as a term of ethnicity. Historically, it is more appropriate to think of Uzbek as a political term. The name traces back to Uzbek-Khan, a descendent of the elder son of Genghis Khan. Uzbek-Khan spent his life spreading Islam among the Turkish nomads of northwestern Turkistan. These newly converted nomads began to distinguish themselves from the other nomads by calling themselves Uzbeks.\(^{138}\)

Interestingly, the word Uzbek comes from the words *o’z* (self) and *beg* (prince or


nobleman), and means self master. At the end of the fifteenth century, Uzbeks began to move south from the steppe region north and west of Transoxiana, and took control of the oases from the Persians already located there. Today, Uzbeks consist of a pastiche of Mongolian, Persian, and Turkish features. This combination results from the legacy of the Mongolian warrior Genghis Khan in Transoxiana, the conversion of Turkish nomads from the steppe, and the Persians ruling the oases prior to the arrival of the Uzbeks.  

Transoxiana or Transoxania refers to the region that lies between the Amu (Oxus) and Syr Darya (see Fig. 2). Traditionally though, Transoxiana was referred to by the Arabs as *Ma wara al-nahr*, the land beyond the river—referring to the Oxus. Later, this Arabic title came to refer to all eastern Islamic lands. Even Turks and Persians themselves living “beyond the river” used the Arabic name for the region. Today, however, Turkistan—the land of the Turks—is the most common historical name for the region, as it was the name the Russians used. Although Transoxiana refers to a more narrow region than Turkistan, which now can be thought of as the five former Soviet ‘stans in Central Asia, at the time of the arrival of the Russians Transoxiana represented the greatest concentration of people, wealth, and power, and Russian efforts and presence in Turkistan were concentrated in Transoxiana. Today Turkistan is considered a colonially given name by the Uzbeks.

The settled population of Transoxiana did not think in terms of ethnicity, and certainly did not identify themselves as Turks. This was a distinction made by the

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139 Ibid.


141 Xinjiang is called Chinese or Eastern Turkistan, while the former Soviet ‘stans are thought of as Western Turkistan. The two Turkstans, however, united by language as well as tradition and history, form a larger greater Turkistan only divided by Chinese and Russian boundaries.
Occidentals. Ethnicity was not used to identify people. Traditionally the people of the oases of Central Asia identified themselves more by their village than by the region as a whole.\footnote{Elizabeth E. Bacon, \textit{Central Asians under Russian Rule: A Study in Culture Change} (Ithaca, New York: Cornell University Press, 1966).}

The arrival of the Uzbeks into Transoxiana saw the continued decline of the region from its prime several hundred years earlier. At the time of Uzbeks taking control of Transoxiana, the region—at this time known as Mogholistan\footnote{Bosworth, "Ma Wara Al-Nahr."}—was entering into a period of cultural, economic, and political decline. At the start of the sixteenth century, the region was still suffering from the damage inflicted by Genghis Khan's conquest of the region, and the subsequent wars for control that followed his death. At the same time, the discovery of the maritime route from Asia to Europe greatly decreased the amount of trade conducted over the Silk Road. The triumph of Shias in Persia only served to further isolate Sunni Central Asia from the Arab world.\footnote{Serge A. Zenkovsky, "Kulturkampf in Pre-Revolutionary Central Asia," \textit{American Slavic and East European Review} 14, no. 1 (1955): 16.} Finally, constant conflict with nomads led to the weakening of political states and the degradation of irrigated agriculture and the region's economy.

In this period of decline, during the sixteenth and seventeenth centuries, the khanates of Bukhara and Khiva emerged. These two khanates were followed by the Kokand Khanate in the late seventeenth century. These khanates were constantly engaged in conflict amongst each other and with nomadic tribes that surrounded them. Nevertheless, by the end of the eighteenth century, after two hundred years of Uzbeks in
control, each of the khanates began to strengthen politically and economically and become more cohesive.¹⁴⁵

Of the three khanates, Bukhara was the largest and most powerful. Its large territory consisted primarily of the Zerovshan Valley between the Syr and Amu Darya rivers. In this valley were the historical cities of Bukhara and Samarqand. The city of Bukhara served as the capital. The khanate also contained the Kashka Darya and the Surkhan Darya, as well as the upland regions east of Samarqand. There was no accurate census taken during the nineteenth century, and accounts of the population vary widely, but the most popular figure is around 3,000,000 people for Bukhara. Of these, fifty-five percent were Uzbek, thirty-three percent Tajik, and ten percent Turkmen. Indians, Jews, and Persians were smaller minority groups in the khanate.¹⁴⁶

Khiva was located to the west of Bukhara, south of the Aral Sea. The khanate was centralized around the city of Khiva, and included territory both north and south of the Amu Darya.¹⁴⁷ Kokand, on the other hand, consisted of the vast territory between the Syr Darya and Chinese Xingjian. The heart of the khanate was the rich and fertile Fergana Valley, and also included Tashkent,¹⁴⁸ then, and still, the largest city in Central Asia.


¹⁴⁶ Holdsworth, Turkestan in the Nineteenth Century, 3.


¹⁴⁸ Ibid.
Problems and Shortcomings in Understanding Land Tenure in Transoxiana

There is no clear consensus in the literature on what the traditional land tenure system was in the three khanates.\textsuperscript{149} My readings of the accounts by travelers, diplomats, and historians on the region were riddled with inconsistencies, differing definitions, and huge omissions in the record. Unfortunately, there are no native accounts of land tenure. This leaves us with only the information collected from foreign visitors to the region during the past century. Accounts by visitors are normally divided into two camps: those made by Western travelers to the region and those made by Russians\textsuperscript{150} of various sorts—

including merchants, diplomats, army officers, and spies. The following section examines the problems facing historians and social scientists in trying to accurately understand land tenure in the region prior to the Russians.

Many of the problems in the accounts taken by Western travelers and Russians in Central Asia stem from the fact that they inevitably interpreted what they saw through their own experiences and their own understandings. Colonialism saw Occidentals occupying and controlling new lands, and interpreting native customs and laws through their own biases and understandings. Thus, when the Russians started coming to Central Asia, they viewed the land as a commodity, something that could be possessed, owned, and used for personal gain. The Russians, as with most colonialists, viewed the local customs and traditions as being primitive and crude. From such a point of view, Russians tried to comprehend the complex and extensive local laws and tenure system, and then tried to re-inscribe what they found into terms and concepts that fit into their understandings of land tenure. Lands held communally but distributed on an annual basis—a system found in parts of Turkistan in the nineteenth century—were not easily comprehended by the colonialists, and were defined and written in terms familiar for the colonialist. Inevitably in re-inscribing the complex arrangements of property rights,

150 Ibid.


153 For example, W.P. Coates and Zelda K. Coates, Soviets in Central Asia (London: Lawrence and Wishart, 1951).

tenure was simplified. In addition to the simplification of local laws and tenure into the legal and cultural framework of the Tsarist Government, the Russians were invested in interpreting the local tenure system in a light that served the Tsarist Government in its quest to manipulate and control agricultural production in the Aral Sea Basin.

Travelers to the region faced the same problems as the Russians in trying to comprehend the complex land tenure system. In addition to trying to re-inscribe the local system of tenure, travelers to Transoxiana were encountering three different administrations within which there were many idiosyncrasies. Besides the three khanates, there were numerous smaller kingdoms and despots that the travelers were encountering too. Relations among the khanates and these smaller kingdoms were complex, varied, and impacted property rights and irrigation. Also, besides the size and complexities of the political entities in Turkistan at this time, the landscape itself was large, varied, and in many places inhospitable. The landscape produced oases that remained largely separate from others, and this isolation allowed for distinctions as well. Because of this, the irrigation systems and customs concerning property rights did not easily fall into absolutes for the region as whole. This led to many travelers' accounts conflicting with the experience of others. These conflicts offer insight into both the complexity of the landscape—physical and political—and the intricate arrangements concerning land tenure.

One other cause to the confusion over land tenure in the region, unfortunately not well examined, was the state of flux in Central Asia in the nineteenth century. Even prior to the arrival of the Russians, markets and the government were both changing. These

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156 Zenkovsky, "Kulturkampf in Pre-Revolutionary Central Asia," 17.
changes affected operations, the size of farms, and state of the peasant. So in addition to the variances that existed spatially regarding land tenure, there were also huge changes occurring during the nineteenth century. These temporal changes thus led visitors to the same villages at different times in the nineteenth century seeing differences of who owned and worked the land. The flux found in the cultures, governments, and markets in Central Asia in the nineteenth century receives a thorough examination later in this chapter.

**Shari’a, Odat and Land Tenure**

It is impossible to comprehend sedentary culture in the Transoxiana without appreciating the impact that Islam had upon the people. Qutayib warriors brought Islam to the oases of Central Asia in the eighth century, and since that time it has remained the primary religion of the region. Serving as the main religion, Islam played a huge role in shaping and directing all aspects of sedentary life, including irrigated agriculture and water management. Thus, at the time that the Russians arrived in the region, Islam was not only the main ideology, but also the main social regulator in the khanates. Religion served to shape the feelings and individual relationships within a collective framework, “providing loyalties similar to those of ethnicity.”

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159 Chylinski chooses the word similar here, but based on other readings, such as Bacon, and the role religion played in connecting the “different” ethnic groups across political rivalries against the Russians, I think it would be better to substitute “similar” with “in lieu of”.

much pride in their history and identity as the true “support of Islam,” and despite centuries of decline, Holdsworth considered Bukhara still the center of theological culture in the nineteenth century. In the mid-nineteenth century, the khanates were considered very orthodox followers of Islam, and as such, strict followers of Shari’a. Incidentally, since the collapse of the Soviet Union, this pride and connection between identity and Islam has been re-emerging in the Central Asian states, and this development has drawn much attention and concern from Western interests.

Islam managed to create unique social and spiritual bonds among farmers, tenants, and landholders. Before discussing tenure outright, it is necessary to review sacred law and its role as a social force in Islamic lands. Shari’a literally means the path to a watering place. Shari’a is the sacred law that instructs how one should conduct oneself. It covers every aspect of life and every field of law: international relations, constitutional powers, and administrative authority. The sacred law is understood by scholars to serve as the practical aspect of religious and social doctrine preached by Muhammad. The law is divine, and, as such, is thought of as being incapable of being

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160 Chylinski, "Islam in Soviet Central Asia: Ethnicity and Religion," 44.

161 Bacon, Central Asians under Russian Rule: A Study in Culture Change, 76.

162 Holdsworth, Turkestan in the Nineteenth Century, 32.


deduced, let alone understood. In principle, owing its divine nature, Shari’a does not respond to societal changes. Instead, it was Islamic society that was shaped by sacred law. However, Anderson points out that Shari’a was always melded to local customs and traditions, and in this way the rigid theory of Shari’a was not applied in the Islamic world, as the cultures had much ability to shape and influence how Shari’a was interpreted and applied. Gibb adds to this that although local customs were adapted to Quranic law, Shari’a always had the last say.

Concerning the nature of the Shari’a, it gave the people duties but not rights. In this, the sacred law concerned itself with seemly and unseemly acts with the people bound to act in a seemly way. Each Muslim had the duty to perform seemly acts, those in accord with one’s peers. Thus by acting in a seemly manner, each Muslim behaved in a way that was beneficial for the collective good. This is a key distinction in determining how and why the Muslims of Transoxiana acted the way they did; the point of behaving for the collective good will come up in all aspects of the water-management system. The Russians, on the other hand, highlighted the oppressive nature of the khanates through their use of Shari’a, without regards to its role in facilitating collective behavior.

Attempts by Soviet and Western scholars to interpret and appreciate the Shari’a are riddled with problems and shortcomings. At the very base of these problems lies the differences between how Occidentals and the Muslims view the world. Islam is theistic,

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169 Ibid.: 19.

170 Gibb, Mohammedanism: An Historical Survey, 72.

and in being so attaches value to the divinity and sacredness of customs and laws. Westerners, on the other hand, view and evaluate things in humanistic and materialistic terms. Criticizing Shari’a because it restricted the rights of individual farmers, which the Russians did, is lost upon Muslims who are not interested in personal rights so much as living in accordance with the law and in harmony with their cohabitants.

Shari’a, although in theory a constant, was different from place to place as each location melded its own customs to the sacred law. Because of this, Shari’a and land tenure had uniqueness based upon location, and this partly explains Barthold’s famous quote that the political and cultural history of Muslim peoples cannot simply be found in “the dogmas of Islam.”

The differences between the Islamic theory of land tenure and the reality of land tenure in the khanates also caused confusion for travelers to, and historians of, the region. For not only were Occidentals trying to appreciate Islamic law and theory, they were also having to ignore the parts of sacred law that were ignored by local custom. This led to many differences between what the travelers and historians have determined to be the land-tenure system for the khanates. Thus the failure of travelers and historians to appropriately connect Islamic theory with empirical observation serves as yet another partial explication for the differences in the accounts of land tenure in Transoxiana.

Odat (customs and traditions) played a large role in distinguishing the tenure system of the khanates from the system laid out in Shari’a. The tenure system of Islam is

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172 Park, Bolshevism in Turkestan, 1917-1927, 205.
largely based upon the Agrarian Law of Medina that predates Muhammad. This system of law, in tow with Islam, was brought to Transoxiana in 705 by al-Hadjdjadj. Persians would later take over the region from the Arabs, and as described already, the Uzbeks would take over from them. Thus the khanates in the mid-nineteenth century had a blend of Arabic and Persian features in government and law, in addition to the local customs that the Uzbeks brought to the system.

Traditional Land Tenure in the Khanates

Reliable and consistent statistics, terms and definitions for land tenure in the khanates simply do not exist. Thus, a clear and transparent window into how land was held is not available. Despite all of the problems and obstacles to reconstructing the traditional land tenure of the khanates, some interesting patterns emerge that offer insight into how the land was worked and understood by the farmers. The land tenure found in the khanates dates to the sixteenth century, after the Uzbeks first took over the oases. The single largest contradiction seen in accounts of land tenure revolves around whether private land existed. Strictly speaking, Shari’a does not allow for private land. Under the scared law, all land is held by the khan, and farmers are merely “tenants.” The khan holds the land for the good of the people, and, in theory, the land is lent to the farmers to work and then pay taxes to the khan for access to the land. Thus, in this tax-based land tenure, the farmer is thought of as a tenant. Despite the word tenant being prominently used in accounts of the tenure system, tenant is a problematic term, for the word does not

\[175\] Gibb, Mohammedanism: An Historical Survey, 69.
\[176\] Bosworth, "Ma Wara Al-Nahr."
\[177\] d'Encausse, Islam and the Russian Empire, 8.
convey the rights that the farmers had with regards to the land. Land held by a tenant could be held in perpetuity so long as taxes were paid and it was not abandoned. The land could be sold or sown as the farmer saw fit, and inherited by his male children. Based upon these rights, the tenants of the nineteenth century, although in theory not private landholders, did hold land and not merely serve as tenants on the khan’s land.

Russian accounts, however, stressed the theoretical absence of private property. These accounts would later be used to justify the tsar taking over the lands once the khanates were taken over by the Russians. Schuyler rebuts Russian categorization of land tenure, considering it simplistic. According to Schuyler, there was no evidence of communal ownership headed by the khan, and instead the tenure of land was “governed theoretically by the same rules that prevail in all Mussulman countries, although in practice perhaps changed by certain local conditions.”

To give an idea of who held the land, d’Encausse offers the following percentages that she took from Gafurov. Gafurov estimated twelve percent of the land of Central Asia to be personal holdings of the khans. Fifty-six percent of the land was classified as land not in use, and held as state property. Twenty-five percent was vaqf (waqf) lands held by a charitable trust. Only eight percent of the land was held by the general population. Of these lands held by the general population, Eckert and Elwert assert that because of Muslim inheritance laws, which stipulated that a father’s land be divided amongst his sons, plots of land were traditionally small, and that great and powerful

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landholders were uncommon. It is important to keep this in mind, as much of the literature indicates the land was held by a few, powerful *begs*. Land held primarily by an elite few, however, happened only after the introduction of cotton, and much interference to the traditional land-tenure system.

Much attention was paid to the large amount of land not in use. Gafurov estimated this to consist of fifty-six percent of the land. This was often pointed to as evidence of the inefficient and decadent nature of the khanates, and one of the main things that the Russians, and then the Soviets, tried to change when they came into control of the region. The Russians and Soviets saw these empty lands as an untapped commodity, and were interested in opening the lands for cotton production. In defense of the khanates and their letting half of the land fallow, they limited agricultural activity to the meadow soils of the region, avoiding the naturally saline soils. The Soviets were not so wise when they began their extensive development of the region’s lands, and this has led to many of the current problems of salinization and decreasing yields.

Under *Shar‘ia*, all land is held in trust by the khan, and is divided into two classes: untilled territory (unfertile land) and arable land. The arable land, which only constituted two percent of Russian Turkistan, is then classified into two categories based on how it is watered. The first category is called *lalmi*, and applies to lands located

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184 O’Neill, "Land and Water ‘Reform’ in the 1920s: Agrarian Revolution or Social Engineering?"
in the foothills that received their water solely from the spring and fall rains. *Obi*, on the other hand, refers to lands situated in the valleys and relied upon irrigation for their crops. Owing to the arid nature of Central Asia, the vast majority of the arable land was classified as *obi*, and this was exemplified by the fact that all three khanates were based in major valleys of the region. There is no exact figure given for the percentage of the cultivated land that was irrigated, but Park estimates it to be around seventy-five percent.\(^{185}\)

*Obi* lands theoretically can be classified into four categories. These categories do a fair job of explaining the tenure situation in the khanates. The four categories of land were *miriie* (public domain), *miul’*k (proprietary lands), *amaliak* (reclaimed lands), and *vagf* (lands held by a charitable trust).\(^{186}\)

**Miriie**

Although in theory all lands belonged to the khan, *miriie* referred to all lands under the direct control of the khan himself. These lands included the khan’s personal holdings, his cultivated fields, orchards, and palace gardens. It also included all abandoned, uncultivated, and waste lands. Waste lands were called *mevat*. According to *Shari’a*, *mevat* can be turned into a private holding simply by someone who “vivifies the land.”\(^ {187}\) It is not clear though if this was allowed by the khans, and there is much debate over this portion of *miriie* in the literature. This debate is more fully discussed under *amaliak* lands. Much of the *miriie* lands were made up of lands that no longer were


productive, and those lands whose owners had no inheritors when they died. Under 
Muslim custom, all inheritances were to be divided amongst the male children, and when 
there were no inheritors, the land returned to public domain. 188

**Miul’k**

*Miul’k* lands were the private holdings of the general public. *Miul’k* lands were at 
the disposition of the holder, and were "the property in the most absolute manner of 
private persons." 189 The land could be sold, bequeathed, given away or turned into 
mortmain as the holder saw fit. D’Encausse describes most of these farms being 
extremely small, on average between one and one-tenth and three and three-tenths 
hectares. 190 Matley, on the other hand, refers to *miul’k* holdings averaging between six 
and eight hectares. 191 No explanation is readily discernible for these widely differing 
figures, other than the complexity of land tenure and the dearth of accurate information 
on land holdings from this time. 192 Despite this inconsistency, it is fair to conclude that


190 The numbers supplied by d’Encausse were actually one to three desyatins, the common field 
measurement used by the Russians. Holdsworth defined a desyat in as being two and seven tenths an acre. 
Holdsworth’s ratio was then converted into hectares by multiplying 2.7 by .405. This number was then 
used to give the figures in hectares. D’Encausse, *Islam and the Russian Empire*, 21.

191 The numbers actually supplied were fifteen and twenty acres. Ian Murray Matley, 
"Agricultural Development," in *Central Asia: 130 Years of Russian Dominance, a Historical Overview*, ed. 

192 Concerning the dearth of accurate information for this time, Schuyler quoted a Russian 
government official as saying "all that we know of the country consists of detached descriptions of 
different localities, and the accounts of reconnaissance made by our troops. As the statistical information 
which is communicated to us from time to time by the districts’ chiefs, is so vague and superficial, and 
sometimes even so contradictory that it would be useless to speak of it." Schuyler, *Turikstan: Notes of a 
farmers did have land, and enjoyed rights of ownership over this land, and that most farmers did not have extensive holdings.

Of miul’k holdings, they were broken down into three classes based on taxes. The first of these classes was miul’k-i ushri. On these lands, the holders paid a tax on the size of their harvest. In theory, these are the lands that have been held in perpetuity since the Arabs first conquered them. Accordingly, holders of these lands paid a tax of one-tenth of the harvest to the government. Lands retained by the infidels at the time of the conquest were called miul’k-i khiraj. The conquerors let the infidels retain their land and faith, but charged them an increased tax on their harvest. The tax ratio for the harvest on khiraj lands varies widely in the literature. Taxes ranged from between one-tenth to one-half of the harvest. The third class of miul’k lands was hurri khalis. These were lands sanctioned by the khan to be free of taxes. These were the most sought-after lands, and were given to only large landholders who had much power and sway in the political system. Unfortunately, not much information is given to explain the existence of these lands. Schuyler simply refers to their existence, and questions whether they were created by a legal fiction.

Despite the three classifications of miul’k lands, Schuyler contends that miul’k-i ushri holdings did not actually exist in Central Asia. According to Schuyler, the private holdings were in fact miul’k-i khiraj because the lands were never divided up by the

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193 d’Encausse, Islam and the Russian Empire, 11.

194 Pierce, Russian Central Asia 1867-1917: A Study in Colonial Life, 142.

195 d’Encausse, Islam and the Russian Empire, 12.

conquerors.\textsuperscript{197} Schuyler attributes this mistaken conception of there being \textit{miul’k-i ushri} to the Russians. Schuyler refers to legal scholars asserting the complete absence of \textit{miul’k-i ushri} lands watered by the Syr Darya and Amu Darya, but this claim is not repeated by more modern historians. In this question over the types of \textit{miul’k} lands that existed in the khanates, it is clear how theory and observations in the region often clashed. Twentieth-century historians appear more apt to follow the more clearly defined theoretical laws concerning land tenure, whereas Schuyler and Vambery\textsuperscript{198} relied more upon firsthand observations than the theory concerning Islamic land tenure.

\textit{Amaliak}

Of the different types of land, a clear definition and understanding of \textit{amaliak} is the most difficult. To begin with, \textit{amaliak} lands are not mentioned by either Vambery or Skrine and Ross.\textsuperscript{199} Schuyler defines \textit{amaliak} lands as those lands held by the khan, and indicates that the taxes from these lands went straight to the khan and not to the treasury of the \textit{beg}. The \textit{begs} were the leaders of the khanate’s provinces, and traditionally the \textit{beg} collected taxes on all \textit{miul’k} lands, and then made an offering from the province to the khan.\textsuperscript{200} Schuyler, however, refers to a debate as to whether the money, which went to the khan, was a tax or rent. Schuyler concludes that because the lands could be “sold, given away, bequeathed, and turned into \textit{vaqf} as freely as other lands, without any recourse to the government,” they should be thought of, regardless of what theory might

\textsuperscript{197} Ibid.

\textsuperscript{198} O’Neill, “Land and Water Reform’ in the 1920s: Agrarian Revolution or Social Engineering?” 60.

\textsuperscript{199} Ibid., 61.

\textsuperscript{200} Taxation served as the main centralizing force in the administration of the khanates. As such, taxes will be discussed in the next chapter on the administration of the government and water management.
dictate, as property of the persons cultivating them. In other words, the money paid was a tax based upon the harvest and for all intents and purposes *amaliak* lands were *miul’k*, the only difference being to whom the tax was paid.

Pierce, on the other hand, defines *amaliak* as previously unirrigated land reclaimed by working it. Under *Shari’a*, once someone “revivified” a formerly unused tract of land it became their property. Despite this property status, Pierce stated that *amaliak* lands were taxed more heavily than *miul’k* holdings because the farmer was paying for not only access to water but also to access the land. Pierce also, in direct contradiction with Schuyler, states that *amaliak* land could not be transferred or turned into a *vaqf*.

Adding further to the confusion, d’Encausse refers to *amaliak* as all state land—any land not in use, which would equate *amaliak* with *miriie*. These state lands were at the complete discretion of the khan, and he could do with them what he willed. She speaks of the khans often making gifts from *amaliak* lands to the *begs*. These gifts were called *tankvah*, and were used more and more in the nineteenth century by the khans to help shore up loyalty from the provinces and ensure a contribution of troops by the *begs*. Interestingly, according to d’Encausse, once the *tankvah* was given to the *beg*,

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204 Ibid., 10.
he was free to administer the land however he saw fit. Thus, no taxes had to be given to the khan. Despite the lack of a clear definition of *amaliak*, it is fair to conclude that there were, again, rights of property enjoyed by those who worked these lands.

**Vaqf**

_Vaqf_ lands have a very clear theoretical definition in Islamic law. They are lands held in trust with the yield going to beneficiaries. Although the creation of a _vaqf_ was for charity, the purpose was often more self-serving than that. Under inheritance laws of Islam, property was to be divided in an agnatic manner. This meant that _miyâlîk_ land would be divided and subdivided to each male heir and made smaller and smaller over the generations. But by converting their holdings into _vaqf_, the land could remain undivided through inheritance. This tradition of converting property into charitable trusts is based upon numerous hadiths—teachings of Muhammad. Hooker gives the following example of the creation of a _vaqf_ based on the authority of Ibn ‘Umar:

“Umar had acquired land in Khaybar and came to the Prophet to consult him in the matter saying: ‘O Messenger of God, I have acquired land in Khaybar which is more precious to me than any property I have ever acquired.” He [Muhammad] said: “If you want, make the land itself unalienable and give [the yield] away as alms.” He (Ibn ‘Umar) said: Thereupon ‘Umar gave it away as alms [in the sense] that the land itself was not to be sold, inherited or donated. He gave it away as alms for the poor, the relatives, the slaves, the _djihad_, the travelers and the guests. And it will not be held against him who administers it if he consumes some of it(s yield) in an appropriate manner or feeds a friend who does not enrich himself by means of it.”

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209 Ibn Hadjar al-‘Askalani as found in Hooker, "Wakf."
As alluded to in the above quotation, *vaqfs* could be used to support a variety of organizations. Pierce, however, lists *madrasas*, mosques and charities as the main beneficiaries of *vaqfs*.\(^{210}\) Schuyler describes the recipients of *vaqfs* as religious, educational, and benevolent institutions.\(^{211}\) Each of the khanates had many large and famous *madrasas* (religious schools) and mosques. Today these structures, such as the Shir Dar *madrasa* in Samarqand, are famous historical structures maintained by the government. Historically though, they were not supported by the khan, but through *vaqfs*.

Pierce described four types of *vaqfs*. The first was the pure *vaqf*. These lands were free from all taxes and obligations. In other words, the state had no power to tax or control these lands. The next were conditional *vaqfs*. On these lands, only the portion of the harvest allocated for charitable purposes was granted a tax free status. The rest of the harvest was taxed. The third type of *vaqf* was the hereditary-property *vaqf*. These were lands that were set up purely to allow children to continue to work the land outside of *Shari'a* inheritance laws. Unfortunately, Pierce does not explain how taxes worked on these lands, and what it took for a farmer to be able to change his *miul'k* into a hereditary *vaqf*. The final type was the fictional *vaqf*. These lands were created by a landholder who had an institution serve as the symbolic holder of the land for a small annual allowance. The true land holder would then receive tax breaks and protection from government seizure of land.\(^{212}\)


\(^{212}\) Ibid., 143-4.
Most of the _vaqfs_ were worked by sharecroppers who gave about half of the harvest to the holder or beneficiary of the land. With the _vaqfs_ accounting for nearly twenty-five percent of all land holdings, this led to the prevalence of sharecropping in the region. The Russians highlighted the feudal nature of sharecropping. To the Russians, the large amount of land held in mortmain was a burden on the inhabitants and supported a “large” and “fanatical clerical class.”

Islam was a problem for the Russians in the region. It united the khanates and was a cohesive force in the region. So, of course, theRussians objected to the aspect of land tenure that supported the strong clerical class. Unfortunately there are no references in the literature as to the differences in efficiency and the health of farms between _vaqfs_ and _miul'ks_.

Despite the Russian bias against _vaqfs_, this is not to say that these types of lands were not misused and taken advantage of. During the nineteenth century, more and more lands were converted into _vaqfs_. Wheeler contends that the conversion of lands to _vaqf_ was most pronounced in Khiva, but Holdsworth asserts that no numbers were ever given to support this, and considers it a generalization by the Soviets. Regardless, the question of _vaqf_ lands being used as a way to avoid taxes by large landholders cannot be discussed outside of the context of changes to the economy and land tenure in the region as whole during the nineteenth century.

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213 Ibid., 301.


Water Rights

Unfortunately, there is not nearly as much written on water rights in the khanates as there is on tenure. Regardless, there are some clear patterns that can be discerned. Under *Shari’a*, the use and ownership of water depends on the source of water.\(^{217}\) In the khanates, the vast majority of water sources relied upon damming and the allocation of the water at fixed times. The water was needed by all of the farmers at the same time, and thus the resource was deemed exhaustible. For this reason, the ownership of water was not permitted. Instead, as with the land, water was considered God’s gift and held in trust by the khan for the good of the people.

The right to water was closely linked to the ownership of land,\(^{218}\) but water was not an automatic right of ownership of land.\(^{219}\) The khan, as holder of all water for the khanate, ensured that each farmer could receive an equitable share of the water,\(^{220}\) but in order for a farmer to receive water they had to contribute to the overall maintenance of the irrigation system. Thus, farmers were expected to contribute supplies, animals, and labor to the upkeep of the irrigation system. In this system, water rights were based upon labor, which served to benefit the community at large, and not just the individual farmer. Although, according to custom, water could not be bought or sold,\(^{221}\) those with


power and wealth were able to secure extra water\(^\text{222}\) or exempt themselves from contributing to the overall upkeep of the system.\(^\text{223}\)

Schuyler offers an interesting insight to the connections between the right to land and the right to water in regard to the location of property on the canal. Owners of land at the head of a canal had the right to no more water than those at the end of the canal. Recognizing that the administrative system could not accurately account for all water delivered, and that rice can handle as much water as it can possibly receive, custom forbid the planting of rice at the top of canals. The Russians considered such a restriction to be a limit to the right of property. Schuyler contends that instead of this being a limitation of right of property, it was instead a limitation of "right of enjoyment." The khan's administration would not allow one's right to an equitable portion of the water be threatened by one's desire to grow rice, and thus, rice was forbidden to be grown at the head of canal for the good of the public.\(^\text{224}\)

**Effects of Cotton and the Emergence of a Cash Economy**

Accounts of the land-tenure system of the khanates are complicated by the amount of change that occurred in the region during the nineteenth century. The


Russians at first did not deliberately try to alter land tenure in the region. At the same time, Russian interest in encouraging cotton production in the region did greatly impact traditional land tenure, amongst other things. Because of the American Civil War diminishing the cotton crop, and thus the Russian's ability to import cotton, the Russians began to look to Central Asia as a source for their cotton. The Russians never forced the production of cotton, but instead encouraged lands to be sown with cotton through tariffs and tax breaks. The Russians began to tax cotton imports while offering tax breaks on cotton in Central Asia. These policies had the desired effect. In 1886, only 13,200 ha were sown with cotton. By 1914, there were 597,200 ha. This tax policy, combined with the Trans-Caspian Railroad reaching Samarqand by 1888, precipitated a switch in the region from a natural, self-reliant economy to a market-based one.

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225 The Russians, although they viewed the locals as barbarians, did appreciate the value of the traditional culture, and its interrelationship with the environment. Brower quotes a memo from the Tsar's Ministry of Foreign affairs that complains of the General Governor of Turkistan of meddling in the "conditions of life of people alien to us by their religion, language and history". Despite how poorly the Russians' efforts in Central Asia have been reviewed by both Soviet and Western scholars, the Russians did appreciate the fact that the culture was adapted to and for its location, and because of this, despite how backwards and primitive at times the Russians thought it, that they were best off to just let customary practices continue. Daniel Brower, Turkestan and the Fate of the Russian Empire (New York: Routledge Curzon, 2003), 43.

226 Cotton production in Central Asia starting under the tsar, and only furthered by the Bolsheviks, is a well-researched and discussed issue. Most of the focus on cotton, however, surrounds its impact upon the economy, environment, and politics of the region. The effect that it had upon the social fabric of the region is not well examined. Nevertheless, in his History of Irrigation in Turkistan, Barthold quoted an ethnographer who summed up cotton's impact with regards to local culture by saying, "it looks as if cotton has driven all your stories and songs out of your head." Holdsworth, Turkestan in the Nineteenth Century, 29.

227 It is worth pointing out that it is often assumed that Russians first came to the region to secure a source for cotton production. Although an interest in cotton production played a part, it was part of a larger constellation of political and economic reasons. These reasons include the pursuit of a military victory after suffering defeat in the Crimea, Russian concerns about British activity in the region, and a market for Russian goods. Saray, "The Russian Conquest of Central Asia."


229 Rywkin, Moscow's Muslim Challenge: Soviet Central Asia, 15.
As capitalism became more pervasive in Central Asia, land ownership evolved with land use and ownership becoming more concentrated. This shift in the economy served to displace many farmers. Growing cotton required a major investment in capital and labor. Although Russian merchants and bankers were willing to lend money for local farmers to grow cotton, usury was banned by Islam and the concept was not readily understood by the rural farmers. Owing to poor borrowing practices and bad years wiping out many of the local farmers, the traditional rural ownership of land quickly dissipated as more and more Russians and other Europeans moved into the region, forming large plantations. As traditional farmers were losing their farms in the new market economy, nomads were losing their lands to the Russians. In 1893, 200,000 Russians seized traditional nomadic pasture lands for agricultural production. They justified such actions through the Islamic law that all lands belonged to the khan, and the tsar was the new khan. The Russians also assumed that the settling of the nomads would be to their own benefit, as well as the region as a whole.

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230 Brower, *Turkestan and the Fate of the Russian Empire*, 80.


233 Ibid., 44.

234 The tsar set up a land grab for Russians, and well-to-do farmers raced to the region. According to Mandel, this led to over a million nomads fleeing for Xingjian, China, and he compares this takeover of the pastoral land at the turn of the century to the fate of the American Indians. William M. Mandel, “Soviet Central Asia,” *Pacific Affairs* 15, no. 4 (1942): 392.


236 Barthold broke rank with his compatriots who believed settling the nomads would be to their benefit as well as the region’s. Holdsworth cites Barthold as describing the Russians as failing to appreciate the role that the nomads played in the economy of the region. Barthold connects the loss of the nomads’ herds with the increased price of meat, as well as the deterioration of the stock of horses in the region. He also feels that displacing the nomads only served to unite them with the sedentary population.
Farmers who lost their land combined with the nomads who lost their pastures in forming a new class of landless laborers—*mard-i-kar*—in Turkistan. Many of these landless laborers were put to work on the large cotton plantations. Not surprisingly though, the combination of plantations being managed by colonizers with little understanding of the land and farming practices, and these plantations being worked by former nomads with little knowledge of the traditional irrigation systems, led to low yields and the abandonment of lands as canals clogged with silt and soils quickly became salinized. Under these conditions, many of the large plantations went bankrupt.

Although many lost their land during this time, many others became rich. As many traditional farmers faltered in the newly emerged cotton market, many local farmers succeeded. As these farmers succeeded, they continued to buy more and more land. This led to a shift in the size of farms, and these farms were worked by sharecroppers.

Concentration of land and power did happen as the region took on a market economy, but reports of the concentration of land and the gross inequities in landholdings have certainly been exaggerated by the Soviets. The Soviets were interested in showing a class discrepancy between a wealthy land owning elite and the landless laborers.

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through religion and blood. This served to make the ‘Turks’ a more united people for the Russians to contend with. Holdsworth, *Turkestan in the Nineteenth Century*, 29.

237 Ibid., 14.

238 Ibid.

Thurman sums up Soviet representation of the inequities in landholding by saying the Soviets' motives in presenting the inequity, unlike their evidence, was clear.  

Nevertheless, sharecropping did become a feature in Central Asia in the late nineteenth and early twentieth century. Although there were many variations to sharecropping, the crop was always divided based upon who supplied what: land, water, seed, draught animals, and labor. A common sharecropping scenario entailed the landowner supplying animals, seed, and food. The land owner then retained between three-fourths and four-fifths of the harvest. It was also during this time that *shirkats* (collective societies) began to emerge. These consisted of a group of households sharing draught animals and feeding themselves. These collective societies would then work the land as sharecroppers, only receiving land, water, and seed from the land owner. The *shirkats* would then retain one-half of the harvest.  

**Changes to Tenure under the Bolsheviks**

After the October Revolution, Central Asia fell under the control of the Turkistan Autonomous Soviet Socialist Republic.  

At this time, Turkistan was in the midst of a famine. The agricultural sector, which had shifted to cotton production under the tsar, was no longer able to feed the local population. Central Asia was reliant on wheat imports from the north, which during the revolution had stopped. At the same time, the  

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Soviets were battling with the local *Basmachi* forces who rejected the Soviets as rulers of Turkistan. The revolution, combined with the local conflicts, served to devastate the region’s economy.

In an attempt to create a class warfare that would benefit the Bolsheviks, the Tashkent government nationalized all lands in 1918. The Bolsheviks had nationalized lands elsewhere in the Republic, and these efforts were met with the peasants taking over the land from powerful landowners. This did not happen in Turkistan. The Soviets, it seems, had failed to appreciate the social and spiritual bonds created by Islam in the region. According to Park, the religious, communal, and economic ties between the landholders and the peasants prevented them from seizing the newly nationalized lands. The reasons that the peasants failed to act as the Bolsheviks hoped they would are complex, but at the heart of the matter lays the impact of Islam and sacred law. In Turkistan, where *Shari'a* dictated social organization, to take what was not yours was not only socially forbidden but was a mandate from God. Thus, seizing land that was not yours was a sin to the Muslim peasants. This led to Europeans, and not the local population, seizing most of the land in Central Asia after the revolution.

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243 The *Basmachis* were fighting for the right to retain private property and the preservation of *Shari'a*. The fact that the *Basmachis* were fighting for the preservation of private property, here *mi'lu'k* lands, highlights the inaccuracy of the Russians who thirty years prior to the *Basmachi* uprising claimed private property did not exist under the khans. For more detail see Ludmila Polonskaya and Alexei Malashenko, *Islam in Central Asia* (Reading, U.K.: Ithaca Press, 1994).

244 Thurman, *The "Command-Administrative System" in Cotton Farming in Uzbekistan 1920s to Present*, 3.


246 Ibid., 321.


The Bolsheviks, in order to both rid Central Asia of the large landholders that
developed with the introduction of cotton to the region and to maximize their control over
the farmers, wanted to "atomize" the rural units of land. The Bolsheviks wanted to
break up all large land holdings. By doing so, they would disenfranchise the elites of the
region, and would also set the rural villages up to be quickly converted into the
collectivized farms that the Soviets believed would lead to increased agricultural
productivity.

The Soviets began to realize that control of the region—both politically and
economically—was not possible so long as the historical social ties of Islam and tenure
under the khanates remained. Land reform could only happen after the Bolsheviks drove
wedges among the peasants, mullahs and begs, and after the lateral ties among farmers,
the villages, and the tribes were broken. In 1922, all vaqfs were to be at the disposition
of the rural peasants and regulated by Soviet agrarian law. The hope was to
undermine the financial support of Islam in the region, as well as pit the peasants against
the religious elite supported by the land trusts. At the same time, the Soviets also
dissolved all miul'k holdings. The intent was to slowly undermine the traditional
tenure system.

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250 Thurman, The "Command-Administrative System" in Cotton Farming in Uzbekistan 1920s to
Present, 10.


In 1925, the Central Asian Bureau of the Central Committee of the Russian Communist Party adopted a decision to confiscate all land, cattle, and agricultural implements. The goal was then to redistribute them to the peasants. Again, the peasants did not cooperate, refusing to take property that was not theirs. So instead, the Bolshevists initiated land reform in stages. The Bolshevists required all landholdings greater than seven hectares of irrigated land to be confiscated. The Bolshevists used educational programs to try to create favor for land seizures in the villages. They also relied upon the secret police and the koschi, a Bolshevik organization that oversaw the interests of local farmers, to use intimidation and coercion on any and all peasants who did not actively support the seizure of lands by the state. As a final blow for Islam in the region, in 1928 the religious courts and schools of Turkistan were officially closed.

The intent of seizing the land was to increase the state’s power and control over the region. Whereas cotton cultivation was encouraged under the tsar through economic incentives, under the Bolshevists it was coerced through administrative control. The traditional system based upon Shari’a and odat, which saw the common good as the intent of land tenure, was replaced by a land-tenure system inspired by political control and an interest in cotton production. The ultimate result of the land reform was the state owning all land and water rights, and the land ultimately being worked by either state

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257 Ibid., 330.

farms or kolhozes—collective farms. These farms were huge operations, normally consisting of 3000 hectares that were worked by 1000 farmers. Collective farms were producer cooperatives. The farm was assigned land in perpetuity, and then instructed what to grow. The farm then sold its output to the state. State farms were worked by workers who received a wage. These farms were directed and operated by the goals of the state, and the farmers received a wage for their efforts. The water was completely controlled by the state, and use of water was not charged.

In addition to these large farms were quasi-private household plots of land. These plots were worked by the family, and were private in the sense that the family was free to choose the crops planted and to work the land themselves. Although these lands were only about three percent of all arable land, they accounted for up to twenty-five percent of the total agricultural output. The farmers had lost all their rights and privileges they had under the traditional tenure system, as well as the social network that connected the workers to the land and to one another. The operation and management of these farms will be discussed in the following chapters.

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261 Ibid.: 119.

Land Tenure since Independence

Radical transformations of land tenure are rare, and Uzbekistan has experienced such changes twice in the twentieth century—first with the October revolution, and then with the collapse of the Soviet state. The former Soviet states other than Uzbekistan have reacted in a variety of ways in terms of reform since 1991, many in a not-so-cautious manner. States like Slovenia and Bulgaria have returned land to the owners of the land prior to the revolution. Equally aggressive in pursuing reform, Albania and Armenia have completely dismantled the land-tenure system of the Soviet era. More moderately, Russia and the Ukraine legalized private land to exist simultaneously with state ownership. Kazakhstan, Uzbekistan’s neighbor to the north, now recognizes the private ownership of household plots. The GOU, on the other hand, has started down a path of reform best described as “step by step.”

The GOU’s constitution, adopted in 1992, retained Soviet land policy in that all land remains under state control. Although private land exists in theory in Uzbekistan, the right to buy or sell land is forbidden. This decision was rationalized by the state for two reasons. The first was that the state wanted to avoid speculation on the land, and the

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266 Bloch, Agrarian Reform in Uzbekistan and Other Central Asian Countries, 5.


268 Bloch, Agrarian Reform in Uzbekistan and Other Central Asian Countries, 8.
land accumulating in the hands of the powerful. The second reason, offered by Karimov himself, is that land in Uzbekistan is useless without water, and the water is a national resource managed and delivered by the state. One other reason, though not offered by the state, is that by continuing to control the land, the state retains power over the peasants. Much as the Soviets wanted to completely control the land in order to facilitate the production of cotton, the same thing can safely be assumed of the GOU.

Despite the lack of private land, the right to land has slowly changed during the time of the GOU. The primary land-tenure system of the Soviets has been transformed into four forms of land rights: shareholding, the lease, the private farm, and the garden plot. The sovkhozes—state farms—of the Soviet era have been phased out by the GOU, with most converted into kolkhozes. This transformation is clearly represented by the increase in number of kolkhozes during Uzbekistan’s first five years of independence. In 1991, Uzbekistan had 971 kolkhozes and 1137 sovkhozes. By 1996, Uzbekistan had 1374 kolkhozes and only fifty-five sovkhozes. The kolkhozes, however, in an attempt to give more incentive to the farmers to improve efficiency, have been transformed. Most kolkhozes are operated by either shareholders or a shirkat. In the shareholding system, shares are distributed to the workers of the farm. The workers are expected to pay for these shares when they have the means to. Profits are then distributed to the shareholders based upon how many shares they hold. Unfortunately, shareholders often feel that

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271 Bloch, Agrarian Reform in Uzbekistan and Other Central Asian Countries, 6.
shares are worthless pieces of paper, and that the operations and management are the same under the shareholder system as they were under the traditional kolhoz.\textsuperscript{272}

The \textit{shirkat} is a lease system, where the chairman of the \textit{kolhoz} leases land to the members. Normally, these leases are one to five hectares in size, and vary in length of time. Eckert and Elwert connect the longer the lease to the greater the investment made by the farmers to improve operations.\textsuperscript{273} It is unclear, though, how much this statement is based upon observation and how much upon theory.

Private holdings consist of farm enterprises and the traditional household plot.\textsuperscript{274} The farm enterprises consist of individuals holding land in leases of between ten and fifty years that used to belong to \textit{kolhozes}. These leases normally consist of lands between three and five hectares.\textsuperscript{275} The land itself is free, but the farmer must pay for water.\textsuperscript{276} Although these farmers are free to control operations and management as they see fit, they are still reliant upon the \textit{kolhozes} for their water, machinery, and inputs. To the detriment of the success of the private farms, water goes first to the collective farms, and then to the private farms. With water shortages common, this arrangement limits the success of private farms.\textsuperscript{277} One more thing worth noting is that private farms are allotted, in theory, to those who can prove that they are capable of running a private farm.

\begin{footnotesize}
\begin{enumerate}
\item[\textsuperscript{272}] Eckert and Elwert, \textit{Land Tenure in Uzbekistan}, 20.
\item[\textsuperscript{273}] Ibid., 20-1.
\item[\textsuperscript{274}] Bloch, \textit{Agrarian Reform in Uzbekistan and Other Central Asian Countries}, 9.
\item[\textsuperscript{275}] Ibid.
\item[\textsuperscript{276}] Ibid.
\item[\textsuperscript{277}] Eckert and Elwert, \textit{Land Tenure in Uzbekistan}, 17.
\item[\textsuperscript{278}] Bloch, \textit{Agrarian Reform in Uzbekistan and Other Central Asian Countries}, 9.
\end{enumerate}
\end{footnotesize}
But since the farms are allocated by the authorities of the *kolhoz* and local government, cronyism plays a large part in who gets land and who does not.\textsuperscript{278}

The traditional household plot continues to play a major role in agriculture. Each family is entitled to a personal plot of land to work. In 1992, rural dwellers were allotted a quarter hectare of irrigated land for personal use. In 1997, these lands accounted for fifteen percent of all arable land, up from three percent during Soviet rule.\textsuperscript{279} Most of these holdings produce more than is needed by the family, and the excess is sold in the local markets.\textsuperscript{280} These holdings are thought of as quasi-private holdings where the family is free to operate them as they see fit, but the land cannot be sold, and the family must rely upon the state for water.

Despite the move toward more private holdings of land, the state still controls water, and thus holds power over the land. The recent move to WUAs is a way to help put more power in the hands of the farmers, but so long as crop prices are set by the state, the substance of the land reform remains limited.

**Conclusion**

Unfortunately, there is no firm and definitive understanding of the land-tenure system under the khanates prior to the arrival of the Russians. Even a full understanding

\textsuperscript{278} Ibid., 10.

\textsuperscript{279} Ibid., 11.

\textsuperscript{280} Lerman, Garcia-Garcia, and Wichelns, "Land and Water Policies in Uzbekistan," 148.
of land tenure during Russian rule eludes us. The lack of a native record, combined with foreigners’ limited exposure to the region, leaves us with only a partial view of the distribution of land and water. Nevertheless, some interesting and important patterns do emerge. Under the khanates, private property, in the sense that farmers had the ability to work the land and sell it if they saw fit, did exist. The ability of the peasant farmer to hold private land helped keep farmers invested in the operation of their farms, as well as the health of the land and quality of the water. The Central Asian farmers of the nineteenth century were not simple tenants without a vested interest in the land’s health and productivity.

At the same time, Islam, which largely shaped not only the tenure system but also was the main social regulator in the khanates, fostered a culture of water rights for all. One way it did this was to limit farmers from practices that negatively restricted one’s peers from their rights to land and water. *Shari‘a*, and its role in shaping how the farmers viewed one another and their rights, was sadly misunderstood by the Russians. They saw limits to what the peasant farmer was allowed to do on his land as limitations to their private property. It must be remembered that Russians were colonialists and saw the land as a commodity to be exploited. Thus, they viewed limitations with a very narrow frame of reference. As such, the extent to which such limitations operated to keep the water and land available for the good of all was not considered.

Although the land was not communal under the khanates, the property rights did instill a sense of not only entitlement to one’s own land, but also the land of the others. In this, Islam served to use social capital to help manage, operate, and maintain the irrigation system and the agricultural economy that it supported. The management of the
irrigation system, and the khanates as a whole, cannot be appreciated outside of the scope of Islam, and thus religion will continue to be a focus in the next chapter.

*Shar'i'a,* and the concept of the land being held for the common good, served to ensure that water was available to all, as was land. In this, land as property not only existed in the khanates, but existed in terms of a social relationship between the people who worked the land. The land held value to and for the farmers, and they had reason to try to maintain this value through investment and respect for each other.

Although the Russians never deliberately set out to overhaul traditional land tenure, through their attempts to convert the region into a cotton producing one, they did, in fact, completely change how land was viewed and owned (not to say anything about how it was worked). The fragility of the traditional tenure system should not be forgotten, nor its impact upon the health of agriculture and the life of the peasants. Subsidies, tariffs, and usury managed to dispossess farmers of their lands, making them landless laborers. The market economy effectively destroyed the long-evolved connections and rights of the farmers to land. At the same time, the very lands that they lost were not succeeding as cotton plantations.

Where the Russians feared to deliberately interfere with tenure, the Soviets did not. They calculatingly set about to ‘reform’ land tenure. The goals of this reform are questionable and much debated. Regardless, it is important to remember how difficult it was for them to get the peasants to act as the Bolsheviks wanted them to. Islam served as a major obstacle between the intent of the Bolsheviks and the local peasants. Land was not seized by the peasants as the Bolsheviks had hoped, even though the tradition of the
small, private farmer had already been banished from the landscape by the Russians. The farmers still felt that taking what did not belong to one was wrong, and “reform” only happened through much coercion, intimidation, and re-education programs. As the GOU and the international community set about to reform the land yet again, it is important that they heed the history lesson of the Bolsheviks in their efforts to do so.

The Bolsheviks, however, did succeed in their efforts to “reform” land. Water and land both became state property, and farmers became workers on large, collective farms. In this reform, the farmers became separated from the land, and lost their connection to the land and water, as both were distributed in relation to the state’s interest in the good of all. Although similar to the rhetoric that describes land under the khanates, the effects were vastly different.

Currently, as the GOU continues to engineer land reform, it is important that the needs and interests of the farmers themselves be considered, and not simply assumed. Under the Bolsheviks, land was reformed to save the peasants from their patriarchal, feudalistic system. Never mind that the farmers had little interest in such reform. Now, as the state continues down the path of reform, it is important that the farmers are brought into the discussion and not merely seen as a means (or hindrance) to successful reform.
CHAPTER FOUR

CHANGES AND PERCEPTIONS TO THE MANAGEMENT
OF WATER IN UZBEKISTAN

The Aral Sea crisis is thought of as a water-shortage issue. Although technically correct, thinking of Uzbekistan and the Aral Sea Basin as being water scarce is misleading. Water scarcity is normally defined as when more than two thousand people are sharing one million cubic meters of water. Yet Uzbekistan, the country with the worst human to water ratio in Central Asia, has only 192 people per one million cubic meters of water. This distinction exemplifies the role that human agency has played in causing the current situation in the basin. Thus the current desiccation of the basin and problems in the agricultural sector need to be understood as being anthropogenic in origin. From such a vantage, it is important that the organization and management of the irrigation system be considered. L. M. Cantor sums up the role humans play in an irrigation system best when he said an irrigation system must be understood and examined not only as a technical achievement, but also as an expression of "human organization and its adaptation to the physical environment."

Unfortunately, historians and Soviet scholars have not given much credit to the human organization of the water-management system or the leadership of the khans. Instead, the traditional organization of water management has simply been viewed as

281 Wegerich, "Water: The Difficult Path to a Sustainable Future for Central Asia," 256.
282 Ibid.
despotic, inefficient, and backwards. There is a poor view of the native governments in the region is typified by William Curtis when he wrote the restless natives of Bukhara were "a great deal better off under the broad, tolerant policy of Russia than they [were] under the non-progressive, narrow, and corrupt rule of the native khans." There are two main reasons for the disparaging view of water management in Central Asia. First, the colonials viewed the local traditions and knowledge of the region as being poor, barbaric, and crude. Colonial arrogance was exacerbated by political interests when the Soviets took power. Similar to what was seen with regard to land tenure, Soviet policy was to downplay any and all achievements of the Central Asians prior to the revolution. The Soviets never recorded or acknowledged the positive aspects of water management. At the same time, what the Soviets did acknowledge, they tried to cast in the most negative light possible to facilitate the goals of the Bolshevik Revolution. This involved describing the khans as despots, and the Soviets, themselves, as liberators. As the Soviets saw it, they swooped in and saved the local population from the inefficient and cruel rulers of the land.

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288 Never mind that the efforts to save the local population were never met with any efforts on the Central Asians part. This was clearly seen in the last chapter's description of the Bolshevik land "reform" that repeatedly failed as the farmers were not as interested in shaking off the shackles of the "feudal" patriarchy as the Bolsheviks had hoped.
Unfortunately, during much of the twentieth century European and American attempts to appraise water management in Central Asia were largely shaped by Wittfogel's controversial, and now dated, theory of the hydraulic society. As an historian, Wittfogel noticed that arid landscapes led to the development of large, centralized states. In this linear pattern, Wittfogel noticed a nexus between irrigation, centralization, and despotism. This observation led to the hypothesis that as irrigation technologies increase and their systems expand, they require strong and centralized operations. The hydraulic theory states that in arid environments, such as Central Asia, irrigation is limited by the organization of labor, and whoever manages to control the labor and thus water will have complete control of the region. Hence, centralized control in arid regions produces totalitarian regimes that operate through a bureaucracy of secular and religious specialists. Although the hydraulic theory has been attacked for its simplistic and linear conclusions between the development of irrigation systems and a totalitarian state, its impact remains in the assumptions and attitudes of scholars toward water management in the region.

The Soviet bias combined with Wittfogel's legacy has limited understandings of the nature of water management in the khanates. Rivaling the controversy over the

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291 Hunt and Hunt, "Irrigation, Conflict, and Politics," 129.

nature and extent of property rights seen in chapter three, the general and unfortunately unfair assumption is that the pre-Soviet khanates were indeed despotic, hydraulic societies.²⁹³ Soviet and Western historians alike have contended that operations, maintenance, and distribution of water were accomplished by the khan’s total and “despotic” power.²⁹⁴ From such a view, there was no social capital involved in the successful operation of the irrigation system. Instead, water management and the economy survived only through the totalitarian control of the khans, all at the expense of the farmers. More recent studies,²⁹⁵ however, have suggested that water management in the khanates was a clever and intricate system that allowed for the successful operation of the systems.²⁹⁶

In order to more fully understand the irrigation systems of Central Asia, this chapter examines the management of the systems, as well as the structure and nature of the governments at that time. Following this, the subsequent changes that took place under the Russians and Soviets are also explored. The hope is to break free from the Soviet and Wittfogel-inspired understandings of the khanates in regards to irrigation, and to offer a more accurate understanding of how the irrigation systems were managed.


²⁹⁵ For example, Ibid; Wegerich, Institutional Change in Water Management at the Local and Provincial Levels in Uzbekistan.

²⁹⁶ Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 44.
The Administration and Power of the Khan

To better frame the nature and power of the water management system, it is necessary to look at the administration of the khanates themselves. Whereas the land tenure was more distinctly Arabic, the administration of Transoxiana was Perso-Arabic in nature. The system traces back to the eighth century Abbasid Caliphate, but was altered by Persia’s control of the region after the Arabs. Each khanate was run by the khan. Traditionally, the khan was elected, a part of the Uzbeks’ nomadic legacy, but by the nineteenth century this tradition had disappeared. The khan served as the supreme secular and religious leader. As with most Islamic states, the separation between the secular and the sacred was minimal, and thus not only did the khan represent the people’s as well as Allah’s interest, but the very structure of the state was intertwined with religious authority. This was clearly seen by the majority of government posts being held by ulamas—well educated religious scholars.

Because they ruled as both a secular and religious leader, the khans are normally viewed as despots who were responsible to no one. Although the khan was an autocratic leader, he did not rule with an all-powerful hand. Islam as well as odat

298 Bacon, Central Asians under Russian Rule: A Study in Culture Change, 74.
299 Polonskaya and Malashenko, Islam in Central Asia, 29.
300 Ibid.
301 Bacon, Central Asians under Russian Rule: A Study in Culture Change, 74.
302 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 43.
(customs) served to check the powers of the khan. Shari'a was divine and beyond question. Although this served to give the khan a seemingly unquestionable reign over his domain, sacred law also instilled prescriptions to his duties and powers as head of the state. Just as Shari'a served to limit the rights of individuals for the social organism, it also served to ensure that the khan acted with the best interests of the community. In this, Islam created a trust between the khan and the people. The people would trust the khan and the khan would trust in Allah's wisdom. Through religion, the Uzbeks related to the leader with a reciprocal set of obligations. Edward Allworth offers the following quote from Al-Ghazali as an example of how Islamic prescriptions limited the powers of the khan: “One day of just rule by an equitable Sultan is more meritorious than sixty (or seventy) years of continual worship.”

In addition to the limits instilled by Islam, Allworth considered the khan to be a totalitarian ruler whose powers were ameliorated by traditional qualities. Traditionally, the khan served as a ruler-scholar to his people. In this, the khan was expected not only to be learned in the ways of Allah, but to also be learned in the oral and written traditions of strong leadership. Leaders such as Alexander, Anushrman, and Amir Temur shaped the way the khan understood his power. From these leaders,

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304 d'Encausse, Islam and the Russian Empire, 18.
305 Gibb, Mohammedanism: An Historical Survey, 68.
306 Chylinski, "Islam in Soviet Central Asia: Ethnicity and Religion," 44.
308 Ibid., 13.
traditional codes and princely values set prescriptions and morals to guide leadership. At
the heart of these values were justice and fairness as exemplified in the following quote
attributed to the most famous of all Uzbek leaders, Amir Temur: "It is necessary to the
king that he adheres to justice in all his actions."\textsuperscript{309}

Despite the ameliorating influence of both Islam and odat, the khans still retained
strong control over their domains. The leader of Kokand, for instance, was described as a
complete tyrant whose ability to hold on to power was only possible through the presence
of Russian troops.\textsuperscript{310} When discussing the power and rule of the khans, it is important to
acknowledge that this was a time of flux and change in the region. So just as traditional
qualities in the region such as the economy were changing, so too might have the use of
power by the khans. Still, the traditional view of the khans as despots without
mentioning the role of religion, customs and obligations needs to be questioned, as does
the overall view of the khanates as being highly centralized operations under the khan’s
control. As will be seen later in this chapter, the khanates were large territories through
which communications and authority traveled slowly. Thus the khanates were not as
centralized and despotic as often assumed. This will be seen in descriptions of the
fractured nature of the tax system, and the authority of the local provincial leaders and
water managers.

\textsuperscript{309} Ibid., 24.

\textsuperscript{310} Eugene Schuyler, Turkistan: Notes of a Journey in Russian Turkistan, Khokand, Bukhara and
Hierarchy of the Administration

With water being held in trust by the khan, water management was officially part of the khan's administration. The government in the khanates was a mix between a representative, democratic system where power flowed in an upward direction, and a totalitarian system where power was seated in the khan and used to run the state.\textsuperscript{311} Centralization was built upon a system to regulate and deliver taxes from the farmers to the khan.\textsuperscript{312} In return, the khan ensured the health of the land and water, as well as supply protection from attacks. This system was extremely hierarchal in nature with the khan, of course sitting at the top.

The khan served as the supreme leader of the state, but his actual involvement in the day to day operations appears to have been limited. Under the khan was the \textit{qush-begi} (chief minister), who was in charge of overseeing the operations of the state.\textsuperscript{313} The khanates were divided into regions, \textit{viloyats}, and run by the \textit{hakim}. When a new \textit{viloyat} was captured, the khan always appointed a new \textit{viloyat} who would ensure that his interests and authority were respected.\textsuperscript{314} How much authority and independence the \textit{hakims} had is not clear. According to d'Encausse, the amount of autonomy in the \textit{viloyats} was inversely related to the region's distance from the khan.\textsuperscript{315} For instance, the

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\textsuperscript{311} d'Encausse, \textit{Islam and the Russian Empire}, 26.
\textsuperscript{312} Holdsworth, \textit{Turkestan in the Nineteenth Century}, 9.
\textsuperscript{313} Becker, \textit{Russia's Protectorates in Central Asia: Bukhara and Khiva, 1865-1924}, 7.
\textsuperscript{314} Holdsworth, \textit{Turkestan in the Nineteenth Century}, 4.
\textsuperscript{315} d'Encausse, \textit{Islam and the Russian Empire}, 9.
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smallest of all the khanates was Khiva, and accordingly, Khiva was the most centralized of the khanates with the viloyats having little autonomy.\textsuperscript{316} Interestingly, Mary Holdsworth asserts that many viloyats—that she offers Shahribsabz as an example—were added to Bukhara without being fully implemented. Such viloyats did not regularly contribute either taxes or troops to the khanate, but would instead occasionally give gifts to the khan. She goes on to suggest that the khan would send clergy to such peripheral viloyats to make capital out of the religious pre-eminence of Bukhara.\textsuperscript{317}

\textit{Viloyats} were then divided into tumens. In Kokand, tumens were also called begliks, but the difference between the two appears to have been in name only name.\textsuperscript{318} The tumens were run by a beg who was appointed by the khan.\textsuperscript{319} The begs were chosen from the local ruling family to help ensure the assuagement of the people.\textsuperscript{320} The beg had to contribute troops to the khan’s army as well as ensure the collection and delivery of taxes to the khan.\textsuperscript{321} In this sense, the beg served as the chief tax collector for the tumen, and was responsible for the tax money reaching the hakim. The independence of the tumens is not clearly understood, but as with the viloyats themselves, it appears the further from the khan, the more independent the beg. O. Olufsen, however, makes a much stronger statement about the independence of the beg. He purports that the begs

\begin{footnotesize}
\begin{enumerate}
\item Wheeler, \textit{The Modern History of Soviet Central Asia}, 45.
\item Holdsworth, \textit{Turkestan in the Nineteenth Century}, 4.
\item Ibid., 9.
\item Becker, \textit{Russia’s Protectorates in Central Asia: Bukhara and Khiva}, 1865-1924, 9.
\item Holdsworth, \textit{Turkestan in the Nineteenth Century}, 9.
\end{enumerate}
\end{footnotesize}
were allowed to operate independently so long as the taxes were collected and reached the khan.\textsuperscript{322}

The \textit{tumens} were then divided into \textit{amlakdarstvas}. These areas served simultaneously as tax collecting and water administrative districts.\textsuperscript{323} The \textit{amlakdarstva} was headed by the \textit{amlakdar} who was appointed by the \textit{beg}. The \textit{amlakdar} was in charge of the actual collecting of taxes, and then delivering the money to the \textit{beg}. \textit{Amlakdarstvas} were then divided into \textit{qishlaqs} (villages). \textit{Qishlaqs} were directed by an elected elder called the \textit{aqsaqal}.\textsuperscript{324} Villages were normally grouped together and headed by a \textit{min-boshi}.\textsuperscript{325} The collection of villages often served as the mouth piece for the individual \textit{aqsaqals}, who in turned represented the villagers.\textsuperscript{326}

This administrative hierarchy was similar in all three khanates. The only real deviation from this structure was in Khiva, which was much more centralized and regimented than the other two khanates. Seymour Becker contends that the size of the khanate was the main variable in the amount of centralization.\textsuperscript{327} Khiva, the smallest of the three khanates, was the most centralized. Although it is worth pointing out that Khiva was different than the other khanates in terms of the large amount of gift lands, \textit{tankvah}, given. Geoffrey Wheeler suggests that nearly half of all lands in the khanate were given

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\textsuperscript{322} Olufsen, \textit{The Emir of Bokhara and His Country}, 488.

\textsuperscript{323} Holdsworth, \textit{Turkestan in the Nineteenth Century}, 9.

\textsuperscript{324} Becker, \textit{Russia's Protectorates in Central Asia: Bukhara and Khiva, 1865-1924}, 9.

\textsuperscript{325} d'Encausse, \textit{Islam and the Russian Empire}, 26.

\textsuperscript{326} Holdsworth, \textit{Turkestan in the Nineteenth Century}, 9.

\textsuperscript{327} Becker, \textit{Russia's Protectorates in Central Asia: Bukhara and Khiva, 1865-1924}, 10.
\end{flushright}
as gifts to the begs.\textsuperscript{328} The large portion of the lands remaining directly in the control of the begs served both to increase the begs' power and to win their loyalty to the khan. Bukhara, although the largest of the khanates, was considered a more centralized state than Kokand.\textsuperscript{329} This can be attributed to the khan of Bukhara, Nasrullah, making great strides to increase institutional cohesion in the nineteenth century.

Although differences and discrepancies to the structure of the khanates exist, some clear patterns can be seen. The khan did not have total control or authority over the hakims or begs. To the contrary, it seems in many places that the khan’s influence was subservient to provincial authority. It appears that these provincial officials were left to act as they pleased so long as the flow of money and troops to the capital continued. In this, provincial power controlled much of the operations of the state. The structure of the government was based upon the collection and delivery of taxes. Thus in order to more fully comprehend not only the administration but also the land tenure and the farmers’ interests in the successful operation of irrigated agriculture in the khanates, the next section briefly reviews taxes in the khanates.

\textbf{Land and Water Taxes in the Khanates}

Taxes in the khanates consisted of two main types: the zekat, a tax on trade, and taxes deriving from the use of land and water. The traditional land-tenure system of

\textsuperscript{328} Wheeler, \textit{The Modern History of Soviet Central Asia}, 46.

\textsuperscript{329} Holdsworth, \textit{Turkestan in the Nineteenth Century}, 3.
Transoxiana offered a mechanism for the taxing of agriculture. Lands and water were held in trust by the khan, who then "leased" the lands to the farmers. In return, the farmers paid taxes on the land and water and performed labor on the irrigation system in return. Taxes were levied based upon the amount of water used and the size of the harvest. With the bulk of the state's wealth deriving from these taxes, the khan was interested and invested in the holding and use of the lands by the farmers. This interest is clearly seen by the entire structure and centralization of the state being based upon the collection of taxes. At the same time, by connecting taxes to the use of land and water, the traditional system—contrary to the view of the taxes solely being a burden to the farmers—served to increase efficiency, as the farmers felt invested to minimize their use of inputs.

Of the land taxes, there were two kinds: the haradj and the tanap. The haradj tax was a proportional tax on the yield of the harvest. According to Michael Thurman, the proportional tax system was used because of the varying levels of soil and water quality to which the different farmers had access. There is much confusion over what this proportion was. Part of this confusion derives from the lack of a clear understanding of the land tenure system. Some historians suggest that the ratio of the haradj depended on what type of miul'k land the harvest was coming from, khiraj or ushri (lands held by non-believers) with the ratio being higher on the ushri holdings. Schuyler, however,

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330 Ibid., 9.
332 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 40.
333 d'Encausse, Islam and the Russian Empire; Matley, "Agricultural Development."
contends that all miuł'k lands in Turkistan were ushri holdings, as the conquerors never retained property in the region. Regardless, harvests were taxed between one-tenth and one-half.\textsuperscript{334} Although the confusion over the different types of land holdings in the region partially explains the discrepancy in the ratios of the proportional land tax, the level of provincial authority and regional differences also serve to explain the varying figures.

The taxes for all lands were not, however, based upon a proportion of the harvest. On lands where it was difficult or inappropriate to estimate a harvest—such as orchards, meadows and gardens—a mudazer (fixed tax) was levied.\textsuperscript{335} This fixed tax was based upon the amount of land, the tanap, and was often simply referred to as the tanap tax. The tanap varied in size across Central Asia from between two-fifths and one and one-quarter of an acre.\textsuperscript{336} Schuyler contends that the tanap tax varied from forty kopeks to three rubles and sixty kopeks per tanap.\textsuperscript{337} Thurman claims that the exact rate of the

\begin{footnotesize}
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\item Holdsworth puts the ratio between \(1/5\textsuperscript{th}\) and \(1/10\textsuperscript{th}\) of the crop. Matley indicated that the tax on ushri holdings was between \(1/7\textsuperscript{th}\) and \(1/3\textsuperscript{rd}\) of the crop, and \(1/10\textsuperscript{th}\) on khiraj holdings. Helene Carere d’Encausse distinguishes between the tax on harvests in irrigated (\(1/10\textsuperscript{th}\)) and unirrigated lands (\(1/6\textsuperscript{th}\)). Pierce puts the ratio between \(1/10\textsuperscript{th}\) and \(1/4\textsuperscript{th}\). Curtis calculated the proportional land tax to be \(1/3\textsuperscript{rd}\) of the harvest. Schuyler indicates that the proportional land tax in Bukhara was nominally \(1/5\textsuperscript{th}\) of the harvest, but reduced to \(1/10\textsuperscript{th}\) in the latter part of the nineteenth century in order to help the farmers adjust to changes in the region under the Russians. Curtis, Turkestan: “the Heart of Asia”, 122; d’Encausse, Islam and the Russian Empire, 30; Holdsworth, Turkestan in the Nineteenth Century, 9; Matley, “Agricultural Development,” 278; Pierce, Russian Central Asia 1867-1917: A Study in Colonial Life, 145; Schuyler, Turkestan: Notes of a Journey in Russian Turkistan, Khokand, Bukhara and Kuldja Vol. I, 303.
\item Matley, “Agricultural Development,” 278.
\end{enumerate}
\end{footnotesize}
*tanap* tax depended upon the type of land and what was grown on it, with orchards and vineyards taxed the highest and cotton and alfalfa taxed the lowest.\(^{338}\)

In addition to the land tax, farmers paid taxes and contributed labor based upon the amount of water that they used. The tax was called the *kosh pul*. In theory, it was supposed to be used solely for financing the construction and maintenance of canals, but Schuyler suggests that the money also began to be used for other purposes during the nineteenth century.\(^{339}\) Estimates\(^{340}\) were made on how much water a farmer used, and taxes were then accordingly levied.\(^{341}\) Not only were farmers expected to contribute financially to the irrigation system, they were also expected to perform upkeep and maintenance on the irrigation system in order to gain access to water. Many considered the corvée to be forced labor.\(^{342}\) Viewing the need to perform upkeep on the system as forced labor, however, misses the connection between the right to water and the contribution to the upkeep of the system. The annual corvée produced exclusivity to the rights of water, in that only those who helped maintain the system could receive benefits from it. Considering such an arrangement as forced labor is not only unfair to the organization of the irrigation system and water rights in the khanates, it undermines the strengths of the common property system put in place by the khans.


\(^{340}\) With water being taxed and equitable distribution of water expected, how water was measured and use estimated is an important subject. This will be covered in depth in the next chapter.

\(^{341}\) Williams, "Water Law in Czarist Central Asia," 40.

The above taxes, as well as the corvée, were prescribed by the khan. The structure of the state was set up to ensure that taxes were collected and delivered to the khan. Schuyler describes the collection of taxes for Bukhara as follows: The *amaklakdar* were *serkers*. These were the officers who collected the taxes. Under the *serkers* were scribes and land measurers who inspected fields during the summer and collected the *haradj* on the threshing floor come the harvest. The tax collectors were paid directly from the taxes collected. Schuyler estimates that about one-tenth of all taxes collected were used to pay for the tax collecting process. The taxes then flowed from the *serkers* to the *amaklakdar* to the *beg* to the *hakim*, and finally reached the khan.343

Developed over many centuries, this system of taxing harvests and water use was well adapted for the soils and conditions of Transoxiana. Taxes on the harvests encouraged the farmers to make the most of the land that they had. At the same time, taxing water use encouraged the farmers to maximize the efficiency of the water that they used, and tying water rights to the corvée created a sense of exclusivity. With the distribution of water linked to responsibilities, the farmers were invested to use the water appropriately, and in this the taxes helped ensure that the resource was successfully managed. One other thing about the traditional tax system is that, according to Thurman, the farmers understood the system, knew what was expected from them, and knew how they could behave so as to conserve and maximize the use of inputs such as water.344

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This is not to say that the tax system did not have its weaknesses. Owing to the provincial authority, it appears that taxes could be raised and lowered as the officials saw fit. Also, corruption was rampant. Schuyler states that bribery was common, with the rich able to bribe officials to avoid paying taxes—and this says nothing of the fictional vaqfs chartered as a way to avoid paying taxes. This corruption led to the taxes being collected by village authorities under the Russians, which led to an improvement. In this particular example, it is clear how the village, with its network of connections and trust, permitted a more just collection of taxes. Balancing these abuses of the tax system was the tradition of lessening or forgiving taxes during bad spells. Abu Bakr Muhammad ibn Ja'far Narshakhi wrote that taxes were not collected from lands that were either inundated or ruined by water. This traditional practice in the region continued into the nineteenth century. Mordvinov recounts how farmers who experienced total crop failure were excused from taxes, while those who suffered from poor yields were taxed at a lower rate.

Water Management in the Khanates

As discussed in the previous chapter, the farmers were able to possess land and work it, but under Shari'a water was considered to be God's gift and could not be owned

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347 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 40.
or controlled by a private individual. Water was instead under the dominion of the khan, who held the water in trust for the people. The khan had the final say on how water was managed and distributed, and served as the final decision maker in all disputes and conflicts. Despite this power, the khan was largely not involved with the normal operations and maintenance of water. This was handled by a special branch of the state. For instance, Bukhara had a secretary for the Irrigation Department.\footnote{Olufsen, \textit{The Emir of Bokhara and His Country}, 491.} It should be noted, however, that owing to the arid landscape and necessity of irrigation for agricultural production, the khan had an incentive to make sure that the irrigation system operated in a fair and effective manner in order to ensure a bountiful harvest and the subsequent payment of taxes. At the same time, as discussed earlier in this chapter, the khan did not have a "boundless tyranny," and thus he had to reconcile his interests in receiving taxes from the harvests with those of the farmers.\footnote{Thurman, \textit{Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present}, 44.} This was accomplished through the clever management of water, which ensured the rights of the collective good without sacrificing individual involvement in the process.

The management of water resources for the collective good was not merely an empty expression in the khanates. Tied with the land rights, each farmer was guaranteed an equitable share of the water. As seen in Bukhara, the equitable distribution of water was conducted at the watershed level. The Zeravshan Valley, which made up the bulk of the Bukharan Khanate, had over eighty-five main canals that extended over 1570 miles in
the mid-nineteenth century.\textsuperscript{350} This length did not include second or third-order canals. Despite the enormity of the system, under the khan the entire valley was administered to ensure that water was available for the whole valley, and not just for those at the head of the valley. According to Schuyler, this involved a system of classifying the river as high, low or "middling." Water in the river was monitored, and when the river was middling, dams were put in place to ensure that water would reach the lower end of the valley in the spring and autumn when water was both at its lowest and most precious.\textsuperscript{351}

The above example does an excellent job of showing how water was managed on a watershed basis, and in this, was a complex system. Brian Spooner defines a complex irrigation system as one where the engineering and management of the system is beyond the capabilities of individuals or small groups of farmers.\textsuperscript{352} The management of irrigation under the khans was stratified, with centralized decisions made for the good of the khanate (as seen with monitoring water levels at the scale of the watershed). As will be seen in the next chapter, however, the technologies employed in the khanates were not overly advanced, but were well suited for the local conditions. The same can be said for the management. The management used in the khanates was based upon long standing customs and "folk" knowledge. This system allowed for site-specific knowledge to be


\textsuperscript{351} Ibid., 288.

\textsuperscript{352} Spooner, "Irrigation and Society: The Iranian Plateau," 48.
employed by the farmers, while the state ensured that the rights of the collective good were protected.\(^{353}\)

Whereas the structure of the state itself is well documented, detailed accounts of the structure and duties of the water management organization prior to the arrival of the Russians are not abundant. Thurman, however, has made a detailed examination of Russian and Soviet records in order to offer insight into water management in Kokand. Olufsen, at the same time, gives a fair account of water management in Bukhara. What follows is a synopsis of Thurman’s findings for Kokand. This synopsis is intermittently interspersed with differences between water management in Kokand and Bukhara.

With the khan serving as the steward of water rights for Allah, the irrigation system was divided into tumens/begliks based upon “local water sources and natural streams.”\(^{354}\) In this arrangement, each tumen consisted of a group of villages that shared a source of water and system of canals and diversions that distributed water to the different villages. At the tumen level, the irrigation system was managed by the mirab bashi, which loosely translates to “chief water prince.” It seems sometimes that the mirab bashi was also referred to as the ariq aqsaqal, or canal elder. The mirab bashi normally lived at the head of the canal supplying water to the beglik. The mirab bashi was in charge of the capture of the water for the first order canal, and the allocation of water to the secondary canals. He also supervised the maintenance and construction of

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\(^{353}\) Thurman, “Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present,” 44.

\(^{354}\) McCray, “Envirom-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems,” 44.
the main canals. Under the mirab bashi served an assortment of junior officials. At times, the mirab bashi also served as the head tax collector in addition to managing the region's irrigation system.

The management of the irrigation system at the regional level was based upon custom and tradition. In this, it appears that the khanate made few demands from the top with regard to how the system was operated at the local level. The local nature of the management of the system was reinforced by the fact that the mirab bashi was elected by the junior administrators of the beglik. This allowed for most of the mirab bashis to come from the ranks of the local mirabs—water managers at the village level. In addition to managing the main canals of the tumen, the mirab bashis also provided the interface between the state and the water users. The mirab bashi could be sanctioned by the beg if he failed to appease either the wishes of the farmers beneath him or the beg or khan above him. In this, the mirab bashi had to strike a balance between his clientele—the water users—at the regional level and the khan at the state level. Increasing their power in the management system, farmers paid the mirab bashi according to how well they felt the elder was doing. This provided great incentive for the mirab bashi to distribute the water efficiently and fairly at the regional level.

The above statement that the mirab bashi was elected is not without disagreement. Mordvinov claims the mirab bashi was appointed by either the hakim or

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355 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 45.

356 Williams, "Water Law in Czarist Central Asia," 38.

357 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 49.
beg, not elected.\textsuperscript{358} Olufsen's account also differs. He reports that the mirab bashis of Bukhara were appointed by the khan himself.\textsuperscript{359} However, Thurman states that Mordinov's claim of the mirab bashi being appointed is contradicted by all other accounts. Thurman takes a conciliatory stance between the two views. He suggests that most likely the farmers and junior administrators in the tumen, as well as the beg, had a role in the decision process.\textsuperscript{360} The farmers were allowed to vote and express who they thought should be the mirab bashi, but the beg made the final decision. Although such a consultative process is logical, Thurman does not explain why Russians and Soviets, who were so invested in showing the worst side of water management in the khanates, would nearly unanimously interpret such a process to be a democratic one. It contradicts their view of the traditional system being despotic. It seems that they would have chosen to focus on the supposed tyranny of the begs over all aspects of the farmers' lives.

At the secondary-canal level, the water was managed by the mirab. The mirab lived within the area of his jurisdiction. The mirab supposedly knew "his district in minute detail," and served to manage construction, maintenance, and operations of his district.\textsuperscript{361} He was voted into office by the farmers under him. The mirab also served as the interface between the farmers, whom he knew well, and the mirab bashi above him. Not only did the mirab serve as the mouthpiece of the water users, the water users were

\begin{itemize}
\item \textsuperscript{358} Ibid., 47.
\item \textsuperscript{359} Olufsen, \textit{The Emir of Bokhara and His Country}, 491.
\item \textsuperscript{360} Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 49.
\item \textsuperscript{361} Von Middendorf, as cited in Ibid.
\end{itemize}
also his clientele. Same as with the mirab bashi above him, the mirab was paid by the farmers, thus giving the water users some leverage in how the system was managed.\footnote{Ibid., 50.}

Beneath the mirab were the villages themselves, who received their water from distributary canals. Up to ten villages could be fed by one distributary canal.\footnote{Lev Feofilovich Kostenko, \textit{The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer}, vol. 1 (Simla: Government Central Branch Press, 1882), 196.} Each village was headed by an aqsaqal (elder). The village elder served to represent the interests of the village. There were two types of organizations associated with the villages: In one, villages pooled their labor resources in order to maximize their resources and profits. This association of villages was called a ketmen, and acted as a WUA, and was headed by one of the aqsaqals. This leader was the ellik bashi (leader of fifty), and both served to represent the interests of the villages to the mirab, as well as oversee the construction, maintenance, and operations at the village level. In the ketmen, decisions were made by the ellik bashi, but only after consultation with the elders. Also, the farmers often met and voted on decisions. In the second organization, within the villages, tops—small collections of farmers—were formed to pool resources. The tops were normally based on familial ties, and they would often maintain intra-farm canals collectively.\footnote{Thurman, \textit{Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present}, 52.}

In terms of conflict resolution over water issues, the mirab bashi made the decisions for the khan. This power was not without a check. Olufsen states that when
there were doubts or concerns over water rights the farmers would assemble with the mirab bashi, and the farmers and the official would “mutually” settle the affair.\textsuperscript{365}

Despite the clear picture presented by Thurman, many questions concerning the nature of water management still exist. According to Olufsen, the mirab bashi, as with all positions of power, did not actually do much. Instead, the mahrem, serving under the mirab bashi, actually conducted the day to day operations and oversaw the irrigation system.\textsuperscript{366} It is difficult to determine how accurate or applicable such a statement is, but most likely there is some truth to the statement in that in some tumens the officials did little work, while in others this was not the case. One other thing Olufsen mentioned was the selling of surplus water. He states that after the water was distributed the official had the right to sell the surplus at a fixed price.\textsuperscript{367} While others\textsuperscript{368} make mention of bribes being paid and power being used to secure excess water, the selling of water by the management was not seen in any other report. Unfortunately, the role and duties of junior officials is not as clearly laid out as one might wish. This limits present assessments of the actual operation of the water-management system. Despite the lack of a thorough discussion of junior officials, Williams relates the lack of junior officials during Russian rule to the inequitable allocation of water. Those with power took the

\textsuperscript{365} Olufsen, \textit{The Emir of Bokhara and His Country}, 492.

\textsuperscript{366} Ibid., 491.

\textsuperscript{367} Ibid., 492.

water without repercussions (1967, 44). Williams also mentions the lack of the mechanisms that traditionally existed to resolve water disputes during the Russian rule.\footnote{Williams, "Water Law in Czarist Central Asia," 39, 44.}

Thurman makes an interesting comment on the role that water scarcity played in the Kokand Khanate. According to Thurman, regions in the khanate where water was scarce had greater social cohesion and cooperation. He goes on to state that it seems the farmers recognized that cooperation and group management brought greater returns to the community than competition for scarce water.\footnote{One of the fascinating aspects of this observation is that it not only suggests arid environments do not automatically produce despotic management systems, but that they in fact can produce the opposite. Here Thurman purports that the greater the scarcity, the more arid the landscape, the greater the self-governance, social cohesion and cooperation. This is a major contradiction to Wittfogel’s hydraulic theory.} Where water was abundant, such strong social cohesion was not necessary and thus not found. To further his point, Thurman quotes A. F. von Middendorf as saying the indigenous water management represented an “unexpected example” of “successful self-administration.”\footnote{Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 54.} Although this is a fascinating and powerful observation on the nature of water management in Kokand, it is a bit suspicious owing to how closely it follows common-property theory. In common-property theory, competition for scarce water is displaced by “compliance in that each irrigator cooperates by complying with the internal rules of water allocation among competing interests. Farmers cooperate for the simple reason that in the absence of this shared structure of rights and duties there would be anarchy.”\footnote{Bromley, "The Commons, Common Property, and Environmental Policy," 3.} It is difficult to accurately gauge how much Thurman is simply taking modern theory and attributing such practices to the farmers of Central Asia.

\cite{Williams, "Water Law in Czarist Central Asia," 39, 44.}

\cite{Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 54.}

\cite{Bromley, "The Commons, Common Property, and Environmental Policy," 3.}
Still, there are a few key aspects of this managerial organization that need to be highlighted. First and most important was that elites within the system came from the communities that they served. In this, local traditions and customs, both in terms of management and O&M, were retained. This also undermines the simplistic view of water management in the khanates as being despotic; there was much local autonomy to water management. At the same time, with the elites coming from within the local communities, this minimized the gap in the knowledge and understanding of the irrigation system between the farmers who worked the fields and maintained the irrigation system and the mirab bashi and mirabs managing the system.

Although the managerial system had a distinct and hierarchal nature, the system allowed for communications to flow easily in both top-down and bottom-up directions. Water users had a say in the management and maintenance of the irrigation system, and were able to influence the managers through complaints and by withholding payment. Succession to elite roles was not overly restricted and had a democratic component. This fostered a sense of belonging and trust. Finally, exclusivity—only those who contributed to the good of the system received benefits—helped establish horizontal connections between farmers. Farmers and villages would come together to minimize their costs, and in doing so established lateral ties. This allowed for increased investment in the irrigation system itself, and an incentive for the members to behave in a way that was for the good of the community.\(^{373}\)

\(^{373}\) O'Neill, "Land and Water 'Reform' in the 1920s: Agrarian Revolution or Social Engineering?" 70.
Redrawing the Boundaries to Water Management under the Soviets

When the Soviets took over the region, they had the same plans as the Russians did for Central Asia; they wanted it to become a cotton monoculture to secure independence from foreign markets. This desire for increased cotton production in the region drove them to completely change the landscape—to expand the irrigation system and irrigate the deserts and steppes of the region. Concerning the intentions of the Soviets with regard to Central Asia after the revolution, W. P. Coates and Zelda K. Coates offer the following observation: “All the scientists and Ministers whom we interviewed in Central Asian Republics answered with an emphatic ‘yes’, the desert as such is doomed.” In this quote, the dramatic changes to the water-management system are captured in two different yet pivotal ways. First, water management, linked with the intentions for the development of the region, became controlled by the Soviet scientists and politicians, displacing the farmers and mirabs who traditionally managed the system. Secondly, the system was to become larger, more centralized, and controlled by the engineers. These changes saw the knowledge of the farmers who traditionally oversaw management being replaced by the intentions of the state.

In order to more fully comprehend the changes to water management under Soviet control, it is necessary to briefly examine the change in culture and goals to resource management under the Soviets. Soviet natural resource management was driven by a philosophy of resource exploitation. The Soviets thought that the peripheral and underdeveloped regions, such as Uzbekistan, could and should be developed by exploiting their natural resources. The region’s natural capital was assumed to be

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374 Coates and Coates, Soviets in Central Asia, 102.
inexhaustible, and the costs of pollution were underestimated. This natural capital was to be transformed and used for developments in physical and human capital. In this manner, the soils and waters of Central Asia were the means by which the Central Asians would acquire a more prosperous life (not to mention the way that Soviets would supply cheap cotton for its industries in the north). The ecological and social costs to developing these resources were therefore not considered. In fairness to Soviet policies, however, education and standards of living in the Central Asian republics did improve under the Soviets.

From such a view of resource exploitation for the benefit of the region, the Soviets wanted to expand the irrigation system to increase cotton production. Prior to any substantial changes to the irrigation system, however, the Bolsheviks first overhauled the traditional water-management regime, which they considered to be cruel and barbaric. Land and water became the property of the state. In 1923, the control and maintenance of the irrigation system was handed over to the Central Asiatic Water Department. The traditional management of water resources defined by local, hydrological boundaries gave way to a large-scale, centralized management system. Water-management boundaries were no longer defined by watersheds, as they had been traditionally. Instead, the boundaries were based upon the arbitrary boundaries of the

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new Central Asian states, which many have felt were based more upon a desire to divide the region in order to keep it weak.\textsuperscript{379} In redrawing the boundaries for management, oversight of the water resources was officially moved from the villages where the water was used to Tashkent.

Later, water management shifted again to Moscow. The maintenance of the system along with the control and distribution of water fell under the Regional Directorates of the Ministry of Land Reclamation (MLRWM). The MLRWM sat at the top of a complex and hierarchal management system, with numerous departments operating under the ministry. Sarah O'Hara and Tim Hannan comment that this complex system led to a very regimented system of communication. They describe departments with overlapping duties in water management. Despite operating out of the same building, they would not talk directly to one another, but instead through Moscow. This led to not only a lack of discourse regarding what needed to be done, but affirmed Moscow's role as the principal decision-maker. All communications and decisions were filtered and controlled by technocrats and politicians thousands of miles from the canals and farms.\textsuperscript{380}

In this major shift from a more organic management system with the farmers and officials directly interacting to the strictly regimented and hierarchal system of the Soviets, knowledge and attitudes toward management and water resources also shifted.

\textsuperscript{379} The effects of the political boundaries and water management play a key role in the tension between states, as the system was built without regard to the boundaries as it was managed from Moscow. Now, though, the new governments struggle to cooperate and manage the water equitably. Bedford, "International Water Management in the Aral Sea Basin," 64.

Traditionally, irrigation officials relied upon site-specific knowledge to ensure that the farmers received the water they needed. Under the Soviets, with the power transferred away from the villages to Moscow, and from the farmers to the technocrats, irrigation officials made decisions based upon nomothetic understandings of water management. The farmers' and local managers' understandings of water use and needs were no longer considered. Decisions concerning the allocation and distribution of water were now made by technocrats in Moscow, thousands of miles away from the fields of Uzbekistan. This change in the legitimate types of knowledge regarding irrigation systems is more clearly seen in the review of changes in operations and maintenance (chapter five).

The negative impacts from the shift in water management to Moscow cannot be underestimated. When the Soviets took control, management and decisions concerning water shifted from local interests to national ones. Control of the water was placed exclusively in the hands of the elites (engineers and politicians), and the water users themselves had no ability to provide oversight. In this, water management became closed to public participation. The farmers were disenfranchised and became reliant on the state for the water. Although as the irrigation system expanded the water users were more

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381 Freeman, "Designing Local Irrigation Organizations for Linking Water Demand with Supply," 114.


383 Micklin, Managing Water in Central Asia, 54.

384 Dukhovny and Sokolov, Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin.
linked under the Soviets than they had been in the past, they were solely dependent upon
the state for the allocation and delivery of water. This ultimately helped break down the
lateral ties that existed in traditional water management, as well as instill a culture of
passivity and dependency in the water users. With this culture of passivity and disinterest
in water management by the farmers and local managers, they became removed from the
successful operation of the system itself. Unfortunately, the role that centralized water
management played in Uzbekistan to undermine both social capital and the successful
management of water resources was only exacerbated by changes in the operation and
maintenance of the irrigation system and agriculture. As a whole, these changes are
examined in the following chapter.

Changes to Management since Independence

The water management system in place in Uzbekistan is very similar to the one
the GOU inherited from the Soviets. It remains hierarchal and centralized, and
management still flows in a top-down direction.\(^{385}\) In Uzbekistan, water management is
headed by the Ministry of Agriculture and Water Management (MAWM). The MAWM
controls water research, development, planning, and distribution. It is also responsible
for both the construction and maintenance of the irrigation and drainage systems.\(^{386}\)
Under this ministry sit regional (oblasts) administrative offices. Yet, as with before,
decisions of allocation, maintenance, and management remain in the central office. The


central office makes all of the decisions, and communicates these to the regional offices. These offices then carry out the directives. However, as discussed in the first chapter, Uzbekistan is trying to reform management by placing more responsibilities on the farmers and local managers through the adoption of WUAs.

With the collapse of the Soviet Union, one major change to water management in the basin emerged. The irrigation systems, as well as their management under the Soviets, were designed without regard for either hydrological or state boundaries. All decisions were made in Moscow, and thus conflict over water between various interests was not a problem. Unfortunately, the collapse of the Soviet Union has changed this, and since 1991 there has been an increase in the emergence of interstate conflicts over water quantity and quality.

At the heart of these conflicts is the differing interests between upstream states (Kyrgyzstan and Tajikistan) and downstream states (Uzbekistan and Turkmenistan). The upstream states see water as something to run their hydroelectric power plants and provide heat during the winter. To do this, the upper-basin states must store the high flows of spring and summer and release them during the cold winter months. The lower-basin states, on the other hand, require the water to irrigate their fields. Thus they want the water to be released in the spring and summer for the production of their crops. This newly formed source of conflict in water management has been met with the development and signing of numerous international water-management agreements.

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Formed in 1992, the International Coordinating Water Committee (ICWC) is the most important of these agreements. Under this system, the legacy of the allocation of water under the Soviets is to be used for future allocations within the basin. Although water is currently distributed throughout the basin without overt conflict, as water becomes scarcer and more polluted such agreements might not last. D. P. Bedford refers to the state of international cooperation in the basin as an "illusion of unity." This fracturing of the irrigation and management system across different states only serves to complicate the difficult nature of reform.

Conclusion

The water-management system in the khanates was complex, stratified, and hierarchal. The khan served as the supreme leader of this system in order to ensure that water was available for all of the farmers. Because the wealth of the state derived mainly from taxes upon agricultural production, and agricultural production was dependent upon timely delivery of water, the khan was invested in ensuring that water was, in fact, managed for the good of the state.

Despite the centralized and hierarchal nature of water management in the khanates, the Soviets misrepresented these states as being overly despotic and tyrannical. Soviets and historians have unfairly and simplistically interpreted the khans as being tyrants who managed the water accordingly, all at the expense of the farmers. Such

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390 Ibid.: 68.
views fail to acknowledge the roles that religion and the traditional understandings of leadership played in ameliorating the khans’ power. At the same time, the large size of the khanates made an overly centralized state not only impractical but impossible. Thus provincial powers played a major role in the operations of the state, with tumens free to operate largely independent of the khans.

This local authority had its parallel in the administration of water. The management system in the khanates evolved over hundreds of years and served to maximize the operations of the irrigation system. Water was managed with an understanding of local water sources. Although the administration was hierarchal, the farmers and junior officials were able to influence higher officials. They also had the ability to communicate with the begs. The water-administrative system incorporated the knowledge and understanding of the farmers. In this, local knowledge and an appreciation of site-specific concerns were valued in the administrative system. The khan, it seems, rarely made major top-down judgments that dictated how water was delivered or allocated in the various regions of the khanate. Thus the farmers retained a voice in the system and were invested in the successful management of water.

Under the Soviets, the system became overly centralized, with ultimately all decisions for management and maintenance made in Moscow. In this, the farmers became completely subordinate to the interests of the state, and were unable to influence management decisions. This system ultimately disenfranchised local forms of knowledge, as engineers and politicians increasingly decided the best way to manage water. Public participation was completely removed from the system. Remnants of this can still be detected in the apathy of Uzbeks with regards to problems concerning water.
resources and management.\textsuperscript{391} Thus far, this overly centralized system has continued under the GOU. Water management in the basin, however, has been complicated by the emergence of interstate conflicts over water that did not exist when all decisions and authority were based in Moscow.

\textsuperscript{391} Dukhovny and Sokolov, \textit{Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin.}
Irrigation has a long and successful history in Transoxiana. Many of the canals in use when the Russians first arrived in the region had been in use for at least the previous 500 years.\(^{392}\) This longevity is a testament to the system being both well-adapted for the region and well maintained. Despite this history of success, the Western view of the irrigation systems, by both Russians and European visitors, was that the systems were primitive and inefficient.

As seen in the previous chapters, the Russians and Soviets presented the traditional land tenure and water-management regimes of Central Asia in simplistic and biased terms. With Soviet scholars generating most of the information on the history of Central Asia, this bias has greatly influenced how current scholars understand and interpret the region. Unfortunately, this bias has also influenced understandings of the nature and extent of the irrigation system and agriculture. This bias can simultaneously be attributed to Russian colonial arrogance and the Soviet’s political motivations.

The traditional irrigation systems of the region were neither Western nor modern in design. To the Soviets, the traditional and time tested system of canals, locks, and dams were thus considered crude and primitive. Coates and Coates\(^{393}\) capture the arrogant view of the Soviets with regard to the traditional canals and structures of the

\(^{392}\) Coates and Coates, *Soviets in Central Asia*, 102.

\(^{393}\) Although Coates and Coates were published in London, their writings appear to be little more than pulp propaganda for the successes of socialism and the Soviet Empire. For this reason, they are used to represent the general attitude of the Soviets toward the traditional irrigation systems in Central Asia.
irrigation system, describing them as simple and insufficient. To the Soviets, the canals
dug by ignorant, disempowered farmers were incapable of adequately “[alleviating] the
thirst of the land for water.”

They go on to describe the outdated nature of the system by pointing out that many of the canals in use prior to the arrival of the Soviets can be traced back hundreds of years. The archaic nature of the irrigation system is an interesting one to consider. For to some, this dated system of canals was a sign of the need for modernization and improvement in the region. While to others, the endurance and legacy of the system was a sign of both successful design and management.

Coates and Coates’ unimpressed view of the traditional irrigation systems is contradicted by Barthold’s description of a dynamic irrigation system that was actively expanded during the centuries prior to the arrival of the Russians. According to Barthold, major irrigation projects were carried out in the Transoxiana during the eighteenth and nineteenth centuries. He describes major expansions to the systems in the Fergana Valley, and the tapping of the Naryn and Kara Darya for the first time. He also documents dams being built in the Zeravshan Valley, and new canals dug near the Amu Darya to increase acreage. Finally, he also describes the construction of new canals to irrigate Khiva’s Urgench. Because of the success of the irrigation system in the khanates, Barthold considered Central Asia to be flourishing prior to the arrival of the Russians, pointing out that between 1827 and 1837 exports exceeded imports in

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394 Coates and Coates, Soviets in Central Asia, 102.

In this description of activities in the region, the irrigation system was both expanding and actively maintained, and able to support a strong economy.

First the Russians and then the Soviets, considering the irrigation system inadequate for their interests, greatly revolutionized the system, instituting numerous expansions and changes. Disruptions to the infrastructure of the system had profound effects on how the system operated and was maintained. As operations and maintenance (O&M) changed, so too did perceptions and understandings of the system by those who were a part of it. In this chapter, the O&M of the traditional irrigation system are explored. From such a base of understanding, changes in the scale and technology of the system are then traced from pre-Russian times through the Soviet occupation of Central Asia. As the nature of the irrigation system changed, so too did the manner in which the farmers related to one another and to the system itself. Thus by examining these changes in technology, how social capital was utilized in the system can also be explored.

This chapter is divided into two major sections. The first section focuses upon the operation and maintenance of the traditional irrigation systems. This section describes the size, design and construction of the irrigation system. It also highlights the strengths and weaknesses of the system. This section of the chapter also focuses upon the maintenance of the system. Because traditional maintenance was largely tied to water rights, this section draws from the previous chapters’ reviews of tenure, water rights, and management to highlight how changes to all of these led to separate farmers from each other and from the successful management of the irrigation system. The second section of the chapter highlights major changes to O&M under the Soviets.

\[396\] Ibid., 44.
Technology and Operations Prior to the Arrival of the Russians

Although the irrigation system prior to Russification was primitive (lacking control structures, drainage canals, and discharge canals), this is not to say that it was inefficient. The irrigation system in the Aral Sea Basin developed through trial and error over thousands of years, and was extremely efficient and sustainable. Upon their arrival in the region, the Russians were amazed by the size, extent, and history of the irrigation system. This is all the more impressive considering that the irrigated area at the start of the nineteenth century was two million hectares—much less than it had been prior to the Mongols coming to the region.  

Each oasis in the region was surrounded by a vast network of canals, some in use and many in a state of disrepair. As with the overall water-management regime, the irrigation systems were largely localized in nature. Nevertheless, many aspects were the same in all three khanates. This brief history will cover the four major physical processes to the water-supply system—capture, distribution, application, and drainage—giving the most attention to the distribution component.

The largest and most visible component of the Central Asian water-supply system was the canals that covered the landscape. To the Central Asians, irrigation canals were thought of as watercourses. Both natural and human-made watercourses were viewed as canals. Hence, the irrigation systems were comprised of two different types of canals—the arna and the yap. Arnas, although considered canals by the Central Asians, were

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397 Micklin estimates that, in its prime, over 3.8 million ha were irrigated in the Aral Sea Basin. Micklin, Managing Water in Central Asia, 27, 29.

398 The word arna has a long history in the region, and is derived from the Khwarazmian language. V. V. Barthold, Four Studies on the History of Central Asia, trans. V. Minorsky and T. Minorsky (Leiden, Netherlands: E. J. Brill, 1956), 15.
rivers that had been widened and deepened by human labor. Thus rivers were not only a part of the irrigation system, but were considered canals in and of themselves. This inclusive definition has led to much confusion for historians trying to determine what were natural rivers and what were artificial canals. Yaps, on the other hand, were courses dug to a width of one or two fathoms. Yaps were fed by an arna and the two together served to form a net of irrigation canals over the countryside.

The most common layout for the network of canals in Transoxiana was a simple, hierarchal order of first-, second-, and third-order canals. The aras fed the first-order canals. Tumens were defined by where the first-order canals (yaps) branched off of the arna. The tumen would consist of the territory fed from this single water source. In this, the tumen was not only a political and administrative region, but also an area that could be defined upon the basis of the villages that shared a common water source. For the sake of clarity, it is important to reiterate that the mirab bashi, who served as the chief of the irrigation system at the regional level, lived at the head of the first-order canal.

Second-order canals branched at an obtuse angle, and ran parallel to their feeding canal. The second-order canals would feed a group of villages. There is not a clear consensus on the number of villages tied to a single second-order canal, but it appears that the

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399 For example, Narshakhi describes there being twelve main canals in Bokhara in 943 (332). Of these twelve, which were canals and which were natural watercourses is not clearly understood. The canal called "the river of gold" flowed into the "river of the city." This "river of gold" is assumed to be the Zeravshan, but some confusion remains. Narshakhi, The History of Bukhara, 31.


401 Due to the confusion on what was a canal and what was a river, there are disagreements in the literature over the ordering of the hierarchal canal system. Kostenko, for instance, considers the first yap branching off of the arna to be the first order canal. Although this is more in line with western conceptions of the order of canals in an irrigation system, it is inconsistent with how the Central Asians defined the word canal and understood their irrigation systems. This paper, for the sake of clarity, will adopt Kostenko's ordering to the canals by not considering the arna to be a canal.
number ranges from between ten\textsuperscript{402} to fifteen villages.\textsuperscript{403} Each village then had its own third-order canal. The villages, although the terminus in the irrigation system, were not independent of one another. The third-order canals that fed the villages also ran back into the second-order canal. In this, excess water from a village would then return to the system. This arrangement not only served to increase the availability of water in the system, but also served to increase the interdependence of the villages upon one another.\textsuperscript{404}

Despite the primitive characterization of the native irrigation systems, the canals were large and lengthy. Kostenko describes first-order canals in Khiva as being 140 feet across at their head, and many extended over sixty miles from their source river.\textsuperscript{405} These canals were significant engineering feats. For the most part, the canals were unlined and earthen.\textsuperscript{406} Olufsen, however, describes the canals in Bukhara as being lined with slate and clay to minimize seepage.\textsuperscript{407} This description of lined canals is not echoed in other accounts, requiring much organized labor and expertise to be constructed.

\textsuperscript{402} Kostenko, \textit{The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer}, 196; Henry Lansdell, \textit{Russian Central Asia} (London: Sampson Low, Marston, Searle, and Rivington, 1885), 536.

\textsuperscript{403} Olufsen, \textit{The Emir of Bokhara and His Country}, 491.

\textsuperscript{404} Kostenko, \textit{The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer}, 196.

\textsuperscript{405} Ibid., 172.


\textsuperscript{407} Olufsen, \textit{The Emir of Bokhara and His Country}, 490.
Kostenko describes the canals as being picturesquely lined with trees on both sides.\textsuperscript{408} These trees, however, were not merely ornamental. Trees lined both canals and fields to promote drainage of the land and stave off salinization.\textsuperscript{409}

In addition to canals being unlined, a key characteristic of the canals was their gradient. Canals with a high gradient will allow water to move too rapidly, and thus increase erosion. Those with a low gradient will accumulate sediment and require greater maintenance. The surveying of the canals was accomplished in a simple, yet amusing, way. The \textit{mirab} would lay on his back and use his big toe to sight off of a man's head in the distance. By doing this, the slope of the landscape could be determined, and the canals were laid out accordingly.\textsuperscript{410} Olufsen describes the canals as being level enough to keep water from eroding the canal.\textsuperscript{411} Hence, the canals meandered across the landscape as they sought their path down slope. Being surface canals, the longer their path the greater the loss of water through evaporation and seepage.

The capture of water was accomplished through diversion dikes and dams. Canals were predominantly excavated off of the smaller rivers in the Aral Sea Basin because of the immense difficulty of diverting waters off the Amu and Syr Darya.\textsuperscript{412} Diversion dikes were used on the smaller rivers to direct water into the main canals. These dikes were constructed by filling trestles with whatever local materials were

\textsuperscript{408} Kostenko, \textit{The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer}, 195.

\textsuperscript{409} USSR National Committee on Irrigation and Drainage, \textit{History of Irrigation, Drainage, Flood Control and River Engineering}, History of Irrigation and Drainage in the Ussr, vol. 1 (Delhi, India: Central Electric Press, 1985), 92.

\textsuperscript{410} Matley, "Agricultural Development," 276.

\textsuperscript{411} Olufsen, \textit{The Emir of Bokhara and His Country}, 487.

\textsuperscript{412} Lewis, "The Irrigation Potential of Soviet Central Asia," 103.
available, often brushwood and stones.\textsuperscript{413} The head-gates to the canals were unengineered, simple dams.\textsuperscript{414} Made of wood beams and clay, the gates could not control flow, and were simply put into the top of the canal to restrict flow and lifted out to allow water to enter the canal.\textsuperscript{415}

Despite the simplicity of this design, much consideration and care was given to where the diversion dikes were placed and the canals dug. Canals were dug off of the rivers to deliberately limit washouts and sedimentation. To accomplish this, canals were dug on hard, level river banks to minimize sedimentation. At the same time, dikes were built on the convex bank of a river. By doing this, the Central Asians took advantage of the physics of stream flow. Sediments largely accumulate on the concave bank of a river. Hence, by constructing the dikes on the convex bank, sediment build-up was minimized at the head of the canal.\textsuperscript{416}

Upon reaching the fields, water was distributed chiefly through furrow irrigation. Matley contends that furrow irrigation was used exclusively in the region, except for rice and alfalfa, of which both relied upon flood irrigation.\textsuperscript{417} In terms of application, the Central Asians had many adaptations to minimize water losses. Fields were kept small, rarely exceeding 0.8 ha. Fields were then divided by low, earthen walls. Mulberry trees growing along the banks of the fields absorbed and then transpired excess water to help stave off water logging, as well as decrease soil loss to wind erosion. In addition, the

\textsuperscript{413} Matley, "Agricultural Development," 270.

\textsuperscript{414} Cyril E. Black and others, The Modernization of Inner Asia (London: M.E. Sharpe, 1991), 94.

\textsuperscript{415} Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 63.

\textsuperscript{416} USSR, History of Irrigation, Drainage, Flood Control and River Engineering, 84.

\textsuperscript{417} Matley, "Agricultural Development," 276.
banks absorbed salts helping to reduce soil salinity. These small fields also allowed for even flooding and limited the amount of wasteful runoff. By irrigating such small fields, average water withdrawals including filtration losses were between 10,700 to 11,500 m$^3$/ha.$^{418}$

Water was applied to the field either directly through a small, distributional canal, or, if the water needed to be lifted, through the use of a water wheel. The distributional canals were small. A one-foot wide canal would be used to irrigate three fourths of a hectare.$^{419}$ Where water needed to be lifted, water wheels with pots attached to their rims were used. The wheels were turned either by an animal (camel or horse) or by the force of the water itself. Although this arrangement was ingenious, the lack of more efficient pumps had disadvantages. The height to which water could be lifted was limited by the size of the water wheel and the strength of the animal or force of the water. Thus, water could not be lifted more than a few meters.

One of the major problems of the native irrigation system was an infrequent and inadequate drainage system. Most fields lacked a drainage system, and suffered from salinization—although the farmers had folk techniques, such as crop rotations, to deal with this problem. The fields that did have drainage systems consisted of crude pipes, often made of clay, laid into the field in order to collect and deliver excess water out of the field. These pipes were perforated to allow water to enter, but not sediment.

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$^{418}$ Amazingly, Micklin notes that water withdrawals increased to over 13,000 m$^3$/ha under Soviet stewardship. He attributes this increase to the larger fields used by the Soviets. Determining such figures, however, is not possible without making many assumptions. Accordingly, this figure is questioned by some. Berkoff, for one, is suspicious, reasoning that the difference between new, healthy fields and older, degraded fields is large enough to discredit such numbers. Micklin, *Managing Water in Central Asia*, 30, 32; Wegerich, *Institutional Change in Water Management at the Local and Provincial Levels in Uzbekistan*, 97.

$^{419}$ Olufsen, *The Emir of Bokhara and His Country*, 491.
However, the pipes frequently clogged, and this rendered the drainage system ineffective.\textsuperscript{420}

According to Thurman's reading of Russian and Soviet records, Tsarist and Soviet engineers considered the native irrigation technology and maintenance to be an obstacle to efficient irrigation. There were three main categories that the engineers found especially troubling: First, the canals lacked permanent, engineered head gates. The head gates were trestles filled with local materials. These primitive gates were often washed out by spring floods, and required emergency maintenance by the farmers at the worst possible time of the year.\textsuperscript{421} In addition to being prone to failure, these gates required much more upkeep and maintenance than the engineered gates found in the West at the time. Secondly, the Soviet engineers felt that the irrigation system was composed of too many redundant canals. These redundant canals increased the length of the system, and thus exacerbated water losses from evaporation and seepage. The redundant canals also increased the aggregate length of canals that needed to be maintained, and increased the amount of effort took to equitably distribute water throughout the system. Thirdly, imprecise leveling of fields and canals increased the amount of maintenance that the system needed, while lowering its efficiency. Because of a lack of more sophisticated tools and surveying skills, the canals, as well as the fields, were often not leveled properly. If the fields were not leveled properly, water pooled in

\textsuperscript{420} Micklin, \textit{The Water Management Crisis in Soviet Central Asia}, 22.

\textsuperscript{421} This description is contradicted by Wheeler, who speaks of the structures lasting hundreds of years. He, however, seems to stand alone concerning the enduring qualities of the gates and dams. Wheeler, \textit{The Modern History of Soviet Central Asia}, 3.
lower parts of the fields, causing salinization, and other parts of the field did not receive enough water.\textsuperscript{422}

Although the Soviet engineers were correct in pointing out some of the problems associated with the native irrigation systems, this is not to the say that the systems were either inefficient or unsustainable. Oases in Central Asia had been irrigated for thousands of years, and it is only within the past hundred years that major expanses of soil have been deemed unusable.\textsuperscript{423} In addition to keeping farms small, the farmers used their vast folk knowledge to minimize negative effects to the landscape, while maximizing production. As noted earlier, farmers used furrow irrigation in their fields to minimize water losses. The furrows were dug in a quadrant formation that broke up the soil and allowed for even inundation of water, without exposing too much of the soil to the dry air.\textsuperscript{424} The silt removed from the canals was used as fertilizer for the fields. The alluvium of the Syr and Amu Darya was rich in phosphates, lime and potassium.\textsuperscript{425} The fertilizing nature of the waters of the basin is reflected in the name of the main river of Bukhara, the Zeravshan. Zeravshan, which means river of gold, was so named for its fertilizing properties.\textsuperscript{426} The farmers also actively used crop rotations to lower the salt level in the soil and fix nitrogen. There was no regulated crop rotation, but the farmers

\textsuperscript{422} Thurman, "Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present."\textsuperscript{423} The International Merv Project, for instance, conducted a detailed paleobotanical analysis of sediment around the city and found no evidence of salinization.\textsuperscript{424} Thurman, "Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present," 75.\textsuperscript{425} Sinnott, "The Physical Geography of Soviet Central Asia and the Aral Sea Problem," 83.\textsuperscript{426} Kostenko, The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer, 193.
knew how to rotate crops to promote soil health.\textsuperscript{427} With regard to crop rotation for soil health, the farmers "[acted] from their experience."\textsuperscript{428}

Throughout the irrigation system, water was distributed to the farms according to custom. The \textit{mirab} was in charge of water allocations. Water was delivered in the order of distance. Those closest to the head of the third-order canal received water first.\textsuperscript{429} The \textit{mirab} would release water to a field in the presence of the farmer, and the amount was measured by eye. Although the Central Asians did not have sophisticated water-measuring technologies, this is not to say that water was released onto the fields in a casual manner. In fact, Kostenko contends that much care and attention were given to the allocation of water to the fields; in Turkistan "every drop [of water] for irrigation is calculated."\textsuperscript{430} This practice of allotting water by custom and measuring it by eye worked because the farmers knew that too much water would limit their yield and ultimately lead to salinization.\textsuperscript{431} Thus, the farmers were interested in ensuring that they received sufficient water, but not more than they needed.

\textbf{Maintenance of the Traditional System}

The maintenance of a large irrigation system in an arid region requires much labor, more than can be done by a single farmer. Thus, the maintenance of an irrigation


\textsuperscript{428} Olufsen, \textit{The Emir of Bokhara and His Country}, 494.

\textsuperscript{429} Williams, "Water Law in Czarist Central Asia," 38.


system is only possible through cooperative effort. The farmers must be motivated and aware of the need for group maintenance, and how their cooperative actions benefit them. One of the defining characteristics of the traditional irrigation system in Central Asia was the tying of water rights to the responsibility of maintaining the system. Every winter, every family that received water from the irrigation system had to supply an able-bodied man for two months to maintain and improve the system. Strangely, this annual calling of labor has been misrepresented by both Soviet and Western scholars. Bacon, for example, criticizes the traditional approach to maintaining the irrigation system as being forced labor.

Every spring, the khan would issue a firman (edict) calling for the construction and maintenance of the irrigation systems. From the firman, the regional mirabs received the authority to enlist any farmer that receives water from the state irrigation system. Any farmer who fails to participate in the corvée was liable to be fined by the state. The tax levied against those failing to participate in maintenance projects was called the tengi (equal). The labor was overseen by the mirab bashi, but the khan and his dignitaries would often tour the tumens, observing maintenance and construction practices. This direct involvement by the khan in the maintenance of the system belies the notion of the

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433 Bacon, Central Asians under Russian Rule: A Study in Culture Change, 75.

434 Most of the literature refers to each farmer receiving water having to contribute labor to the irrigation system. The exception to this comes from the USSR National Committee on Irrigation and Drainage, which stated that each top—a small collective of farmers that worked cooperatively on each others fields—had to contribute one farmer for the year’s maintenance projects. If the top failed to supply a laborer, they could receive no water for the upcoming year. USSR, History of Irrigation, Drainage, Flood Control and River Engineering, 93.

khan being completely disinterested in the successful management of water. With the
wealth of the state directly tied to the water system being well run, the khan’s presence in
the various regions of the khanate would help ensure that maintenance was being
accomplished, and the that firman was not being abused for personal gain by the beg.

Third-order canals were shut off during the winter. During the month of
February, tertiary canals were cleaned. Once this was completed, water was allowed
back into the canals, and the fields were watered in preparation for the spring season.
Second- and first-order canals were maintained in March.436

The farmers had to supply their own tools for all maintenance and construction
projects. As with all aspects of the traditional irrigation system, the implements were
either considered extremely primitive and inefficient, or well suited for the tasks and
environment. Regardless of these differing views, the tools were the product of artisans,
and not of industrial production. The most universal and important tool that all farmers
had was the ketmen. The ketmen was used both in small garden plots and in the
construction and maintenance of canals. It was a long-handled hoe. The blade (see Fig.
6) was used for all digging, as well as moving and loosening soil.437 The ketmen was
considered effective, but required a “sweeping, forceful and exhausting blow to use.”438
Baskets were used to transport the earth from the canals.

It is clear that the farmers were responsible for the maintenance and cleaning of
the canals and structures from which they drew their water. It is not so clear who
maintained the arnas that fed each tumen’s irrigation system. Little attention is given to

436 Ibid., 8.


438 Black and others, The Modernization of Inner Asia, 94.
this process. Olufsen simply says that such projects were conducted by public labor, and that the laborers were not farmers.\textsuperscript{439} Thurman mentions the khan of Kokand forming corvées supervised by a special representative for large, non-local projects.\textsuperscript{440}

Kostenko offers one example, however, of two different \textit{tumens} joining forces to complete maintenance projects on a dam. The Kara Darya fed two \textit{tumens} in Bukhara, the Zia-ud-Din and the Katta Kurgan. The supply of water for the Kara Darya was augmented by a diversion dam placed at Chupan Ata mountain. Although this dam was located outside of both \textit{tumens}, the farmers recognized the importance of this dam to their fields. Thus, the inhabitants of both \textit{tumens} jointly maintained the dam.\textsuperscript{441} This example

\textsuperscript{439} Olufsen, \textit{The Emir of Bokhara and His Country}, 493.

\textsuperscript{440} Thurman, \textit{Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present}, 56.

\textsuperscript{441} Kostenko, \textit{The Turkistan Region Being a Military Statistical Review of the Turkistan Military District of Russia, or, Russian-Turkistan Gazetteer}, 195.
is not meant to suggest that large-scale construction and maintenance projects were accomplished only by those who benefited from them. But, in this example, it is clear that the farmers understood the necessity for maintaining more than just the canal that connected the system to their farm. It also reinforces both the *mirabs'* ability to coordinate maintenance projects and the farmers' ability to operate in a cooperative manner.

The traditional O&M of the irrigation systems was, as can be expected, simpler than the system in place today. The traditional system was locally controlled and defined based upon hydrographical boundaries. In this, the farmers were very much interconnected. The villages shared a second-order canal, and worked together to maintain this canal. Through farmers being closely linked to one another by the system's infrastructure, the traditional system largely relied upon the individual farmers to operate collectively for the good of the system. O&M was largely based upon the knowledge and skills of the individual farmers. As the sophistication of the system increased under the Soviets, the O&M of the system changed, separating farmers from one another, as well as from the land and water.

**Major Disruptions to the Traditional System**

The arrival of the Russians into Central Asia saw a change in the markets and agricultural practices of the region as the Russians converted the region into a cotton-growing colony. Part of this interest by the Russians to see cotton sown across the deserts and steppes of the region was coupled with an interest to expand and improve the irrigation system. Despite this interest, the irrigation system remained largely unchanged.
under the Russians.\textsuperscript{442} Plagued by poor engineering and administration, as well as being hindered by the revolution, irrigation development did not really begin until after 1920. In fact, between 1870 and 1917, only 330,000 ha of irrigated fields were added. Considering that at the start of the revolution there were 3,000,000 irrigated ha,\textsuperscript{443} this was only a nine percent change in the irrigated area of Central Asia.

The Soviets, however, did succeed in completely revolutionizing the irrigation system. These changes had a profound effect upon the ability of the farmers to successfully manage not only the irrigation system itself, but also their own farms. The rest of this chapter examines the changes in O&M to the Central Asian irrigation system.\textsuperscript{444} These changes will be examined primarily through two themes: First, changes are examined through the expansion of the system at the expense of traditional practices and knowledge. Secondly, the reorganization of the farmers and farms into large, state-run collectives provides insight into the role that farmers played in the irrigation system, as well as how the farmers and farms related to one another during the Soviet reign.

Under the Soviets, the technical aspects of the irrigation system changed in two fundamental ways. First, and foremost, the system increased drastically in size. Secondly, the Soviets imported modern engineering to improve the efficiency and the extent of the irrigation system. These changes started immediately after the revolution, even before the counterrevolution subsided. In 1918, with the Soviet state still in a

\textsuperscript{442} Micklin, \textit{Managing Water in Central Asia}, 29.

\textsuperscript{443} Lewis, "The Irrigation Potential of Soviet Central Asia," 100.

\textsuperscript{444} With the arrival of the Soviets, the irrigation systems were expanded and centralized, ultimately producing a single irrigation system for the whole basin. Thus, under the Soviets it is no longer appropriate to speak of irrigation systems, but instead an irrigation \textit{system}. 
period of transition and turbulence, Lenin signed a decree concerning irrigation
developments in Turkistan, and allocated fifty million *rubles* for its implementation. The
first two points of the decree are listed below:

1. Drought control must be considered a matter of paramount importance in the
country’s agriculture and the measures undertaken in this sphere, urgent.

2. It is to be the duty of the People’s Commissariat of Agriculture to adopt
special measures on drought control by organizing reclamation developments as
well as by developing agronomic and afforestation measures in which the entire
rural population of the Republic participates, with the agreement of the
appropriate institutions and organizations.  

In order for drought control to be accomplished, the Soviets wanted to improve
the irrigation system, while at the same time expanding it. Improvements to the system
largely followed the criticisms that Russian and Soviet engineers had of the traditional
irrigation system as described by Thurman (see page 128). The Soviets set about
installing engineered head-gates to the canals that allowed for regulating the flow of
water. They also constructed large dams on the rivers to facilitate greater control of
flows, and allow for increased water storage. Through increased water storage, the
Soviets could increase the timing of water deliveries and ensure adequate amounts of
water for the fields. They also centralized the system, removing many of the “redundant”
canals from the system. This served to allow water to be delivered over greater distances

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446 The majority of the changes to the irrigation system were a result of expanding it, and this is reflected in the gross discrepancy between funds spent on maintenance and expansion. During Soviet times, only ten percent of the water reclamation funds were directed towards the maintenance and improvement of the system. The rest was invested in expanding the system. This vast difference largely explains the degraded nature of the irrigation system that the CARs inherited in 1991. Craumer, "Agricultural Change, Labor Supply, and Rural out-Migration in Soviet Central Asia," 137.
to where it was most needed, but also served to break the long tradition of local water sources for the irrigation systems.447

During the first thirty years of Soviet development of the region’s surface canals, the acreage of irrigated lands increased over 400%. In order to open new fields in the Central Asian Republics (CARs), the Soviets extended the size and extent of the surface canals. The expansions of the irrigation system occurred in two phases. The first occurred largely under Stalin’s rule in the late 1920s as the Soviets enacted a policy to restore the irrigation system of the CARs. This phase of development is typified by the excavation of large canals through the use of mass manual labor. One such canal was the Great Fergana Canal, which was dug by over 160,000 unpaid Uzbek laborers who were supervised by 1,000 Russian engineers. The canal, which was over 270 km long, took only months to build.448 Excavation of numerous others in the CARs followed the completion of this canal. The most notable of these other canals is the Karakum Canal, which is over 1370 km long, and delivers over ninety percent of Turkmenistan’s irrigation water today.449 The main effect of these canals was to help fulfill Lenin’s edict to convert the region into a cotton-growing district by connecting neighboring basins in order to increase water availability.

Although the success of the expansion of the irrigation system led to increased cotton yields—by the 1930s the Soviets were producing over ninety-seven percent of the country’s cotton requirements450—this success came with the price of irrevocably altering

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447 Askochensky, Irrigation and Water Supply in the Ussr, 18-22.
the traditional irrigation system. The economic policies of the Tsar and the transfer of water management to the Soviet state had already eroded the traditional irrigation system, but the development of large-scale canals destroyed the local water sources for the fields that defined so much of the Central Asian irrigation system. Villages no longer could represent their own water needs. They no longer even knew from where their water came. In this, the farmers became dependent upon the state for the delivery of their water, without the ability to influence or direct the state’s actions.

The second phase of change to the irrigation system under Soviet control occurred with Nikita Khrushchev, who in the 1950s and 1960s sought to increase agricultural production in Central Asia through the powers of mechanized technology. In the 1950s, most of the irrigation water came from streams, and not the major rivers of the basin. Water had not been drawn from the Amu and Syr Darya because their fast currents, high banks, and greatly fluctuating flows were too difficult to overcome. Yet the engineering of large dams changed all of that by controlling the flows of these rivers and providing storage for water to be used for agricultural production. Between the late 1950s and the early 1980s, large dams and reservoirs were constructed along the courses of both the Amu and Syr Darya. The Toktogul, Andizhan, Kayrakkum, Charvak and Chardaya dams were built regulating the flow on the Amu Darya. Similar extensive developments were made on the Syr Darya, leading to the complete regulation of the river's flow by the mid-1980s. These dams stored the high flows of spring for use during

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the dry summer months. The dams also supplied hydropower to the region with much of this power being used to run the large irrigation pumps.452

The construction of such large projects was only possible through a mechanized labor force. This mechanization also carried over into the construction and maintenance of the canals themselves. No longer did communities of farmers spend the winter clearing the silt from the canals that they relied upon. Under the modernization of the Soviet regime, tractor-drawn graders were used for silt removal.453 In the mechanizing of the construction and maintenance of the irrigation system, specialized crews, whose sole job was to develop and maintain the infrastructure of the irrigation system, replaced the farmers for this integral part of O&M. Although these crews were well-trained and financed, they maintained the system neither with specific interest in the performance of the irrigation system nor with the folk knowledge that the traditional farmers possessed.

As part of the trend in mechanization, pump stations replaced the old water wheels to deliver water to locations in much higher elevations. These pumps allowed for a greater expansion of the area that water could reach. Large, permanent weirs were also built into the larger canals. These weirs allowed for accurate monitoring of water flow, and could be used to allocate more accurate water distribution. Increases in the extent and accuracy of the system, however, did not equate to increases in efficiency and sustainability.

Again, these increases in technology resulted in an increase in the area brought under cultivation. In Uzbekistan, for instance, irrigated land grew by a factor of 1.52

452 Micklin, Managing Water in Central Asia, 34.
453 Thurman, Modes of Organization in Central Asian Irrigation: The Ferghana Valley, 1876 to Present, 227.
from 1970 to 1985. These supposed advances in the irrigation system required advanced technical and administrative skills. In fact, the Minvodkhoz even established its own technical school and had numerous training centers around the region. The role of elites in running the irrigation system, solidified by the need for their own schools, served to completely destroy the agency of the farmers, and make the farmers completely dependent upon the knowledge and direction of the centralized water-management bureaucracy. As the centralized bureaucracy continued to grow with the size and sophistication of the system, so did interference in the daily operation of the farm. Just as the dams constructed were outside of the scope and capabilities of what the farmers could operate and maintain, so too were the mundane and practical irrigation operations, such as when and how to apply water to their crops. The elites continued to flex and cultivate their authority until finally the farmers became little more than cogs in the machine of centralized irrigated agriculture.

At the same time as the irrigation system was being completely reformed, so too was the nature and functioning of the farms in Central Asia. The land reform initiated after the revolution was part of the Soviet administration’s goal to form large collective farms. The Bolshevik Party believed that the resources of the CARs could best be developed through the establishment of large, collective farms. They felt that the formation of such farms would facilitate the industrialization of the agricultural sector, and this transformation would lead to greater yields of cotton with less costs. To form the collectives, the traditionally small fields of individual farmers were consolidated to form the large collectives (kolhoz), which were run by a board of directors. These farms

454 Ibid., 233.
cultivated the land for the benefit of the state, and left individual workers little incentive with regard to the success or health of the farm. The formation of the collectives also led to a dramatic increase in the average field size from .3 to .8 ha to over 3.5 ha.\footnote{Micklin, Managing Water in Central Asia, 32.}

While the old traditional farms were amalgamated, new lands were opened. The Soviets viewed the large portion of lands that laid in fallow as a sign of the backwardness and inability of the khanates to successfully manage the lands for the good of the public. Thus, as the Soviets expanded the irrigation system, they opened lands that had traditionally been allocated for growing trees or that laid fallow. In opening these lands, the Soviets failed to recognize the role that these supposedly under utilized lands played for the health of the landscape. Thus, this increase in irrigated lands saw an increase to the area devoted to cotton, but not an increase in yields.\footnote{Ibid.} The newly opened lands were formed into large state farms (sov khoz).

\textit{Kolhozes} were producer cooperatives. The state assigned land to the farm in perpetuity and, in return, the collective had to deliver part of its output to the state. These farms were run by a chairman and board of directors. The farmers in the collective were paid based upon their output, but the collective controlled and performed all maintenance projects and allocated the water according to the state’s plans.\footnote{Steven C. Kyle and Philippe Andre Chabot, Agriculture in the Republic of Karakalpakstan and Khorezm Oblast of Uzbekistan (Ithaca, N.Y.: Dept. of Agricultural, Resource, and Managerial Economics, Cornell University, 1997), 4.} \textit{Sovkhozes}, on the other hand, were corporate farms. The farmers were considered workers, and received wages just as a factory worker would. The state supplied all of the capital to the \textit{sov khozes} but
then took all of the profits. Despite the institutional differences to the two types of farms, management on both extended down to the field level. Water users—farmers—had no legal rights to water and no power, let alone interest, to make decisions concerning water. In this, the farmers completely lost their interest in the successful management of water and the farm.

The disinterest of the farmers led to their passively watching unhealthy watering practices be applied to their fields without doing anything to correct it. Thurman quotes Fayzulla Khojaev, the head of Uzbekistan’s Council of People’s Commissars, commenting on the poor practice of applying water to cotton fields without regard to the soils and other local conditions.

Does the [farmer] know about this? Of course he knows, and moreover is more experienced than [the authorities]. But how is it that the [farmer] knows and still doesn’t use this experience? Because there is a great deal of command administration. A plenipotentiary comes around, sometimes with an agronomist, but they don’t know this piece of land and furthermore, rather than communicate and advise with the farmer they mechanically implement the decree concerning on-field irrigation and cultivation.

Not only were the farmers completely disenfranchised by the new collective and state farms. They were also expected to compete against one another to see who could produce the most cotton. Collective farms were grouped together into production units. The winning units of this “socialist competition” were then lauded in the press and


460 Ibid., 24.
deemed heroes and successes of socialism. Losers were blacklisted and threatened with a loss of grain shipments and manufactured goods from the state.\textsuperscript{461}

This socialist competition had a strange impact upon the farms of the CARs. Through water, tools, fertilizers, and all other inputs coming from the state free of charge, the farmers had little interest in trying to maximize their use of inputs versus outputs (cotton). Thus, the farmers passively followed the decrees of the elites in terms of how, when, and where to use water. But by asking the farms to compete against one another, with repercussions for the losers, the state did two damaging things to the culture of the farmers. First, competition completely annihilated the tradition of cooperative behavior between the farmers and water use. Now the farmers were encouraged to increase their production without having to be concerned about the costs of their inputs. Secondly, the combination of the large and bureaucratic nature of the Soviet state and socialist competition simply led to farms “cooking the books” with regard to how much cotton they produced, as they were not paid for actual production, but instead rewarded for what they claimed to have produced.\textsuperscript{462} Socialist policy thus made collective farms competitors. They were encouraged to outperform other farms without regard for the costs of doing so. In this, not only was the tradition of collective behavior by the farmers ended, but competition between the farmers encouraged.

The nature of collective and state farms, a lack of control over water allocations or water rights, and the encouragement of competition between farmers and farms all served to detach the farmers from the land that they worked and the water needed for

\textsuperscript{461} Ibid., 26.

\textsuperscript{462} Ibid., 27.
agricultural production. The negative consequences to separating the farmers from the land and water remained in place until the 1980s. Amongst the many reforms instituted by Mikhail Gorbachev during Perestroika was the reintroduction of the "peasant farmer." The Soviets pushed for smaller collectives, hoping that would increase the ties between the farmers and their land. At the same time, the state began contracting parcels of land to individual farmers. These types of reforms carried out by the Soviets have been slowly followed by the GOU as described in chapter three.

With the brief description of state and collective farms given, it is clear to see the damaging effects they had on the land, the irrigation system, and the behavior of the farmers themselves. Despite the negative impacts of the large farms, it is unfair to put the blame on collective farms. In the at times all-too-simplistic debate on how to reform and improve irrigated agriculture in Uzbekistan, many presume that collectivization in and of itself is bad. Countering such a sentiment, Thurman suggests that collectivization in the CARs was not so much the problem as was the command administrative system that they fell under.464

The Irrigation System since Independence

After decades of Soviet spending that focused upon expanding, instead of maintaining, the system, the irrigation system that the CARs inherited was highly


464 Thurman, The "Command-Administrative System" in Cotton Farming in Uzbekistan 1920s to Present, 43.
degraded. Canals were unlined and in poor shape. Fields were largely uneven. Pumping stations were clogged and often not capable of being used. Unfortunately, the condition of the irrigation system under the independent states has only worsened.

A loss of money and support from the Soviet Empire has left Uzbekistan in a dire economic position. Because of a shortage of funds, maintenance projects are all too often dropped from the budget owing to their being considered unessential. The Ministry of Agriculture and Water Management (MAWM), which is responsible for the maintenance of the main and distributary canals, has failed to keep up with the needed maintenance because of a lack of funding.\textsuperscript{465} Intensifying money shortages, much of the equipment and parts used in maintenance projects were produced in the Soviet Union. With the collapse of the Soviet Union, many of the plants producing these parts were closed.\textsuperscript{466} This has left Uzbekistan with a fleet of maintenance equipment that is no longer usable. The loss of expensive maintenance equipment decreases the state’s ability to successfully manage the system and increases the amount of money that the state needs to allocate towards maintaining the irrigation system.

In addition to money shortages, maintenance of the irrigation system has decreased with the transfer of management from Moscow to Tashkent. Maintenance of both inter and intra-farm canals has dropped off since 1991 as the institutions that managed them under the Soviets have been reorganized and are passing through a period of transition. Inter-farm canals appear to be the responsibility of the MAWM at the oblast level. But with these canals lying between the already neglected main canals and

\textsuperscript{465} Micklin, \textit{Managing Water in Central Asia}, 62.

\textsuperscript{466} O'Hara, "Managing Turkmenistan's Kara Kum Canal: Problems and Prospects," 229.
the farms that they feed, these canals fall to the bottom of the to-do list, and thus remain largely neglected. The intra-farm canals were the responsibility of the collective farms, but as more and more private farms are formed, these canals are not being maintained because of a lack of funding and knowledge of how to properly maintain the canals.\footnote{Micklin, \textit{Managing Water in Central Asia}, 62.}

A lack of inadequate maintenance, combined with an already decrepit irrigation system, has led to a deteriorating infrastructure during the past fifteen years. Dredging sediment from the canals is an endless task; one the GOU has thus far been unable to complete. This has led to the clogging of many pumping stations and the complete abandonment of many secondary and tertiary canals. Thus, sediment build-up has decreased the ability to proactively manage where the water goes and when. Sediment build-up, along with the antiquated management system, causes excessive amounts of water to be diverted to fields, and this misuse of water is more than just wasteful; it contributes to the water logging of soils and salinization.

The highly deteriorated condition of the canals, head-gates, and drains needs attention when discussing the transfer of management to WUAs. A WUA is judged successful by its ability to meet its objectives.\footnote{Kolavalli and Brewer, "Facilitating User Participation in Irrigation Management," 254.} If farmers are forced to join WUAs against their will, and then expected to maintain a highly degraded system of canals and drains, the farmers will not see immediate benefits exceeding the costs of collective maintenance. In this, the WUAs can ultimately be a destabilizing force in the region, only worsening the condition of the irrigation system.

\footnote{Micklin, \textit{Managing Water in Central Asia}, 62.}
Conclusion

The traditional irrigation systems of Central Asia were sustainable and well adapted for the local conditions. The systems were defined by local hydrographical features, and were worked and maintained by the very farmers who relied upon them. Because of the local nature of the irrigation systems, the farmers knew where the water delivered to their fields came from. At the same time, through connecting water rights to the need to contribute to the maintenance of the system, the traditional irrigation systems not only were well maintained and enduring, but also served to form lateral bonds among the farmers. Each spring, the farmers would work together on the system. In doing so, the farmers got to know each other and also understood and appreciated how their actions affected others. Also, by connecting water rights to labor, free riding was not an option for the farmers. In order to receive water, they needed to collectively manage the system.

In addition to the lateral ties, the traditional maintenance practices encouraged, by having the water users themselves not only oversee their own fields but maintain the system, the farmers were intimately aware of, and understood, the operations and nature of all aspects of the irrigation system. Through this, the water users not only knew the villages both upstream and downstream from their own, but also the consequences of overdrawning water, and the impacts that it had on the others. The farmers understood the implications of overdrawning water and how this could damage not only their yield for the year, but contribute to the salinization of their fields. By using locally developed knowledge to operate their farms, as well as the irrigation system, the farmers were the key constituent to the healthy operation and maintenance of traditional irrigated agriculture.
Under the Soviets, all this changed. The irrigation systems were expanded and ultimately connected, forming one system. In the centralized system, no longer could the water users know from where their water came or who was at the head and bottom of the canal. While the size of the system expanded beyond the extent of the traditional systems, so too did the technologies employed. The irrigation system, in becoming highly centralized, became a sophisticated engineering project, and control of the system was removed from the water users themselves and fell to technocrats and politicians. This change in power also saw the complete abandonment of the locally developed understandings of water and irrigated agriculture. Thus, the expansion of the system and the types of knowledge employed ultimately served to disenfranchise the water users, and separated the water users from one another as well as from the land.

The interface between the elites—the engineers, Communist Party members, and water managers—and the farmers produced conflict in the types of knowledge used by the two groups to understand the irrigation system. The elites relied upon nomothetic knowledge to manage and operate the system. They saw the system in terms of abstract theories and principles of how water should be managed, delivered, and applied. At the same time, the remote, rural farmers understood their fields and access to water in terms of locally developed folk knowledge. This discrepancy between the Soviet elites and Central Asian farmers served to marginalize the farmers in the management process, as their folk knowledge was viewed as primitive and inferior. This asymmetrical distribution of power left the farmers feeling voiceless in the system. The stripping of value from their knowledge and subsequent control of the irrigation system fostered a heightened disinterest on the farmers’ part in participating in water management.
Clearly, the advances in the irrigation system under Soviet authority did much to reduce the role of the farmers. However, this is not to say that the increases in technology alone resulted in engineers and politicians completely overtaking the water management system, leaving the farmers out of the equation. The disruptions and subsequent changes to the traditional irrigation system date back to the economic policies of the Tsar that favored cotton production. Subsequent Soviet interest in making the CARs a cotton-producing region, driven by their theories of resource exploitation and collectivization, also played a significant role in transforming the irrigation system. Thus it is important to view the changes to the irrigation system diachronically, and not rely upon preconceived ideas of the interrelations between states and water management, such as the hydraulic theory.

As the GOU looks to return responsibilities of management and decision-making to the water users, it is important that the effects resulting from the changes to the irrigation system be considered. The knowledge, finances, and social structure that traditionally existed are now gone. Unfortunately, providing education regarding how to manage intra-farm canals and subsidizing the tools needed to do so is not enough. Under the Soviets, centralized management served to sever water users from both their land and each other. Collective management on the part of water users cannot and will not happen until these ties that traditionally existed are restored. The next and final chapter looks at where social capital existed in the traditional irrigation systems, what happened to this capital under the Soviets, and what needs to be done to help foster a successful adoption of WUAs by the farmers in Uzbekistan today.
CHAPTER SIX

SOCIAL CAPITAL AND LAND AND WATER REFORM

A culture of water waste emerged, and my own observations confirm that it still thrives.
-Thomas R. McCray

In the traditional view of the historical irrigation systems of Central Asia, the khan was a totalitarian ruler who used his despotic tyranny to keep the irrigation systems running. The farmers were all landless and had no understanding, let alone say, in how the system that they depended upon operated. The locally developed operations and practices used by the farmers were considered crude and inadequate. With such a view of the systems, it is assumed that social capital played virtually no role in the successful management of water and the operations of the farms.

The perception of the irrigation systems being run by despots and worked by ignorant and landless farmers is a simplification to the point of being misleading. Irrigated agriculture had a long and successful history in Transoxiana prior to the arrival of the Russians, and this success is largely dependent upon the “features of social life” that enabled the farmers and administration to effectively control, manage and deliver water. Islam, modes of management, water rights and traditional maintenance practices all combined to form lateral ties among farmers and strong connections between elites and farmers. This final chapter summarizes the role that social capital played in the traditional irrigation systems, the implications of the current stock of social capital, and the need for further study on water in the Aral Sea Basin.

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McCray, DEnviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems(), 86.
Social Capital and the Irrigation System

As current attempts to use social capital through the adoption of WUAs is pursued, it is important that such reforms are undertaken with a sound understanding of social capital, as well as its current status. This section attempts to summarize the history and changes to the irrigation systems as they relate to social capital. The summary is divided according to Uphoff's four functions of irrigation management: decision making, resource mobilization, coordination and communication, and conflict resolution. These four functions are explained in the literature review found in the first chapter. Within the summary for each of the four functions, impacts to social capital under the Soviets, as well as the current stock, are also reviewed.

Decision making

In the traditional irrigation systems of Transoxiana, decisions concerning water management and usage occurred mostly at the farm and regional level. Farmers had a voice in decisions through their village elders (aqsaqal). The farmers participated in all aspects of O&M, and, as such, their decisions were based on experience and an understanding of the system. Because of this, the farmers played a key role in decision making. With decisions happening at the field level, decisions were both timely and site specific, which helped ensure appropriate management.

The rules and procedures concerning decision making were largely made possible through the strong regulating factors that Shari'a and odat played in the communities. Through Shari'a and odat, farmers were encouraged to act in a "seemly manner" and elites to manage for the common good. The importance that religion and custom played in creating rules, trust and connectedness among all agents in the irrigation systems
cannot be overstated. Initial failures of Bolshevik land reform, where the farmers failed to take the land as the Soviets had hoped, illustrates the strength of religion in regulating social behavior. Farmers would not take land and objects that did not belong to them because it was not in accordance with their traditional rules.

In addition to religion and custom, the traditional small size of the fields served to keep the farmers on an equal footing, as power and land did not accumulate in the hands of a few. This served to promote a democratic character to the decisions made.

Religion, customs, and the farmers’ role in decision-making helped ensure that decisions were made for the common good. Water rights and land tenure, with both resources considered public domain held in trust by the khan, served to influence what decisions were made. Traditional water rights considered water to be an exhaustible resource, and decisions were made accordingly. Through water being viewed as exhaustible, the management and water users acted to ensure that it was available for all.

Under the Soviets, however, decision making was moved from the fields and regional districts to Tashkent and Moscow. With this shift in where decisions were made, the knowledge used to make decisions was kept from the farmers, and the farmers ultimately became despondent as they felt left out of the process. Although the technical advancements to the system influenced the gap between the farmers and decision making, Soviet politics, which were interested in control and assuagement, greatly heightened the marginalization of the farmers. Also, with shifts in land tenure and water rights, water was deemed an inexhaustible resource. This greatly influenced how decisions were made by elites, and how farmers followed these decisions.
Any attempt to reintegrate the farmers into the decision-making process must be accompanied by a strong education program. With decisions moved from the fields to the capital, the farmers’ knowledge and understanding of the irrigation system has been squandered. At the same time, with decisions being made so far away from the fields, and water viewed as inexhaustible, the rules and norms of decision making have also been lost on the farmers. Thus education programs cannot be solely technical, but must also help instruct the farmers in the processes and consequences of their decisions.

Resource Mobilization

In the traditional irrigation systems, the state, guided by both religion and self-interest, served to ensure that sufficient water was available for all. The irrigation systems were defined by hydrographical boundaries. A group of villages, normally around ten, would share a second-order canal. The *mirab bashi* enforced customary rules, such as banning rice production at the head of a canal, to ensure that water was available for all villages. At the village level, village identity and close social ties fostered cooperative behavior amongst the farmers. More than religion or ethnicity, identity was based upon the village. This village identity produced strong connections and trust among the villagers. Also, the villagers were aware that it was to their advantage to work cooperatively in terms of maintenance and fieldwork. Such awareness limited competition for water. At the same time, farmers’ knowledge of site-appropriate farming practices and the implications of over-watering the fields led to conservative applications of water and the minimizing of water use.

Maintenance of the irrigation systems was conducted by the water users themselves. Every spring, any farmer who drew water from his local irrigation system
was expected to contribute labor, animals, and tools to help maintain the system. Through maintaining the system, the water users increased resource mobilization and developed social capital. By having the farmers perform the maintenance, free riding was not an option. Drawing water was tied to responsibilities, and established reciprocity between the state and the water users. Also, the water users became intimately aware of how their system operated and who they shared water with. Through meeting every spring to maintain the system, the farmers from the connected villages came to realize what role their personal practices played upon the health of the system, and who their practices affected. This helped build strong connections among the farmers and between the farmers and the system and water they relied upon.

As the irrigation system was centralized and expanded under the Soviets, resource mobilization became overly hierarchal and specialized. Farmers were given specific duties on a collective farm, and completely removed from the O&M of the system, as mechanized crews took over such duties. Although the new duties were clearly defined by the collective and state farms, the large farms served to separate farmers from each other and their land. The collective farms also separated those who maintained the system from those who benefited from the maintenance. Farmers no longer worked cooperatively, but instead they performed individual duties for the collective (or state) farm. In this, there was little incentive to form strong connections with the other farmers or to be concerned with water management. Water was guaranteed by the state and delivered to the farmers. They merely applied it as they were instructed to. This served to instill in the farmers a passive nature toward water management.
The collective farms served to disconnect farmers from the consequences of their actions. Attempts to reintroduce increased resource mobilization responsibilities for water users must be pursued very slowly. The culture of passivity towards water use, and a lack of connections between the farmers, must be addressed. Under the Soviets, a traditional cooperative culture at the village level was replaced by large state-run farms. It will take time for trust between farmers and elites to be restored, and thus farmers should not be given more responsibility than their community can handle.

**Coordination and Communication**

The khanates were large political entities that encompassed a wide assortment of lands and peoples. The size of the states, along with the difficulties of traveling across them, caused communications to be slow and inefficient. The khan’s difficulty in easily communicating with outlying districts led to much regional autonomy. Each region, defined by water boundaries, was responsible for the O&M within its boundaries. Within each region, there was a hierarchal organization of senior and junior officials. For the most part, these officials were elected by the farmers whom they served. In addition, the elites emerged from the communities themselves. By electing local farmers to higher positions, the knowledge and customs developed and utilized by the farmers were maintained and reinforced within the administration of the irrigation system. This not only served to preserve folk knowledge in the districts, but also minimized the gap in terms of knowledge, identity, and ultimately trust between the farmers and the officials.

Each village had a democratically appointed elder to represent the village’s needs to higher officials. This allowed communications to flow from the fields to the elites in a bottom-up direction. At the same time, officials were paid directly by the farmers under
them. This gave the water users an ability to hold the officials accountable for poor management practices.

In addition to the ability for communications to flow in both directions vertically, horizontal networks among farmers also existed. Within each village, farmers pooled their labor and resources in associations called tops. At the village level, several villages would also pool their resources to work together. These organizations were voluntary, and formed because the farmers understood that they could maximize their efforts through collective behavior. In these organizations, ideas and decisions freely traveled in horizontal directions.

The networks that allowed communications to flow in vertical and horizontal directions were severed by the Soviets. As the irrigation system became more centralized, so too did communications within an overly hierarchical system. All communications ran through Moscow, and were controlled by politicians and technocrats far from the fields. In this system, communications only traveled from the elites to the farmers under them. Communications among elites were also restricted by officials in Moscow. Although under the Soviets more information of greater accuracy was able to travel more quickly, thus allowing more coordinated efforts to take place, these efforts were not a result of a democratic process. Nor were these efforts successful in facilitating a sense of belonging and attachment. Instead, the tightly controlled nature of communications forced the farmers to become dependent upon the Soviets for their information and operations.

International agencies must proceed with efforts to improve irrigated agriculture in Uzbekistan with an understanding of the role of dependence and passivity instilled by
the Soviets. The traditional nature of communications fostered a participatory element in water management. This was broken by the Soviets. Public participation and awareness of the issues facing irrigated agriculture is, nearly fifteen years since independence, still extremely low.\textsuperscript{470} The public as well as farmers still expect the state to deliver water, and thus feel that they need not be concerned with issues of water. Because of this, any development efforts must be cautious to not fill the void left by the Soviets as the supplier of water. To do so would allow the water users to continue their passive role in the system. Such concerns are substantiated by McCray's interviews with farmers who expressed their hope that international assistance will fix the problems of water shortages.\textsuperscript{471}

\textbf{Conflict Resolution}

In the traditional irrigation systems, the khan served as the ultimate judge in resolving conflicts. Despite this power, the khan almost never interfered in decision making or conflict resolution. \textit{Mirabs} served as the khan's agent, and ultimately made decisions with regards to conflicts. In this system, the \textit{mirab} was the final judge. Despite this power, the \textit{mirab} rarely had to resolve disputes over water rights or allocation. When problems or concerns arose, the farmers would meet with the \textit{mirab bashi}, and decisions over conflicts would be made through consensus. In this, decisions were considered valid and just, and the rules and processes through which they were made were understood by those affected.

\textsuperscript{470} Dukhovny and Sokolov, \textit{Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin}.

\textsuperscript{471} McCray, □Enviro-Economic Imperatives and Agricultural Production in Uzbekistan: Modern Responses to Emergent Water Management Problems□, 253.
Starting with the Russians but furthered by the Soviets, the ability for conflicts to be resolved at the local level disappeared. The expansion of the irrigation system led to an expansion in the number and scale of conflicts. The expansion saw the resolution process moved from the fields and farmers to the cities and bureaucrats. Although the rules under the Soviets were clear, and elites able to quickly and efficiently resolve conflicts, these decisions were not considered to be equitable. This system left the farmers uncertain as to how conflicts were resolved, and ultimately left them questioning whether the resolutions were fair or applicable.

The lack of equity in conflict resolution left the farmers feeling disenfranchised. Current attempts to shift responsibilities and management to the local level must make efforts to ensure that conflicts are not simply resolved by those with power. In other words, it is important that the farmers not feel that unfair and impractical resolutions are now being made at the local level. If this were to occur, the farmers’ willingness to participate in collective management would be greatly diminished.

The Current State of Social Capital and Implications for the Adoption of WUAs

There are two clear conclusions to be drawn from the above analysis. First, social capital did play a role in the successful O&M of the irrigation systems in Central Asia. Secondly, the networks, norms, and trust that enabled this to happen greatly diminished under the Soviets, and the current stock of social capital in the Aral Sea Basin is greatly depleted. Islam and customs served to form bonds between the farmers, the land, water and the state. These bonds produced trust among all agents in the system, and ultimately
fostered an increased ability for cooperative action by the farmers. Unfortunately, the bonds, traditions, and trusts that have been broken cannot easily be restored.

The diminution of social capital in water management and the irrigation systems of Transoxiana have numerous causes, but two stand out for their prominent role in separating the farmers and disrupting water management. First, the switch from a “natural” economy to a market economy that came with the Russians greatly transformed how water was understood, used, and managed. With the switch in economies, farmers became more focused upon securing more water for themselves, without regard for others. Such behavior was partially fostered by the loss of junior officials to supervise the distribution and use of water, but the drive for profit served to separate the farmers from one another and their ability to understand and appreciate their impacts upon other farmers. The collective good was neglected as the farmers worked more for themselves.\textsuperscript{472} The economic priorities of the Soviets only worsened the stock of social capital. National priorities, mainly the production of cotton, trumped local considerations, such as labor concerns and water resources.

The second major force to diminish social capital in the region was the introduction of a socialist state with its capital in Moscow. In theory, socialism aimed to connect the farmers, who would then work for the common good. Unfortunately, the opposite was true. Coercion, land reform, competition amongst the farms, and a hierarchal and totalitarian management regime all served to breakdown the bonds that

\textsuperscript{472} The disrupting and negative impacts of a market economy upon traditional communities is well documented. Fela Kuti captures the feelings of frustration and disappointment by non-Western populations with market economies in his song \textit{Coffin for Head of State}. Although written from, and for, the African perspective, his words ring just as true for the traditional farmers of Turkistan: “It is a known fact that for many thousand years, we [farmers] we had our own traditions. These money making organizations, them come put we [farmers] in total confusion.” Fela Kuti, \textit{Coffin for Head of State} (Universal City, Cali.: MCA Records).
existed between farmers and elites and reduced the capacity of the state to successfully manage water.

These two forces that have weakened social capital in water management are congruent with McKinney’s two explanations for the environmental problems of the Aral Sea Basin (see page 33): failures in economic planning and changes in traditional farming and farms. In this, it becomes apparent that social capital, the traditional irrigation systems, and the sustainability of agriculture in the basin are tightly linked. This is not to say that economic and political reforms are not needed. They clearly are. But, as such reforms are pushed forward by international agencies, it is important that they not just consider treating the economic and structural aspects to farms without recognizing the implications and need to encourage social-capital development.

**Barriers to the Successful adoption of WUAs in Uzbekistan**

With the state of social capital so depleted, the successful transition to WUAs will be difficult to achieve, and should be approached cautiously and deliberately. In order for self-governance to take place, many changes must first occur. This section briefly reviews what is needed for a successful transformation to take place, and what can be done to help the switch occur.

Land and water must both be redefined in terms of “social relations” with respect to something of value.\(^{473}\) Such a redefinition is only possible through an increase in the trust and connections among the farmers, their land, and water. This will not be an easy nor quick task to accomplish. It is perhaps worth noting that the Bolshevik land reform in the CARs was unsuccessful for many years, and that it was only after an intensive

\(^{473}\) Bromley, "The Commons, Common Property, and Environmental Policy," 2.
reeducation program that the farmers started to act as the Soviets hoped. Now, once again, a mix of elites, governments, and international agencies are hoping that the farmers will quickly adapt to major reforms. The farmers need to fully understand what the intent of the reforms is, and what the implications are with regards to their livelihood. To accomplish this, just as with the previous land reform, not only the laws and bureaucracy that surround tenure and water rights must be changed, but also the culture and values of the farmers. This will take time, and must be approached with care and sensitivity to the complex history of the farmers and tenure in the region.

Agricultural production and social organization were connected by the Soviets through the development of large, inefficient state and collective farms. The adoption of WUAs thus must involve the development of households and villages independent of the legacy of the *kolhozes* and *sovkhozes*. Although land reform thus far in Uzbekistan has strived to produce private farms, the necessary subsequent changes in infrastructure, elites, and community have not been made. Many of these new farms must draw their water from the collective farms, and local authorities and collective managers still retain much of their power and influence. Based upon observations made in 2000, Kai Wegerich noted that WUAs in Uzbekistan were not very active, and that the directors of the WUAs were the former chairmen of the *kolhozes*. In this, the WUAs, although superficially different from the *kolhozes*, are similar to the old Soviet collectives, with little input on O&M from its members. So far, new villages and communities to

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replace the institutional, authoritative and ultimately cultural legacy of the collective farms have eluded reforms being undertaken. Truly self-governing WUAs cannot be realized until the control and power of the collective farms are removed from village life.

Building a vibrant, trusting, democratic, and connected community is not easily accomplished. Despite the difficulty of the task, the importance of strong villages to the health of water management cannot be ignored, and thus community development should not be avoided. Rural community development projects have been pursued in Russia as a means to replace the influence of state and collective farms in agricultural production and social organization. The GOU and international organizations should look to such projects for ideas and inspiration as to how to help build a rural community more capable of collective management.

Socialism versus Neoliberalism

WUAs are expected to produce water savings and increase crop yields as the farmers work to minimize their inputs collectively. The focus of this study has been on the social variables through which water has been managed. Tangentially, the economic conditions through which these social variables existed have also been discussed. Of course, the Soviet era was marked by a command economy and socialism. Many economists have pointed to the “quotas and free delivery” produced by Soviet socialism as being a “recipe for disaster.” Now, in hindsight, the failures of socialist planning and water management in Central Asia are plain to see, but the path forward—the path

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towards a healthy ecosystem, water savings, and better life for the farmers—is, unfortunately, not so clear.

With the failures of socialism as the background, it is important that attempts at reform proceed with a balanced view of a way forward. Many within the international community now feel that much as collectivization and free inputs have destroyed irrigated agriculture in Central Asia, water pricing and privatization will save the farmers and landscape. The sustainability of current development models, based upon the success of the West, must be questioned. Just because socialism has failed does not mean that neoliberalism will succeed. Bruno Latour articulates the dangers of a world transitioning from socialism toward neoliberalism:

The various manifestations of socialism destroyed both their peoples and their ecosystems, whereas the powers of the North and the West have been able to save their peoples and some of their countrysides by destroying the rest of the world and reducing its peoples to abject poverty. Hence a double tragedy: the former socialist societies think they can solve both their problems by imitating the West; the West thinks it has escaped both problems and believes it has lessons for others even as it leaves the Earth and its people to die.

When looked at from the context of traditional irrigated agriculture in Uzbekistan, the prospects for water pricing and privatized land look bleak. The international community should remember that the long and productive legacy of the agrarian economy in Turkistan first broke down as free market forces destabilized the countryside. Russia assumed that a market economy and the Western concept of private property would lead to increased productivity, stability, and civility. As it turns out, the

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478 For example, Kotlyakov et al., "Concept for Preserving and Restoring the Aral Sea and Normalizing the Ecological, Public Health and Socioeconomic Situation in the Aral Region."; Lerman, "Land Reform in Uzbekistan."

opposite happened. With regard to Uzbekistan today, water pricing might very well cripple private farmers who cannot manage to make a living while paying for the water necessary for their crops. Also, as private farmers cannot afford to make a living with such reforms, land might very well accumulate in the hands of a few.

The concerns mentioned above are not meant to suggest that there is no value to water pricing and land reform, only that such reforms should be pursued with sober leadership. Water pricing and privatization both played a role in the success of irrigated agriculture and water management in the past, but they did so with elaborate mitigating factors to ensure that water and land were available to all. It is the author's fear that a zealous belief in privatization might lead irrigated agriculture down yet another destabilizing path. For this, development in the Aral Sea Basin must proceed with great caution. Despite the huge costs of continuing with the status quo in the region, a blind dash towards free markets and WUAs in the countryside might only serve to destabilize the ecosystems, economies, and social conditions further. At the same time, questions must be raised about the sustainability of the Western model of development. Again, just because socialism failed, does not mean that neoliberalism—even if its effects are mitigated through collective user associations—will save the countryside.

Further Studies

In this thesis, the role of social capital in water management has been examined. From the author's research, the need for further studies has become apparent. As land and water reform continue in the Aral Sea Basin, it is important that further research be

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480 Brower, Turkestan and the Fate of the Russian Empire, 60.
conducted on the historical context upon which such reforms are made, as well as the current environment—physical and social—for reforms.

The conclusions drawn in this thesis should be questioned and reexamined. Because of a lack of a detailed historical record of water management in the basin, many inconsistencies in the literature exist. Further research, especially of Russian records, should be made to test what role trust, social networks, and reciprocity played in water management and use. In particular, the historical context of social capital in irrigation management would benefit from an examination of records and accounts that focused more specifically on how the farmers interacted and appreciated the irrigation system. At the same time, the research conducted here only goes back to water use prior to the arrival of the Russians. As water management evolved over time as a response to changing political and environmental conditions, it would be informative for further studies to consider how water was managed prior to the khanates.

In the literature, it was clearly shown that the khanates used religion to make political capital. Further research could help identify the role that Islam played in shaping the social context through which the irrigation systems were developed, managed, and used. Shari‘a shaped the political and social spheres of life in the khanates and, through this, how resources were managed. Future research could also examine how Islam was melded with local customs with regard to natural-resource management in Central Asia. The Uzbek proverb provided at the beginning of this thesis describes water as the “lifeblood” of the farmer. Was water made sacred through rituals? It is worth investigating whether rituals were used to influence and control how water was viewed
by the public, and if water was deemed sacred by the farmers. If so, how did these rituals affect the farmers’ use of water and understanding of water management.

In addition to further research on the historical context of irrigated agriculture in the region, studies need to look at how the farmers and the public currently appreciate water and land reforms. Traditionally, the farmers were a large component of the decision-making process and resource mobilization. Through their active participation in water management, they were very much aware of issues and concerns regarding water. Currently, farmers do not appear to be either very aware of, or interested in, water issues. Land and water reforms would benefit from an increased understanding of what the farmers interpret the current water issues to be, and how they appreciate their role in implementing solutions. Do farmers understand what the current development efforts are? Do they agree with them? How do the farmers understand the Soviet legacy? Do they miss it? If so, why?

If the farmers are to react in a favorable manner to current reform efforts, they need to be addressed specifically and brought in more directly to the reform process. Questions such as those above, and others, need to be answered in order for this to happen. In addition, public awareness of water concerns is extremely low. This disinterest on the public’s part affects how the government and farmers respond to the need for reforms. Questions of why the public is disinterested, and what role public unawareness to water shortages plays in development efforts, must be explored.
Conclusion

Current environmental, economic, and social conditions of the Uzbek countryside are not conducive to sustainable irrigated agriculture. Legal, economic, and infrastructural reforms are being pushed onto the farmers with the hopes of improving water savings and crop yields. Although such reforms are necessary, in order for them to be successful they must occur in concert with social reforms that focus upon the culture of water use and irrigated agriculture. Admittedly, it is difficult to identify and measure social variables such as trust and the connectedness that foster successful management, but the costs of ignoring social capital require that this be done.

The partial transfer of water management from the state to WUAs hopes to use social capital to increase water management. Although social capital has been used to increase the participation of users in irrigation systems elsewhere, this has not been accomplished without a strong stock of capital to tap into. Unfortunately, such a stock is not currently available. Despite the urgent need for change in irrigated agriculture in the Aral Sea Basin, pushing responsibilities on the water users before they are prepared to handle them will only serve to further destabilize the system, as the costs of belonging to a WUA will outweigh the benefits. Thus, it is imperative that elites and international agencies take deliberate steps to foster networks, trust, and reciprocity that will increase the farmers' ability to manage water. Traditionally, successful agriculture relied on trust, reciprocity and social networks. From this history of success, there is both hope and suggestions as to how WUAs can be successful in Uzbekistan.

In the traditional irrigation systems, the farmers retained control and power over their fields, and had to work collectively to maintain the canals. The farmers understood
the system upon which their livelihood relied, and were active participants in all aspects. In order for WUAs to work, farmers need to be empowered and encouraged to make decisions over water. In order for this to happen, they need to be educated not only on the technical aspects, but also the bureaucratic aspects that influence how and why decisions are made.

Teaching farmers about democratic modes of government will not take root unless there is a cultural environment conducive to such management. Power and knowledge were concentrated within the collective and state farms across Uzbekistan. Any attempt to rebuild social capital must address the replacement of the functions and roles that the collective farms played in the countryside. The traditional villages that relied upon democratically elected elders offer direction with regard to how villages can, in fact, replace the order of the collective farm. At the same time, community-development programs underway in Russia can also be instructive.

WUAs as self-governing organizations rely upon the active participation of its members. Current education programs serve to enable farmers to make wise decisions for their farms and canals, but these efforts must be accompanied by efforts to encourage participation in the systems by the farmers. As Uzbekistan breaks its connections from the Soviet era, there is a great interest on the Uzbeks' part to purge Soviet influences from their culture. Education programs in the countryside can take advantage of such an interest by focusing upon the legacy of irrigated agriculture in Transoxiana, and the role that the traditional farmers played in managing and operating the systems. By focusing upon the legacy of the active and involved farmers in the Aral Sea Basin, educational efforts can help foster a more participatory culture in the countryside.
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