

Responses to Agrarian Transition in Central Asia
Reaktionen auf die Agrartransformation in Zentralasien

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Abstract

For nearly three decades, the Central Asian countries have been undergoing transition. The common goal of diversion from the Soviet political and economic system has been less prominent recently. The new challenge is how to build further a development path which depends not only on decisions of speed or content of reforms, but also on how these reforms were accepted and responded to by rural actors, what were the consequences and how they interacted with other socio-economic, historical and cultural factors. It is important to consider not only whether reforms reached their direct recipients, but also how other actors, institutions or contexts influenced, interacted and produced changes.

The motivation of the dissertation is driven by various responses of rural societies to agrarian transition, which we find carry common institutional patterns. The research presented in this dissertation aims at understanding whether agrarian reforms rely on formal institutions or were adversely/positively affected by informal ones or rule of power. We address this question through describing and comparing cases of institutional changes in the agrarian sector of three economies in transition: Kazakhstan, Tajikistan and Uzbekistan. We assume that historical experiences, policy and power legacies can frame agrarian institutions and actions as well as behaviors of rural dwellers. Clashes of old and new institutions can break even persistent, path-dependent formal institutions as actors may respond by using alternative informal institutions that fill the gap of functionality of the agrarian sector and support subsistence agricultural production in rural areas.

We apply a unique combination of socio-economic, anthropological and comparative analytic approaches to investigate agrarian institutional responses in rural Central Asia. Our empirical data and analysis utilize a mix of qualitative and quantitative methods in order to better address the complex context and interrelationships between various agrarian, social and traditional institutional mechanisms, especially, the significance of informal ones.

The individual focus of our analysis on formal institutional reforms related to land, water and restructuring of farms provides the overall framing to identify the responses coming from farmers, water users and agricultural workers. Responses of the actors included unexpected and unintended actions by utilizing alternatives to formal or conventional institutions including the following cases: 1) The feminization of agriculture and erosion of traditional gender roles; 2) Utilization of social capital institutions and informal security nets in conditions of uncertainty of reforms and environmental restrictions; 3) Creation and re-creation of informal water institutions by excluded and water use restricted actors. Institutions are subject to manipulation by social actors who do not follow all norms and rules blindly but, according to the specific situation and circumstances.

There is a need for a holistic view on rural societies and accounting for factors, which can potentially impact the course of implementation or modification of initiated reforms. In all cases presented in the thesis we observe the persistence of path dependent agrarian structures which are driven by history or political interests. Even though formal institutions are fully or partially changed and implemented, their impact may be insignificant and outcomes unpredictable and unintended.

Keywords: Central Asia, transition, institutional responses, agrarian reforms

Zusammenfassung

Seit nahezu drei Jahrzehnten befinden sich die Zentralasiatischen Länder in einem fortlaufenden Transformationsprozess. Das gemeinsame Ziel, sich vom sowjetisch geprägten politischen und wirtschaftlichen System zu lösen, fand in letzter Zeit weniger Aufmerksamkeit. Die neue Herausforderung besteht darin, wie der weitere Entwicklungsweg aussehen soll, was nicht nur vom Entscheidungstempo oder dem Reforminhalt abhängt, sondern auch berücksichtigt, wie dies von ländlichen Interessenparteien akzeptiert und beantwortet wurde, welche Konsequenzen sich ergaben und wie sie mit anderen sozioökonomischen, historischen und kulturellen Faktoren interagierten. Dabei ist es wichtig, nicht nur zu untersuchen, ob die Reformen bei den Zielgruppen angekommen sind, sondern auch, wie andere Akteure, Institutionen oder Kontexte sie beeinflusst haben und Interaktionen oder Änderungen eintraten.

Die Motivation dieser Dissertation leitet sich aus den unterschiedlichen Reaktionen ländlicher Gesellschaften auf den Agrarwandel ab. Diese weisen gemeinsame institutionelle Muster auf. Die in der vorliegenden Dissertation vorgestellten Untersuchungen sollen zum Verständnis beitragen, ob agrarpolitische Reformen auf formale Institutionen angewiesen sind oder von informellen oder Herrschaftsregeln gegenteilig/positiv beeinflusst wurden. Zur Beantwortung dieser Frage werden in dieser Dissertation verschiedene Fälle von institutioneller Veränderung im Agrarsektor innerhalb von drei Transformationsökonomien beschrieben und verglichen: Kasachstan, Tadschikistan und Usbekistan. Als Ausgangspunkt diente die Annahme, dass historische Erfahrungen, sowie das Erbe bisheriger Politik- und Machtverhältnisse die landwirtschaftlichen Institutionen und Handlungen sowie das Verhalten von Landbewohnern beeinflussen können. Das Aufeinandertreffen von alten und neuen Institutionen kann sogar herkömmliche, pfadabhängige formale Institutionen durchbrechen, da die Akteure möglicherweise auf alternative informelle Institutionen zurückgreifen, die Funktionsschwächen des Agrarsektors überwinden und die landwirtschaftliche Subsistenzproduktion in ländlichen Gebieten unterstützen.

Um die institutionellen Reaktionen der Agrarwirtschaft im ländlichen Zentralasien zu untersuchen, wird eine einzigartige Kombination aus sozioökonomischen, anthropologischen und vergleichenden analytischen Ansätzen herangezogen. Die empirischen Daten und ihre Analyse verwenden eine Mischung aus qualitativen und quantitativen Methoden, um den komplexen Zusammenhang und die Wechselbeziehungen zwischen den verschiedenen landwirtschaftlichen, sozialen und traditionell-institutionellen Mechanismen, insbesondere die Bedeutung informeller Mechanismen, besser zu erfassen.

Der individuelle Fokus dieser Analyse auf die formal-institutionellen Reformen in Bezug auf Land, Wasser und die Umstrukturierung von landwirtschaftlichen Betrieben bildet den Rahmen für die von Landwirten, Wassernutzern und Landarbeitern gegebenen Antworten. Zu diesen Antworten der Akteure gehörten unerwartete und unbeabsichtigte Maßnahmen, indem Alternativen zu formalen oder konventionellen Institutionen in Anspruch genommen wurden, einschließlich der folgenden Fälle: 1) Feminisierung der Landwirtschaft und Zerschneiden traditioneller Geschlechterrollen; 2) die Nutzung von Sozialkapitalinstitutionen und informellen Sicherheitsnetzen angesichts Ungewissheit über Reformen und Umweltbeschränkungen; 3) Schaffung und Wiederherstellung informeller Wasserinstitutionen durch ausgeschlossene und in ihrer Wassernutzung beschränkte Akteure. Institutionen unterliegen der Manipulation durch soziale Akteure, die nicht alle Normen und Regeln blind, sondern den jeweiligen Gegebenheiten und Umständen entsprechend befolgen.

Es ist eine ganzheitliche Betrachtung der ländlichen Gesellschaften und eine Einbeziehung von Faktoren erforderlich, die potentiell die Umsetzung oder Anpassung der begonnenen Reformen beeinflussen. In allen in dieser Arbeit vorgestellten Fällen wird die Beständigkeit der von geschichtlichem oder politischem Interesse bestimmten pfadabhängigen Agrarstrukturen beobachtet. Obwohl formale Institutionen ganz oder teilweise verändert und umgesetzt werden, können ihre Auswirkungen unbedeutend und Ergebnisse unvorhersehbar und unbeabsichtigt sein.

Schlagwörter: Zentralasien, Transformation, institutionelle Antworten, Agrarreformen

Dedication

To my parents and grandparents who raised me and gave all their love and care, this thesis is dedicated.

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List of Contents

Abstract	3
Zusammenfassung.....	5
Dedication	7
Acknowledgements	9
List of figures	13
List of tables.....	15
1 Introduction.....	17
1.1 Challenges of transition	17
1.2 Theoretical debates	19
1.3 Agricultural restructuring in Central Asia.....	21
1.4 Methods and approaches.....	23
1.5 Outline of the thesis.....	26
2 The feminization of agriculture in post-Soviet Tajikistan.....	31
2.1 Introduction	31
2.2 A gender perspective on agricultural labor.....	32
2.3 Agricultural reforms and changes in the labor sector in Tajikistan.....	34
2.3.1 Transformation of the agricultural sector.....	34
2.3.2 Roots of feminization—gender roles during the Soviet period and after.....	36
2.4 Feminization of jobs in Tajik agriculture.....	37
2.5 Introduction to case study and field research methodology	39
2.5.1 Background to farm restructuring in the Sughd province	39
2.5.2 Case study methodology and data	41
2.6 The feminization of agricultural production.....	42
2.6.1 Manifestation of feminization	42
2.6.2 Mardikor teams	44
2.7 The feminization of agricultural services.....	45
2.8 Conclusion.....	47
3 Coping with constraints: Crop diversification and soil salinization in two Central Asian cotton regions.....	49
3.1 Introduction.....	49

3.2	Agrarian and environmental legacies and new policy agenda	51
3.2.1	Crop choice and salinity in Central Asia	51
3.2.2	Soviet past and agrarian restructuring in Central Asia	53
3.2.3	Kazakhstan’s agricultural policies	54
3.2.4	Uzbekistan's agricultural policies	55
3.3	Study districts, data and methods.....	56
3.4	Salinity and crop diversification in South Kazakhstan.....	60
3.5	Alternatives to cotton in Samarkand	66
3.6	Conclusions	70
4	Integration of villages into WUAs – the rising challenge for local water management in Uzbekistan	73
4.1	Introduction	73
4.2	The new challenge to water control within irrigation systems.....	73
4.3	Background to the Ferghana Valley and the case study area	74
4.4	Methodology	78
4.5	Case study	80
4.6	Conclusion.....	85
5	Conclusions	87
6	Bibliography	89
	Appendix 1	105
	Appendix 2	106
	Statement of contributions.....	107

List of figures

Figure 1-1: Critical juncture and triggers of the transition period in the framework of case studies reviewed in the thesis.	27
Figure 2-1 Agricultural areas (hectares) by different forms of producers of agricultural goods in Tajikistan.....	36
Figure 2-2. Employment trends of agricultural labor in Tajikistan, 2007–2013.	37
Figure 2-3. Change in total employment of agricultural workers by gender, thousand persons.	38
Figure 2-4. Map of the Sughd province within Ferghana Valley.....	40
Figure 2-5. Farm dynamics for the Sughd province (relative to 1992)	40
Figure 3-1: Map of the study districts.....	50
Figure 3-2: Salt tolerance and water requirements of major crops grown in the irrigated lowlands of Central Asia.....	52
Figure 3-3: Irrigated area in percent of total cropland in survey farms by district, 2016	58
Figure 3-4: Distribution of arable land area by salinity levels in survey district, 2016.....	59
Figure 3-5: Distribution of crop area in survey farms by district, 2016.....	59
Figure 3-6: Land use by crop, Maktaaral district 2005-2016, thousand ha	60
Figure 3-7: Prices of crop output and agricultural inputs, South Kazakhstan 2011-2016, 2011=100	61
Figure 3-8: Years of cultivation practice, cotton and mixed cotton-melon farmers, South Kazakhstan	66
Figure 4-1. Map of Central Asia	75
Figure 4-2. Map of Ferghana Valley	75
Figure 4-3. Map of Ferghana Province.....	76
Figure 4-4. Research area within Ferghana Province.....	79
Figure 4-5. Population growth in Yangi Chek settlement/Vodil village 2010 and 2012.....	80
Figure 4-6. Akhror Mirob Muminjon WUA with two settlements.....	82

List of tables

Table 1-1: Field research periods	24
Table 1-2: Criteria and elements characterizing institutional context and dynamics.....	28
Table 2-1. Categorization of interviewees.....	42
Table 2-2. Characteristics of agricultural employment groups. Summary table of interviews gathered in five organizations situated in the Sughd province, Tajikistan.....	43
Table 3-1: Soil salinization in Central Asia.....	51
Table 3-2: Overview of survey and qualitative interview locations and sample size.....	56
Table 3-3: Agricultural area by salinity levels, South Kazakhstan and Samarkand.....	57
Table 3-4: Descriptive statistics from survey data	63
Table 3-5: Regression of diversification decisions in South Kazakhstan.....	64
Table 3-6: Regression of diversification decisions in Samarkand.....	68
Table 4-1 Changes in land allocations to kitchen gardens in Ferghana Province.....	77
Table 4-2. Categorization of interviewees.....	79

1 Introduction

1.1 Challenges of transition

Over a quarter of a century passed since the Union of Soviet Socialist Republics (USSR) broke up into sovereign independent states. Among them, the Central Asian countries¹ gained their independence in the beginning of the 1990's and joined the group of economies in transition. The challenging transition paths of the successor states included first of all a search for a new statehood and second, decisions on the content and direction of the reforms and development. The starting point of transition and the general goal for all Central Asian countries was to divert from the Soviet political and economic system and to follow the transition path that would arrive in a democratic society with a liberalized, market oriented economy. Over time, the trajectories of transition diverged in their content and speed of reforms by taking individual country characteristics. There is an extensive literature focusing on rural development in transition and farm restructuring processes, however there is still limited evidence on how these reforms were accepted and responded by rural actors, what were the consequences and how they interacted with other socio-economic, historical and cultural factors. It is important to consider not only whether reforms reached their direct recipients, but also how other actors, institutions or contexts influenced, interacted and produced changes.

Transformation of the agricultural system initially consisted of moving away from collective to market economy through land reform and transformation of the state planning system. However, all the countries except Kyrgyzstan retained fully or partially the state monopoly on land ownership. Gradual de-collectivization of large Soviet farms brought to appearance of new production units (Veldwisch and Spoor 2008), yet it did not fully remove the interventions of the authorities in agriculture. As an example, while price controls in Kazakhstan are limited to the energy sector, Uzbekistan and Tajikistan also regulate prices for agricultural products. Conditions defining the patterns of agrarian reforms are presumed to depend on the extent of policy interventions, perceived significance of agricultural and rural sectors (Spoor 2009), and responses of agrarian actors and institutions to changes. Reforms in agriculture resulted in appearance of new groups of actors with different levels of access to land, production inputs and outputs, capital as well as knowledge and experience.

Further developments in land reforms brought new institutions and actors into play. Agricultural actors simultaneously faced issues of the new system with many gaps, partly formed by advisedly kept legacy of the Soviet system, but also due to massively rooted legacies: infrastructure, institutional and agricultural norms, which often contradicted with proposed institutional changes.

Farm organization and performance gained dependency not only on the new external environment which introduced new legal institutions and a variety of competitive markets (Djanibekov et. al 2013), but also on a composite of interlinked arrangements formed between the actors that are ruled by historical legacies, culture or social-economic evolutions and politics (Sehring 2009, Van Assche et al., 2011). Multiple outcomes can be considered as possible scenarios of institutional changes during the transition process such as: co-existence of old and new; or maintenance of the old without the acceptance of foreseen and planned changes; or full acceptance/abandonment of new.

In the light of mentioned scenarios combinations of formal and informal rules, norms, conventions as well as relations have been influencing the ways in which agricultural actors began adjusting to new transition roles and context. The question is when these institutions can create a

¹ Central Asian countries within the current thesis include Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan. Turkmenistan was not included into the list, while it is still not possible to conduct surveys or interviews due to the strict and closed governance system.

concordance and interaction which could lead to an improvement of wellbeing, growth of the output and productivity of farms and overall agricultural development in rural Central Asia.

The transition process itself opened a whole new niche for theory development and research which continues challenging many scholars while changes in post-Soviet countries continue. Economists did not have a clear model or a similar case for economic transition which could provide orientation to research. Early transition literature essentially focused on setting the countries on the 'right track' by shifting the design from communist to capitalist order or from social to democratic, providing policy advice and describing the general characteristics of countries that were less known and hidden within the Union (Ahrens and Hoen 2013, Roland 2001). Transition economics evolved from study of comparative systems and soon became a new field in the development economics initially and primarily addressing issues of stabilization, liberalization and privatization (Hoen 1996, Lavigne 1999). Comparative approach has become one of the essential elements of the research on transition first by focusing on competition between socialistic and capitalistic systems and later also comparing the Soviet with transformed economies or directly observing the transition among several countries. Ahrens and Hoen (2013) listed major debates rising along questions of systematic transition as: 1) the nature and direction of transition; 2) components of economic transition strategies, with respect to timing pacing, and sequencing reform measures; 3) actors who would prove to become key drivers of economic restructuring and growth processes. Many authors distinguish between three approaches to transition: shock-therapy, gradualism, and institutionalist (Havrylyshyn, 2006, p-23, Roland 2000)

Shock therapy view on transition is based on liberalization, stabilization and privatization reforms. These reforms were advised to be quickly implemented to create irreversibility. Partiality of reforms from this perspective would create rents for given groups that will be threatened by further reforms. (Marangos 2003, Roland 2000). According to the second approach: the gradualist or evolutionary perspective the transition should intervene in a sequence and at a pace that coincide with the evolution of market institutions and processes. Here, a strong emphasis is given to the possibility of experimentation, "reversing reforms that do not work and keeping them partial to create momentum for further reforms" (Roland 2000). The third. institutionalist approach believes in the need of using the existing institutions to prevent economic disruptions and social unrest. Development of transitional institutions adequate to the initial conditions, but which eventually can evolve toward more perfect institutions is prioritized. The evolutionary institutionalists consider important to develop self-enforcing social norms that foster entrepreneurship, trust and respect for legality and commitment (Roland 2000, p-334). Institutional policy analysis assumes that orientations and actions of political actors are shaped by institutions, be they formal or informal (Sehring 2009).

Policy recommendations followed the views and evolved 'generations of reforms'. Ahrens and Hoen (2013) identify the three subsequent generations of reforms:

- Following neoclassical prescriptions and application of Washington consensus type policies, where, however, political interests and institutional impediments were not taken into account;
- Institutions considered essential and the best-practice (Western-style) institutions should be taken as a blueprint as they may represent a useful reference point for transition economies and less developed countries (Khan 2002, Bardhan 2005). In order to make policy reform effective, market forces should work and eventually overcome government failure. Scholars of economic development identify key institutions for transition which include among others "rule of law, private property rights, an independent judiciary enforcing private contracts impartially through regulation to safeguard economic competition, sound corporate government structure and a transparent financial architecture" (Ahrens and Hoen 2013).
- The third generation was based on neglected processes of how institutions are crafted and enforced (Quian 2003). Here an interplay of economic and political institutions that are

crucial for economic performance matter. It became apparent that best practice government structures cannot be turned into a model as they are defined by initial conditions faced by the transition countries, different economic structures and stages of economic development, different political interests and different societal preferences (Ahrens 2002, 2007).

- The latest, fourth generation, comes from the institutionalist approach that considers informal institutions such as customs, traditions, norms and religion and their influence on effectiveness of transition process to be significant (Troschke 2013).

Current stage of understanding transformation has diverged due to differences in developments of the countries in transition and the influence of outside international processes. Approaches to transition have widened from macro policy considerations to the level of institutions which cover all levels of processes and interactions and make a crucial part of the present thesis. Thus, agrarian reforms, their implementation, institutional development and most importantly, the actors influencing and/or impacted by structural changes and transition processes provide the rationale for the present research. We conduct our research in Central Asia in order to understand the social fabric of rural areas and identify constraints and opportunities for agricultural developments and social organization of rural and farming societies. We expect that through identifying institutional patterns, power relations and asymmetries it is possible to understand and analyze the persistence or possibility of transitional developments in Central Asian countries. Yet we research not only whether institutions are functional or beneficial in general, but also who benefits from them (Jones Luong 2002). So the search for answers of how to change the institutions is directly related to the question of how to transform or transit the system.

As already mentioned earlier, feasibility of policy reform and institutional change aiming at improving economic performances depends not only on formal but also on prevailing informal institutions in the society including existing norms, values, religious rules and codes of conduct. The relationship between formal institutional change and its impact on informal institutions has so far only received limited attention (Sehring 2009). We address this gap through describing and comparing cases of institutional changes in the agrarian sector of three economies in transitions: Kazakhstan, Tajikistan and Uzbekistan. The research question is whether new regulations, norms as well as structures and organizations of post-independence agrarian reforms in Central Asia have been institutionalized or have been adversely/positively affected by informal institutions and rule of power. We assume that historical experiences, policy and power legacies can frame present institutions and actions of rural actors. Clashes of old and new institutions can break even persistent, path-dependent formal institutions as actors respond by using alternative informal institutions that fill the gap of functionality of the agrarian sector and support subsistence agricultural production in rural areas.

1.2 Theoretical debates

The most basic and most referred definition of institutions was given by North (1990) as the “rules of the game”. It is understood that institutions regulate social life by assigning rules and sanctioning violation. The thesis follows a broader definition used by most scholars of sociological institutionalism. Institutions are social relations, behaviors which involve rules and norms and underlying perceptual frames created by actors. Institutions can be stable and fluid. According to the Social Institutionalism preferences, interests, and objectives of individuals are socially and culturally constituted. Factors of institutional change are: power, economic situation, spreading of ideas, aspects outside of domestic realm. The institutional context along with the general legal framework can include such components as culture, religion, gender relations, traditional and local institutions which contribute to the institutional setup.

There are three theoretical approaches to studying institutions namely: rational choice, sociological, and historical institutionalism.

According to the rational choice institutionalism institutions exist because they reduce insecurities, enhance the possibility to anticipate the behavior of other actors, and hence allow for strategic interaction. This way, institutions reduce control, enforcement, and transaction costs which would otherwise arise because of insufficient information. The orientation at institutional norms is the result of an individual rational cost-benefit equation as it is perceived as cost-reducing (Hall and Taylor 1996: 942-946; Peters 1999: 43-62; Sehring 2009: 31-32).

Sociological institutionalism focuses on how institutions influence preferences, perceptions, interests and objectives of actors. In this view, an institution is a social relation or behavior that “come[s] to be taken for granted” (DiMaggio, Powell 1991:9, Sehring 2009:32). “Institutions influence behavior not simply by specifying what one should do but also by specifying what one can imagine oneself doing in a given context” (Hall, Taylor 1996: 948). When facing choice actors react based on experiences in comparable situations or situations in the past, at standards of behavior transmitted by culture and history (March, Olsen 1989: 23).

Historical institutionalism is based on the assumption that development is path-dependent. It is assumed that once institutions are stable, and proven to be successful, they will have a longer time effect. Institutions carrying historical experiences and policy legacies can become persistent and will limit the entry of new institutions and options for change. A ‘path’ is an institutionally structured response of the actors to new challenges and is an obstacle for change (Hall and Taylor, 1996). Therefore, changes to institutions often fail due to restrictions driven by path dependencies and powerful actors that benefit from certain institutions and hence have an interest in their persistence or change (Hall, Taylor 1996: 937; Thelen and Steinmo 1992; Thelen 2002). Historical experiences and policy legacies will be used again and frame present actions. Institutional changes such as economic transition are dynamic processes of reproduction and adaptation (Streeck and Thelen, 2005). These effects are reinforced as reform policies in general are eager to establish new institutions, while they rarely give attention to the deinstitutionalisation of old institutions so that they are not replaced but rather complemented by new ones (Lowndes, 2005).

Institutional bricolage is another approach which includes the concept of path-dependency but enlarges it with the definition of bricolage - patching together the elements of various institutional and community logic. To explain such approach Sehring (2009) provides an example of intersection of institutional logic with norms of social consensus in local water governance. Bricolage can be also interpreted as process of transformation of informal and formal institutions (traditional and modern) into ‘institutional syncretism’ (Galvan, 2004). In this synergy both institutions change and create a new element which is considered to become an institutional change. There are several authors (Stark and Bruszt 1998, Grabher and Stark 1997, Campbell 1997) who oppose the concept of transition which embeds the Soviet legacy as an obstacle to reforming. They stress the enabling effects of institutions leading to actors that are simultaneously objects and subjects and one hand they are constrained by institutions, on the other, they are actively involved in reassembling and reinterpretation (Sehring, 2009).

The institutional perspective to transition assumes formal changes of rules or structures yet it also includes informal arrangements. Formal institutions are “bureaucratic institutions” (Cleaver 2002) or “formalized arrangements, based on explicit organizational structures, contracts and legal rights”, often introduced by governments or development agencies. Informal institutions are defined as “socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels” (Helmke and Levitsky 2004: 727). Such institutions can be based on “culture, social organization and daily practice. Formal and informal institutions carry distinct incentives, mechanisms, and identities as well as are formed² and interact differently. Institutions can overlap, complement, contradict and influence, interrelate to each other, hence, traditional

² The design and change of formal institutions can be enforced by entitled actors, whereas informal institutions originate from social dynamics.

culture and social arrangements can become 'formalized', 'bureaucratized' (Cleaver 2002); or formal institutions can provoke the revival or creation of informal institutions. On an analytical level Helmke and Levitsky (2002) provide the following codifications of formal and informal institutions: (1) Formal institutions are state institutions or rules enforced by the state while informal institutions are established by society. (2) Formal rules are those enforced by a third party (in most cases by the state), while informal institutions are self-enforcing. (3) Formal rules are written down and codified while informal rules are unwritten.

Power asymmetries have a significant place in the analysis of institutions, especially on the issues of persistence despite changing institutional environments and questions of winners and losers in the process of transition. 'Lock-in' effect is a mechanism, stemming from path-dependency arguments, that signifies politically sustained stability in spite of constantly changing context into which institutions are embedded (Luong 2002, Thelen 1999). Events or series of events that occur over a short period or momentums³, called "critical junctures", can place institutional arrangements on the path or trajectories, which are then very difficult to alter. These may serve as starting points for many path-dependent processes whether towards a change or back to previously existing dependencies (Capoccia and Kelemen 2007).

Our assumption is that the behavior of actors and thus the policy outcomes are shaped by formal and informal institutions of decision making. We consider institutional change not only as development of new institutions and elements, but also a mix, overlap and recombination of existing institutional elements and new concepts. We question whether formal changes matter in the face of informal patrimonial features (Sehring 2009, Kandiyoti 1999). We ask whether they provide a strong opportunity for path change in Central Asian countries or do the shared informal patterns dominate so that the countries show the same path-dependent policy outcomes?

Institutional policy analysis assumes that orientations and actions of political actors are shaped by institutions be they formal or informal. Institutional design of the decision making process encompasses all formal and informal rules that regulate which actors gain access to decision making process and their interactions. The analysis also includes identification of key actors and their interests and strategies. Informal institutions in all countries play an important role and outlast formal changes. To what degree and based on which mechanisms do these informal aspects modify formal institutions?

1.3 Agricultural restructuring in Central Asia

During the Soviet period, the agricultural sector consisted of vertically integrated enterprises. Centralized planning and coordination rooted in the economic system of the Soviet Union formed giant institutional blocks such as, collective farms, spread out in majority of regions of Central Asia. The Soviet agriculture covered areas where agriculture traditionally existed and also spread to "virgin", deserted lands through construction of massive irrigation schemes. Three major sectors hosted the Soviet labour force: state, collective and private sector. In agriculture this division was represented by 1) the state-owned and operated share of agriculture and non-agricultural enterprises and organizations involved in subsidiary agricultural activities (*sovkhkozy*); 2) a portion of farms run collectively by farm members (*kolkhozy*); and 3) people working on private plots and uncollectivised peasants, which were rare (Lubin 1984, p. 57). The average size of *kolkhozy* reached 2000-4000 ha, and *sovkhkozy* between 5000-8000 hectares in Uzbekistan, Tajikistan and, in Kazakhstan, grain specialized *sovkhos* farm occupied on average 25,000–30,000 hectares. The water management and supply system was centralized and organized according to the boundaries of the

³ Critical junctures can include incidents such as political processes, economic crisis, military conflict or social changes.

administrative units (collective farms, districts and provinces). The establishment of collective and state farms intended to change previously settled norms and organizational behaviors of societies and introduce massive, specialized production. For most of the formerly Soviet Central Asian countries, the assignment of the agriculture as a primary sector meant involving the majority of the rural population into production of state order crops and related agricultural activities. Agricultural activities performed within household plots and through private subsidiary work has been growing in Central Asia in spite of its misrecognition and even prohibition by the Soviet government. In mid 1970 the share of such activities reached around 50 percent and more than one-fifth of labour resources were occupied exclusively in agriculture (Lubin 1984, p. 61).

Favorable climatic conditions, prior agricultural knowledge and experiences of Central Asian societies determined the Soviet authorities to make the region a hub for cotton growing – to become the supplier of the ‘white gold’⁴. Due to the expansion plans of the cotton industry, significant investments were provided for irrigation system development, and into the agro-industrial cotton-complex of production (Spoor 2007). Soviet farms received “extensive price subsidies for inputs and enjoyed access to subsidized state financial instruments for the funding of their long-term capital expenditures” (Lerman et al. 2004). State planning towards increasing productivity and meeting higher targets of cotton yields had the essential tasks of dealing with labour and technology. Although the last task was partially met through mechanization of cotton harvest in some locations and development of new cotton varieties, the largest input had still to come from the rural population (Kandiyoti 2005).

Agriculture continues to be the backbone of the Central Asian countries, adding its contribution to national and regional food security, and serves as income generation source for rural families. The population of Central Asia is predominantly rural with approximately 40 percent living in rural areas and on average 30 to 40 percent of the economically active population is engaged in the agricultural sector (World Bank 2016). The agrarian sector is also considered to be the largest consumer of natural resources in Central Asia, especially of water. Irrigation is practiced in less than 33 percent of the total cultivated area in the region. Agrarian reforms in Central Asian countries were almost one of the first to be implemented, but also one of the most complex and continuous, considerably affecting rural dwellers.

The agricultural sector during the first years of independence was characterized by low performance, due to the same issues which existed during the Soviet period, namely weak incentives for farm workers to fulfill state-order production plans. The break-up of input supplies, sales chains and a lack of investments led to poor performance and deterioration of state and collective farms. The cotton industry of Central Asian countries inherited not only physical components of the system: irrigation infrastructure, subsidiary organizations and human resources, but also, to some extent, its organizational and networking institutions.

Uzbekistan reserved the full land ownership right and maintained the state order policy on two strategic crops: cotton and wheat, while dismantling former state and collective farms and constructing new farm entities. New categories of agricultural production systems were legally represented by: agricultural enterprises (shirkats), commercial farms (former *khoyaligi*) and smallholders farms, (*dekhqans*), based on household plots (Lerman 2008). The legacy of the past was transferred in elements of state interventions, quota and production targets on strategic crops and; experimentation with the terms of leasing, farm size controls, and government loans. Such conditions of reforms have imposed institutional constraints on farmers to operate as autonomous actors. Although the main strategic crop remained, the cropping pattern has been changed with wheat gaining a second importance after cotton and second crops becoming vital for reciprocal relationships between commercial farms and the rural farming population (Platonov et al. 2014). In this regards, the characterization of a divided economy (Ilkhamov 2000, Spoor 2004), with the first

⁴ A public definition of cotton which was considered precious for the nation.

economy centered on production of exports or import substitutes (cotton, grain) and the second, oriented on food production for the domestic market, has been accepted by the state. However, the duality and functionality of formal administered farm categories have been questioned since various non-administered interdependencies connected to accessing state resource, production quotas or second crop plots, critical in the operation of farms, appeared (Lerman et. al 1996). Thus, limited groups of the rural population received access to land through establishing commercial farms, a structure which has been in regular transition. The reforms of the economy have come with numerous changes and amendments to the current legislation and initiation of new reforms including in the agricultural sector.

After the announced independence in 1991, Kazakhstan, similar to other neighboring countries, initiated restructuring of Soviet collective and state enterprises. Several stages of land reforms were directed at the redistribution of land plots based on shares. According to the Land Code (2003), however, permanent rights associated with land shares were void and the “share-holders had to either acquire a land plot from the state (by outright purchase or by leasing) or to invest the land share in the equity capital of a corporate farm”(Lerman 2009). As a result of land reforms different legal types of farms appeared including: limited and joint-stock companies, agricultural cooperations, individual (peasant) farms and state and non-state entities. Last ten years “was characterized by enlargement of croplands, rising capital input and agricultural value” (Petrick et. al 2013), especially due to grain supplies produced mainly in the Northern Kazakhstan. Owners of farms, especially the ones that have chosen to diversify their agricultural produce, had to learn to become sovereign economic agents (OECD 2016). Southern regions of Kazakhstan are specialized more in cotton. Although the cotton industry is not prioritized by the state as strategic or significant for the economy, however, it became a social resort of employment for rural population that has long served in the frame of Soviet state and collective farms. In Kazakhstan, private land ownership was established, although not fully distributed and three types of formal actors appeared, namely agricultural enterprises, individual farms and households (Shtaltovna and Hornidge 2014).

After independence from the Soviet Union, Tajikistan suffered not only from the shock of the suspension of economic support from the Soviet Union but also from a five-year civil war. These political upheavals have increased the importance of the agriculture sector. Although the first land reforms were initiated in Tajikistan directly after the breakup of the Soviet Union (1991) the civil war delayed these reforms. It was only in 1998 when reforms continued encompassing the transformation of former Soviet collective and state farms into collective joint-stock and individual farms. However, the distribution of land for private use was unequal and included many administrative and informal obstacles (Mirzoeva 2009).

1.4 Methods and approaches

A basic aim of this study is to gain insights into the socio-economics and politics of agrarian institutional reforms in Kazakhstan, Tajikistan and Uzbekistan as well to reflect on responses of existing institutions and agents to the changes in the governance and organization of agricultural sector. The following sections of the thesis explain the comparative research design, case selection and empirical research methods applied.

Central Asian countries are unique as they encompass various experiences including path-dependent, structural-historical legacies as well as new developments of the abrupt transition. These states are often characterized as neopatrimonial regimes in which formal democratic structures are combined with informal ones (Sehring 2009, Ilkhamov 2007). To analyze such a complex context and interrelationships between various agrarian, gender, traditional mechanisms and institutions including, informal social institutions we apply socio-economic, policy analysis and anthropological approaches. We take a bottom-up perspective to transition and implementation of reforms. Thus, we address a micro-level understanding of reform implementation and practical responses. Institutional

changes and conditions of the agrarian sector on the micro- and meso-levels in our research are addressed through analyzing institutional interlinkages between the rural dwellers and the agricultural production processes and resource use.

Three different case studies presented in the thesis are similar in their content of changing formal agrarian institutions. However, the cases are different in showing various institutional responses and interactions concerning structural changes in farming systems and agrarian policies. While the cases studies were explored in three countries, common elements of transition and reforming are present namely: farm restructuring from soviet to market-oriented; labour migration out of agricultural sector and from rural areas; water institutional reforms; and the presence of Soviet agricultural legacies such as cotton growing. Choices of countries and topics depended on various projects the author was involved in 2011, 2012 and 2016 during which empirical studies were conducted including the collection of quantitative and qualitative data. Field visits were split into four stays, details of which are presented in the Table 1-1.

Table 1-1: Field research periods

Chapter number and title	2. The feminization of agriculture in post-Soviet Tajikistan	3. Coping with constraints: Crop diversification and soil salinization in two Central Asian cotton regions	4. Integration of villages into WUAs – the rising challenge for local water management in Uzbekistan
Research period	October-November 2011, 2012	November 2016 January-March 2017	September-October 2011
Research places	Sughd province of Tajikistan	South Kazakhstan and Samarkand province of Uzbekistan	Ferghana Valley, Uzbekistan
Research objectives	To characterize and categorize the agricultural labour force in agricultural sector of Tajikistan and understand the driving factors of feminization and its consequences.	To understand the main drivers of crop diversification choices made by farmers in Kazakhstan and Uzbekistan	To analyse the institutional framework of integration of water users into Water User Associations in Uzbekistan.
Target groups	WUAs, farm managers, permanent and seasonal workers	Farmers, wage workers	WUAs, WUA members, other farming water users, households.
Methods	Qualitative	Qualitative and quantitative	Qualitative

Variations in empirical evidence and the plurality of the theoretical background related to country comparative research topics of the thesis demanded also the plurality of methods applied.

The quantitative approach is not always capable to capture all the variations and dynamics among individual arrangements and thus, they have to be reduced to the most important and most observed cases. Moreover, it is relatively difficult to carry out a more detailed analysis on local systems of power or informal arrangements among rural actors due to sensitivities of the political and cultural context in Central Asia. Though structured survey and discrete answer choices provide reliability of aggregation and confidence for comparing among groups, the researcher cannot move beyond the structure and understand the subjective experiences, the making of a social situation and

implicit/unconscious aspects of phenomena which can be addressed with qualitative methods. Consequently, qualitative methods utilized in each of the chapters are considered to be an adequate approach to empirical research and the best suitable means to uncover actors' subjective beliefs, views, and values to better understand the context. Several authors utilize qualitative methods as they are considered more feasible in the context of developing and in transition economies since they are context sensitive (Kandiyoti 1999, Sehring 2000, Wall and Overton 2006) and are appropriate for enhanced understanding of the societies especially in times of institutional instability. The research utilizes an inductive approach by interpreting empirical material and applies some of the hypothesis deduced from theory.

The qualitative research included several methods that helped to combine, complement and triangulate the information and its analysis including semi-structured and expert interviews, participant observation, informal conversations, and transect walks. Depending on the country of focus and languages used, interviews were conducted in Kazakh, Tajik, Uzbek and Russian languages.

Agricultural actors varying in different characteristics (men/women, age, education, farm type etc.) have a complex knowledge about the topic under study, in other words, they have their own subjective theory about, for example, how the Soviet system of collective farms functioned and the way it evolved up to present time or whether feminization existed during a centralized agricultural system. The semi-structured interviews were used to reconstruct the interviewees' subjective views on the research questions especially related to informal practices.

Application of the qualitative approach in present research followed the method of reconstructing subjective theories proposed by Groeben (1990) for elaborating semi-structured interviews. Semi-structured interviews aimed to discover the problem perceptions and social constructions of reality of those who define policy problems and their solutions. First basic structure of the interview or a guide was developed. Based on the designed structure and defined topics, questions were designed to grasp the knowledge concerning processes, content, opinions of the respondents. Interviews were conducted in an open style to provide the possibility for any emphasis of the respondents. The selection of the interviewees for expert interviews was based on given knowledge and theoretical considerations. In contrast to other forms of qualitative interviews, the interviewer is important as an expert for a specific issue (Meuser, Nagel 2002).

For qualitative research, although we had some fixed informants before arriving to the field, we primarily used iterative enlargement of the sample in the course of the research and theoretical sampling (Mayer 2002, Will 2001). For other respondents such as farmers, farmer's workers and wage workers, we used principles of snowball sampling. All interviewed persons recommended further interview partners. This technique not only provided recommended access to respondents but also allowed receiving insights into networks and cleavages (Sehring 2009). However, to avoid a bias in the selection of respondents, list of villages, farmers or WUAs (location along the water source, by types of farms) were pre-selected prior to the field research.

Participant observations were the most important research method for the studies constituting the second and the fourth chapters of the thesis (Flick 2014). Very often informality and lack of certainty on what is right or hiding something that is valid in practice, but cannot be validated through legal institutions created challenges and ethical issues to face. For example, research applied within the third chapter of the current thesis reveals variation in responses depending on the methods applied. Subjective responses of farmers on salinity during the survey varied from the answers obtained from participant observations and in-depth interviews in the same villages. Participant observations allow insights into de-facto behavior and situations, hence facilitates comparisons between ideal and real situation, or de-jure and de-facto realities. During the participant observations the author of the thesis, as an observer, was in some cases active (working together with the wage workers on the cotton field) and in other cases a passive observer (offices of the Water Users' Associations). Following Flick (1995) the observation process was divided into phases of descriptive observations. First of all, observations were used to gain an overview of the field and

identify interviewing aspects. Secondly, we worked through focused and selective observations to narrow down our perspective to problems, processes and persons considered relevant for the research questions. In Tajikistan and Kazakhstan some of the observations and the interviews were conducted with field assistants who knew well the local language and the context. Such an approach and discussions with assistants increased the reliability of the observations and helped to obtain new ideas and to interpret interviews. During the field works for all the chapters the author used a lot the 'transect walk' interview method. The method consists of informal interviews conducted with a person or a group while walking along the research area and visiting. This interview method is expected to provide more information when the person explains on the site or is confronted with specific situation compared when the interview is conducted in a room.

For the analysis of the data, qualitative content analysis was employed. Qualitative content analysis aims at identifying the main contents of the material with a step-by-step reduction and categorization of the textual material. The interviews in some cases were recorded in others were protocolled due to non-consent of the interviewee to record his/her responses. The process of qualitative analysis was based on coding the texts. The code system was based on the topics set initially before the interview and were redeveloped through inductive processing of information obtained from the interviews and observations.

Applications of qualitative and quantitative methods vary in numerous dimensions starting from their research logic (Flick 2014). Reconciliation of two methods is proposed to happen through pluralist research approach in which casual explanations receive more insightful and richer content (Sayer, 2000). It is assumed that agricultural actors carry specific ways of describing and interpreting society that has both structure and complexity, thus is featured with plurality. Such mixed and pluralistic approach to methods was used in Chapter 3 of the present thesis. The comparative study of crop diversification included combined quantitative and qualitative research strategies. Mixed methods were included in different phases of research processes such as in: a) collection of both types of data; b) designing the survey questionnaire and validation of quantitative sampling through qualitative exploration and field research; c) deepening and assessing results and; finally d) combining the survey with qualitative field study (Flick 2014). The quantitative part of the research utilized the data from a unique farm survey conducted in 2017 as well as qualitative evidence from interviews with farmers and official statistical information to disentangle the linkage between soil salinity and crop diversification in two Central Asian cotton regions. Various sections of the survey questionnaire were developed by the members of the AGRICHANGE⁵ project and the survey was conducted by a hired data collection firm. Farm- and plot-level data collected among 200 randomly selected farmers in South Kazakhstan and 450- in Samarkand, allowed instructive comparisons of the effects of environmental constraints and different policy environments. The survey data was then analyzed to statistically compare agrarian characteristics and estimate the probability of diversification through probit regression analysis by using StataSE 15 software.

All the interview and survey data was anonymized through removing respondents' identifying information from the data and assigning new identifier codes for each interviewed person. During the anonymization processes several attributes such as general locations and professional or gender characteristics of the respondents were kept. Each chapter of the thesis provides list of selected interviewed persons, whose interview quotes were mentioned in the text.

1.5 Outline of the thesis

⁵ AGRICHANGE: "Institutional change in land and labour relations of Central Asia's irrigated agriculture"- research project funded by the VolkswagenStiftung within the funding initiative "Between Europe and the Orient – A Focus on Research and Higher Education in/on Central Asia and the Caucasus"

Restructuring of Soviet state and collective farms, privatization of land and the establishment of commercial farms have become important attributes of reforms carried out by Central Asian countries. It is assumed that the fall of the Soviet Union has provided a critical juncture of path change in cases where formal reforms were fully implemented. However, to gain fundamental institutional change there is a necessity of concordance and positive responses of all actors on the establishment and implementation of new reforms and organizational changes in the agrarian sector. The partiality of reforms can be in the interest of ruling powers, which might have an interest to carry on with old institutions or shape the new formal institution in their benefit. Further, the partiality can also come from intended or unintended responses of actors. These responses can be carried through old, new or mixed institutional perspectives, which often may be informal. The direction of institutional change could be influenced by the possibility of disparities between private incentives of ruling classes and social welfare; the role of ideology, particularly in shaping the perceptions of opportunities among rural actors or political and economic organizations; and the complex interactions between all of them. Brief phases of institutional flux, in the literature referred to as critical junctures, allow breaks in path-dependency and may cause dramatic changes. However, it depends on the choices and behaviors of actors whether these junctures will be powerful enough not to leave any alternative for continuation of the old path.

We identify selective cumulative causes (Pierson 2003) which have reached a critical level (juncture) and influenced and may cause long-term institutional changes in rural Central Asia (Figure 1-1). The big juncture is the collapse of the Soviet Union which produced many system-wide changes including land, water reforms and farm restructuring.

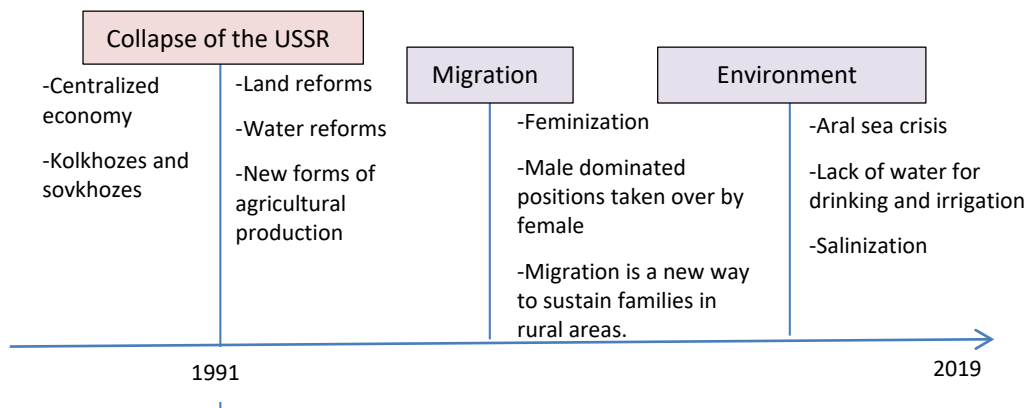


Figure 1-1: Critical juncture and triggers of the transition period in the framework of case studies reviewed in the thesis.

The objective of this thesis is to investigate the institutional responses to agrarian transition. The fundamental question is to understand the interaction between reforms and institutional dynamics in the agrarian sector in Kazakhstan, Tajikistan and Uzbekistan. Under this context we investigate whether reforms rely on formal institutions or are adversely/positively affected by informal ones and who benefits from them.

To answer these questions the research addresses important criteria and elements which characterize institutional context and dynamics.

Table 1-2: Criteria and elements characterizing institutional context and dynamics.

Criteria and elements of change	Chapter 2: The feminization of agriculture in post-Soviet Tajikistan	Chapter 3: Coping with constraints: crop diversification and soil salinization in two Central Asian cotton regions	Chapter 4: Integration of villages into WUAs—the rising challenge for local water management in Uzbekistan
Challenges (Old and new)	Unemployment, male outmigration, gender inequalities and informalities in labour	Environmental and manmade soil salinization and land degradation infrastructure maintenance, lack of transparency in land quality assessments.	Reallocation of water or/and priority setting for the overall rural livelihoods are ignored by new institutional arrangements (Water User's associations).
Reform areas	Land and farm restructuring	Farm restructuring. Cropping policies. Subsidies	Land and water management. Restructuring of irrigation schemes
Rural societies	Rural female population	Farmers and households	Water users
Threats	Growth of informal and low social security positions for women	Salinity and uncertainty of reforms; Knowledge and infrastructural deterioration.	Exclusion of smallholders from agricultural activities Mismanagement and un-governability of water infrastructure and use
Changing order	Erosion of traditional gender norms, feminization	Different strategic value of information (salinity) due to new and changing reforms	Institutional change from centralized collective state irrigation to farm membership based associations. Competing interests of the state and the rural population over water.

Source: Author's compilations.

Table 1-2 summarizes each chapter case based on the mentioned criteria and elements including: old and new challenges, types or areas of agrarian reforms, rural society groups in focus, threats created by formal or informal institutions to the rural society and institutions. All criteria which contributed to a changing of order or served as triggers for further changes of old or facilitated the creation of new institutions.

Chapters following the introduction of the thesis address specific set of research questions. The questions are provided below and followed by a short overview of the corresponding chapter.

The second chapter focuses on analyzing economic and social transition factors affecting the agricultural labor force and the position of rural women in post-Soviet Tajikistan. Specifically it looks at the increase in women's labor participation and, in particular, the growing diversification of the agricultural positions they take on as well as their increased labor mobility stemming from male outmigration. It attempts to answer whether this has helped to lift gender inequalities or whether, on the contrary, it has served to reinforce patriarchal values. The male outmigration and as a result the feminization of agriculture, as a product of reforms and socio-demographic changes in rural Tajikistan, is one of the many unintended consequences of reforms. This phenomena represents

institutional changes in labour structures, contractual relations and gender perspectives to agriculture.

The third chapter presents a comparative study of districts in two countries: Kazakhstan and Uzbekistan. It explores the impact of old and new agrarian institutions on decisions and choices made by agrarian actors. The new order maintained a quota system in Uzbekistan and subsidized cotton and wheat crop in Kazakhstan, thus promoting its production and exports. However, the state no longer was acting as a caretaker and as responsible for maintaining the inherited infrastructure and the environmental consequences of massive cultivation as during the Soviet regime. Agricultural policies driven by past reforms and the uncertainties of new reforms and orders of the state contribute more substantially than any other hurdles of diversification, constraining farmers' decisions in the region. The research questions are as follows: What is the state of soil salinization and cropping patterns in South Kazakhstan and Samarkand? How does soil salinity feature in choosing to diversify or not in the irrigated areas of South Kazakhstan? Which are the main drivers of farmers' crop choices? What is the role of salinity in crop diversification decisions by farmers in Samarkand? Which other drivers are important? The partiality of reforms and a mixture of old and new institutions have created many contradictory conditions and requirements for farmers.

Chapter four is based on a case study from Uzbekistan and explores the relationship between formal and informal institutions and their dynamics taking water institutions as the unit of our research. We consider water user associations (WUAs) through legal, policy and administrative institutions. Although a WUA is a representation of organizations consisting of actors and constrained by institutions, it is an institution itself, which sets, enforces the rules and the values of water management (Sehring 2009). According to Sehring (2009) water institutions are defined as formal and informal rules and norms – including their underlying cognitive systems as well as the organizational structures that set and enforce them – that regulate control of and access to water resources, hence their usage, distribution, and status. Water reforms in Central Asian countries followed western blueprints and were adopted through legal institutions. However, a strong path-dependency of water institutions established during the Soviet Union has not allowed the Association and new norms to be accepted evenly. Moreover, vested interests of high and mid-level authorities restricted or ignored direct actors: commercial farmers and households who were supposed to benefit, own and manage these institutions. The chapter hypothesizes that the non-integration of multiple uses and users into governing bodies leads to non-rule conformity and therefore anarchy or informal arrangements.

The last chapter summarizes the findings and gives an outlook on further research issues. The annexes provide additional information on the empirical research and data analysis. It includes a list of all persons interviewed.

2 The feminization of agriculture in post-Soviet Tajikistan⁶

2.1 Introduction

After gaining independence in the early 1990s, the majority of the former Soviet countries experienced periods of political and economic turbulence. Among them is the Republic of Tajikistan, which, after gaining independence in 1991, was ravaged by civil war from 1992 to 1997. The war brought with it a drastic decline in living standards, and a sharp fall in production and employment (World Bank, 1999). Although there have been many reforms aimed at improving economic development over the past 25 years, the implementation of these reforms has been slow, investments and job opportunities, especially in rural areas, are lacking, and the population is becoming increasingly vulnerable. One major constraint for the overall population is poor employment conditions that negatively affect both men and women; however, female workers typically struggle more as a result of additional burdens stemming from their involvement in reproductive family care and productive agricultural and non-agricultural activities (Chant, 2006; Gartaula et al., 2010). In the formerly Soviet Central Asian countries, the encumbrances of transition and of structural adjustments have had a disproportionate effect on women compared to men. In particular, female employment has been influenced by post-independence socioeconomic, institutional and cultural changes including a weakening of social protection systems, effectively reducing the possibility of women working outside the home; limited access to paid jobs and employment opportunities; and the redistribution of state ownership, which placed many income-generating resources in the hands of men.

The present study looks at the increase in women's labor participation and, in particular, the growing diversification of the agricultural positions they take on as well as their increased labor mobility stemming from male outmigration. It attempts to answer whether this has helped to lift gender inequalities or whether, on the contrary, it has served to reinforce patriarchal values. We contribute to, and advance, the existing knowledge on feminization by characterizing and categorizing the agricultural labor force specific to Central Asian countries and show how women have gone from being non-participants to being included participants beyond the conventional female positions.

Tajik land reform was initiated in the early years of independence, encompassing the transformation of former Soviet collective (*kolkhoz*) and state farms (*sovkhos*) into joint-stock companies called collective farms (CFs) and individual *dekhkan*⁷ farms (DFs). However, the distribution of land for private use was unequal and included many administrative and informal obstacles (Mirzoeva, 2009). For the rural population, low-paid agricultural work became less rewarding and provided insufficient wages for meeting basic household needs. Due to the limited employment opportunities at home in both the agricultural and non-agricultural sectors, around 40 percent of the working-age population, the majority under 30, set out to search for labor opportunities abroad. According to the World Bank Living standard Measurement Survey on Tajikistan, around 95 percent of the migrants go to Russia and they are predominantly men (93.5 percent) from rural areas (WB, 2013). The absence of male labor in agriculture led to a substantial increase in the responsibilities of female household members. In addition to caring for the family, women were now required to take over what were previously considered to be traditionally male agricultural activities. Since then, the proportion of women in the agricultural labor force of Tajikistan has been increasing, from 54 percent in 1999 to more than 75 percent of the total current

⁶ This chapter is based on the following publication: Mukhamedova, Nozilakhon; Wegerich, Kai (2018): The feminization of agriculture in post-Soviet Tajikistan. In *Journal of Rural Studies* 57, pp. 128–139.

⁷ *Dehkan*-from Persian language is a word for a peasant, farmer.

population (TAJSTAT, 2015). Increased involvement and the diversification of the roles of women in agricultural activities have led to the phenomenon of feminization of the agricultural labor force.

Feminization refers to the increased participation or greater roles of women in decision-making processes within the community or household. The phenomenon itself has a rich history and can be found in both developed and developing countries (Sachs and Alston, 2010; Lastarria-Cornhiel, 2008; Mandel, 2013). The trend towards the feminization of agricultural labor is often linked with a variety of factors such as male labor outmigration, the growing number of female-headed households, and the development of labor-intensive agriculture (Kelkar, 2009; Lastarria-Cornhiel, 2008). In many cases, the feminization of labor is accompanied by changing political and economic processes such as access to and control over resources, degradation of productive resources, low returns on labor and other investments, and lack of finances for health and social services. Rural women respond to these changes by participating more in subsistence farming and taking over a wider number of agricultural occupations, including those that were formerly considered to be male activities (Tamang et al., 2014; Mandel, 2013).

This paper contributes to the knowledge on the feminization of agriculture in rural societies and presents a systematic review of the reforms and social changes that have taken place since the collapse of the Soviet Union and the beginning of the transition period in Tajikistan's Sughd province. As such, this study questions whether the observed economic transition, agrarian reforms, male outmigration, and the subsequent increase in women's labor participation has facilitated changes in gender occupational segregation. We assume that in transition countries such as Tajikistan, although the jobs women perform remain subject to low protection, security, and earnings, increased participation in the labor force provides a gateway to a wider spectrum of labor opportunities and a certain amount of control over their own lives. Therefore, a gender perspective provides an important analytical lens for assessing how changes associated with transitions affect gender relations and women's status in societies characterized by varied levels of openness to, and tolerance of, women's participation in the labor force (Bieri, 2014).

The paper continues with a background section providing an introduction to the research area as well as agricultural production during the Soviet Union and within the transition period following independence in 1991. This is succeeded by a framework focusing on the causes and consequences of the feminization of labor in general and in agriculture. The case study section focuses on two support services influenced by the feminization of rural communities and agricultural production: water management (village and farmer *mirobs*—water masters) and the organization of seasonal workers (*mardikors*). The conclusions emphasize the importance of considering the contextualization of feminization for possible interventions and the need for comparative research in other provinces of Tajikistan to reveal similar or distinct cases of women gaining importance in agricultural support services where the supply of male workers has decreased.

2.2 A gender perspective on agricultural labor

Gender roles are based on the different expectations that individuals, groups and societies have of others based on sex, societal values and beliefs. Interactions between individuals and their social, historical, political and economic environments shape the norms which influence the formation of gender roles in society (West and Zimmerman, 1987). Applied to various contexts and locations, these norms can represent certain formal or hidden structural elements that influence gender regimes. Thus, not only are activities and experience gender-specifically structured, but gender norms influence the formation of skills, interests, power relations, and decision-making processes at individual, family, and institutional levels. Economic activities differ according to gender norms and, in the workplace, men and women are often expected to perform different tasks and occupy different roles based on their sex. Gender-occupational segregation refers to the different distribution of men and women across occupations and jobs. Occupational segregation is determined by “social norms, values and beliefs that commonly undervalue women's productive work and legitimize their

relegation to lower status, casual, manual work while men predominate in managerial and more skilled jobs” (Abdelali Martini and Dey de Pryck, 2014).

In the United States, improvements in women's occupational standing began to gain momentum from the 1970s, during which sex segregation declined by more than 14 points (Cotter et al., 2004). This movement subsequently spread throughout the Western world and brought with it a change in traditional views on women's rights, including the increased influx of women into paid labor, the expansion of the educational system, technological and institutional developments, and, most importantly, a shift in the public opinion towards gender equality (Mandel, 2013; England and Boyer, 2009). Empirical evidence from Western countries also shows that the occupational mobility of women and the resulting feminization of certain labor positions furthermore progressed with the increasing demand for workers due to a shift or absence of male workers in those occupations (Mandel, 2013; Shortall, 2014). Women became successful in entering highly rewarded occupations and/or previously male-dominated professions such as medicine, law and managerial positions. However, to a certain extent, this process negatively influenced the pay levels in male-typed and high-paid occupations (Mandel, 2013) and empirical evidence confirms the devaluation theory, which refers to a process of decreasing fees for jobs that occurs as a result of women's entry into prestigious occupations (England and Boyer, 2009). Yet, contrary to highly paid occupations, low-paid male-dominated occupations that “require little or no education and skills should be less affected by women's entry because their initial social ‘value’ or reputation is already low” (Mandel, 2013, p. 1188). Thus, regardless of the progress achieved in the name of occupational gender equality, the positions and benefits attained by women remain, for the most part, worse than those of men who have the same professional qualifications.

Although empirical data shows some convergence of male and female patterns of employment in Western countries, analyses by Standing (1999) suggest that in industrialized countries the growth and flexibility of labor markets and diverse forms of insecurity have triggered a relative and absolute growth in non-regular and non-wage forms of employment. Employment in the formal sector is largely based on wage and salaried labor where workers are secured and protected under legislation and guaranteed better career prospects, whereas the informal sector consists of self-employed, family labor and wage workers with low pay and skills, less stability, and few career prospects (ILO, 2002). Women's participation in the dual labor markets consisting of formal and informal jobs mainly happens due to multiple demands on their time and energy in the absence of any family, community, or state-run support services (Wharton, 2013). In developing and transition economies, over 50 percent of women are informally employed or combine both formal and informal jobs. Informal jobs do not provide an official working status or social protection; they do, however, provide some flexibility and additional income earning opportunities which are, at times, the main source of income (ILO, 2010). Furthermore, a flexible and informal labor supply seems to suit the needs of many production businesses with a demand for low-paid workers (Standing, 1999).

The proximate cause of increased female participation in agricultural production is defined as the increased participation of men in off-farm wage work, including the seasonal labor out-migration of men (Abdelali-Martini and Dey de Pryck, 2015; Lastarria-Cornhiel, 2008). While few in number, certain studies also hint at the “erosion of traditional roles” (Taylor et al., 2006; FAO, 2011) and the adverse influence of greater female activity on the male participation rate in agriculture, which could further cause the male agricultural force to shift to other sectors or lead to increased labor migration. The effects of migration and poverty are often mitigated by women through reproductive activities as well as their increasing involvement in agricultural activities (Mutersbaugh, 2002; Razavi, 2003; Mukhamedova and Wegerich, 2014a; Tamang et al., 2014). Due to low levels of literacy, skills, training, and bargaining capacities in most developing countries, women are more compelled to resort to jobs that are low paid, seasonal, and labor-intensive, such as in agriculture. This is coupled with difficulties accessing various resources and entering into markets. In some developing countries, the employment of women is even considered a sign of poverty, and disturbs gender roles

as it represents the man's unfulfilled role as breadwinner (Lastarria-Cornhiel, 2008). The increased importance of women's contributions to the household economy has eroded male authority and enabled women to challenge the stereotype of the male breadwinner (Kabeer, 2013; de Haan and Lakwo, 2010). Women taking up jobs at lower wages and the tasks formerly performed by men, such as land preparation, cultivation of crops, spraying pesticides, harvesting, post-harvesting, and marketing of produce (Kelkar, 2009), often carries positive interpretations of feminization such as the improved bargaining position of women within the family, leading to improved welfare for children (FAO, 2011). Despite the substantial amount of time allocated to domestic work, rural women experience a kind of empowerment in the absence of men: they manage small budgets and household decisions. To some extent, women's mobility is increased as they go to the local market to sell their products. However, in the case of larger items, they tend to rely on older male relatives. In an analysis of feminization of agriculture in China, Zhang et al. (2006) notes that rural women, particularly from the younger generation, increasingly control household income and make decisions about the sale of agricultural products, investments, and purchases of large items such as houses and consumer durables.

While these arguments could imply that male labor migration leads to increased opportunities for autonomy and better employment for women, there are cases with opposite consequences. These vulnerabilities reshape gender relations in ways that continue to disadvantage women including low-remuneration, the informal status of waged workers, or non-remuneration of family workers (Akramov and Shreedhar, 2012; Deere, 2005). A study by Desai and Banerji (2008) in India suggests that women working in agriculture do not gain more freedom and autonomy if they live in an extended family. Male migration has tended to strengthen rather than weaken traditional gender ideologies. Several case studies from Nepal also show that the effects of male labor outmigration on women's participation in agricultural work and decision-making are contingent upon the intra-household arrangements of roles and power (Gartaula et al., 2010). Similarly, Reeves (2011) notes that in a Central Asian context, collective regulation of female honor or control of women's movements by not only the family, but also the village, can mean that wives left behind often enjoy fewer opportunities for mobility, rather than more.

2.3 Agricultural reforms and changes in the labor sector in Tajikistan

2.3.1 *Transformation of the agricultural sector*

Located in Central Asia, the Republic of Tajikistan occupies a mountainous area with only about 10 percent of its land suitable for agricultural use. According to government data (Decree No. 349 of Republic of Tajikistan, dated 31 August 2004), the total arable land is 720 thousand hectares, of which 502 thousand hectares are irrigated. During the Soviet Union, the Tajik Soviet Socialist Republic (SSR) was classified as an agrarian economy, with 43 percent of its labor force employed in the agricultural sector (1991). The first land reforms (Appendix 1) after independence were initiated in 1992, but the civil war (1992–1997) delayed their implementation. The 1992 Law “On Dekhkan Farms” established the right of every citizen to create a dekhkan farm (based on private, individual, and inheritable land shares), and the Law “On Land Reform” stipulated, in total, three different organizational forms of the restructured farms: dekhkan farms, lease share enterprises, and agricultural enterprises, however, most of the ex-collective farms experienced delays in restructuring. Most of the newly formed farms also preserved the old Soviet type structure. Workers from former Soviet farms became members of agricultural enterprises and turned into land shareholders (sahimdors) who were to receive land certificates entitling them to a share of land within the former collective farm.

It took several years, however, before land certificates were issued to members of some of the collective farms. The certificates of land also did not provide the full rights to actually possess the documented land plot, thus leaving the management and use of the land to the farm leader. Finally,

only after the 2002 Law on “Dekhkan Farms” did some private farms begin to appear. According to Tajikistan’s State Agency for Surveying, Cartography, and Land Use, in 2011 some 35 percent of agricultural land still remained under collective farms and associations and 20 percent with dekhkan farms (Lerman and Sedik, 2008; FAO, 2011).

Following the latest land redistribution stage (Toshmatov 23 January 2014), by the beginning of 2015 (1 January 2015) there were 108,035 dekhkan farms with an average size varying between one and five hectares. However, not all share owners of the formerly collective farms received their entitled plots of land. Although, according to the law, former farm workers were entitled to withdraw their land share, in reality this was not practiced by the majority of agricultural enterprises (Table 2, p.19). Maintaining the same collective farm structures, established value chains and state order system for cotton allowed a continuation of administrative control and interventions (KasWag AgriConsulting Worldwide 2008). Few women entered into the privatization process of their land rights as heads of farms, although, at an earlier stage of restructuring, they were reported to hold around 53 percent of shares within farms (ADB, 2006). In 2015, about 13 percent of the 110 thousand registered dekhkan farms were formally managed by women.

Agricultural production takes place not only on farms, but also in kitchen gardens and on presidential lands to which people often have access. Presidential lands, with an average size of 0.115 hectares, were intended to supplement the household plot as a source of food for household consumption. In cases where the household members worked on the collective farm, a defined (alienated or not) parcel of land (sahim—land share) was promised. Kitchen gardens are mostly involved in growing fruit trees and horticulture and fodder crops (Figure 2-1). Gardens close to the house or homestead plots are by far the most productive segment of agriculture, accounting for over 50 percent of the value of agricultural production on about 12 percent of arable land (Yakubov, 2013).

The total population of Tajikistan, which currently sits at over 8.7 million people, has been increasing, with almost 73 percent residing in rural areas. The collapse of the collective farm system left rural men and women with few employment opportunities beyond poorly paid jobs in agriculture. There have been small rises and falls in the total population employed in agriculture over the years. Lerman and Sedik (2009) explain that the decline in employment was possibly caused by the incipient decrease in industrial production already occurring before independence, as well as the outmigration of Russian minorities (who were mainly employed in the industrial sector) and devastations during the civil war.

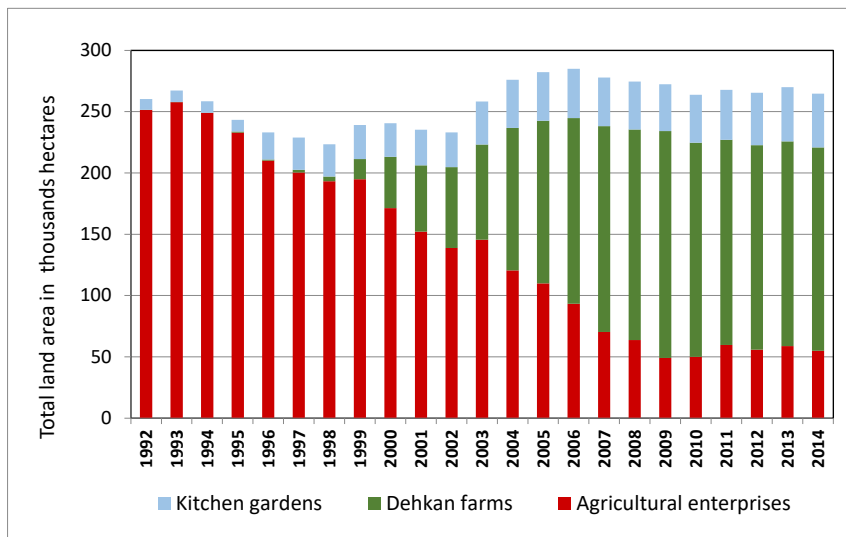


Figure 2-1 Agricultural areas (hectares) by different forms of producers of agricultural goods in Tajikistan

Source: Agency of Statistics of Republic of Tajikistan 2015.

2.3.2 Roots of feminization—gender roles during the Soviet period and after

In the last decade of Soviet rule, the Tajik Soviet Socialist Republic (SSR) was classified as an agrarian republic with 43 percent of the labor force employed in the agricultural sector (Curtis, 1996). During the Soviet period, agricultural production was organized in crop-specialized, state-owned, large-scale collective farms (kolkhoz and sovkhoz⁸) where the Soviet system tried to regulate gender relations by involving women in production on a similar basis to men. The representation of men and women in collective farms became more or less equal, and women were also encouraged to become involved in political and economic decision-making processes within the collective farm (Mickiewicz, 1977). Islamic customs, which are interwoven within Tajik traditions, assign all authority and power to men, but the constitution provides men and women with equal rights. According to traditional family merits, women are seen as caretakers within the home, while men are the breadwinners and the protectors of their wives, mothers, and daughters. Although in family life there was scarcely any redefinition of gender roles (Akiner, 1997), in the agricultural sector the collectivization of private farms broke the tradition of women acting as only housewives and dependents by assigning women into wage jobs (Constantine, 2007). While Soviet policies on gender relations claimed to prioritize women's liberalization, it ignored their status and existing contributions to production and the economy. The paradox of Soviet modernization was characterized by the state integration of women into the workforce as well as the provision of equal citizenship, while at the same time supporting motherhood as a social duty and exploiting patriarchal family structures (Kandiyoti, 2007).

Originally the kolkhoz and sovkhoz type farms were supposed to have little gender role distinctions (within non-managerial positions), but over time some specializations began to occur along gender lines. Planting, weeding, trimming, and harvesting became the responsibility of women, while men took over the role of irrigation, transportation, mechanization, and heavy land preparation work. Hence, a gender biased categorization of rural labor had already begun to come into play during the Soviet times. Women occupied few managerial positions at the lower levels of significance and decision-making power (female specialization in administrative/technical education was introduced only during the Soviet Union). By 1987, the policy of “the rent of cotton plots” was initiated. Under this policy, kolkhoz plots (0.5–2 hectares) were assigned to collective farm members and their families for growing and harvesting cotton according to state plans on an annual basis. Kolkhoz members assigned to agricultural lands were called hektarchi. Hektarchi, in the times of the Soviet Union, was not a gender specific term and made reference to kolkhoz members and their families working on assigned land. Hektarchi at that time were represented by almost equal numbers of men and women; however, the most tedious tasks of trimming and gathering cotton were allocated to women. After independence and the start of the economic transition, the collapse of the collective farm system left the rural population with few employment opportunities beyond poorly paid jobs in agriculture and an overall unemployment rate of almost 40 percent (World Bank, 1999). Both the causes and outcomes of poverty are heavily gendered and women and girls have borne a greater share of the cost of economic transition. This has resulted in the intensification of women's

⁸ The major difference between the two farm types was that the wages of the former were dependent on the profit that was made by the farm in accordance with the working days of the worker. In contrast, the workers of the latter received a fixed salary independent of the profits of the state farm, and each member of a household also received an equal amount of potatoes, carrots, or other local products. Different programs were initiated to reduce the inequalities between the two state farms and in the second half of the 1970s the loss-making kolkhozy were merged into sovkhozy.

workloads with increasing participation in formal and, more importantly, informal labor markets alongside an unequal household division of labor (Falkingham and Klytchnikova, 2006, p. xviii).

2.4 Feminization of jobs in Tajik agriculture

During recent years, the total labor force has increased by almost 60 percent, although the number of those employed in the agricultural sector has decreased (Figure 2-2) and the latter contributed only 23 percent of the total Gross Domestic Product (GDP) (USAID, 2012).

According to World Bank data (2013), Tajikistan's unemployment rate averaged 11.53 percent from 1991 to 2013. Rising unemployment and reduced wages triggered male outmigration, and increased the labor activity of women. According to the Migration Service under the Government of the Republic of Tajikistan, in 2012 the total number of seasonal labor migrants was 877,335 (about 10 percent of the total population), of which only 14.1 percent were women. Half of the male labor migrants were between 21 and 30 years old. In 2014, remittances from labor migrants constituted approximately 50 percent of Tajikistan's gross domestic product.

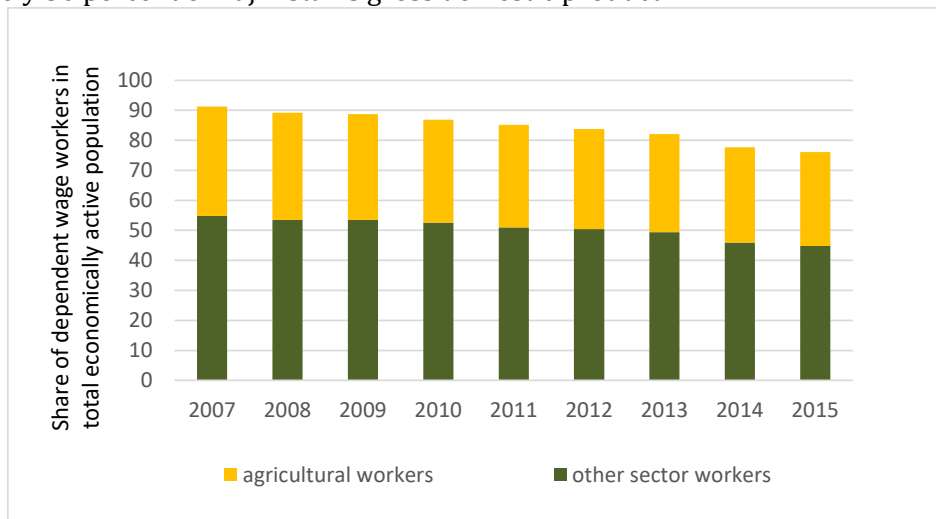


Figure 2-2. Employment trends of agricultural labor in Tajikistan, 2007–2013.

Source: First author's compilation from data of the Ministry of Labor and Social Security and Statements of the Agency of Statistics of the Republic of Tajikistan.

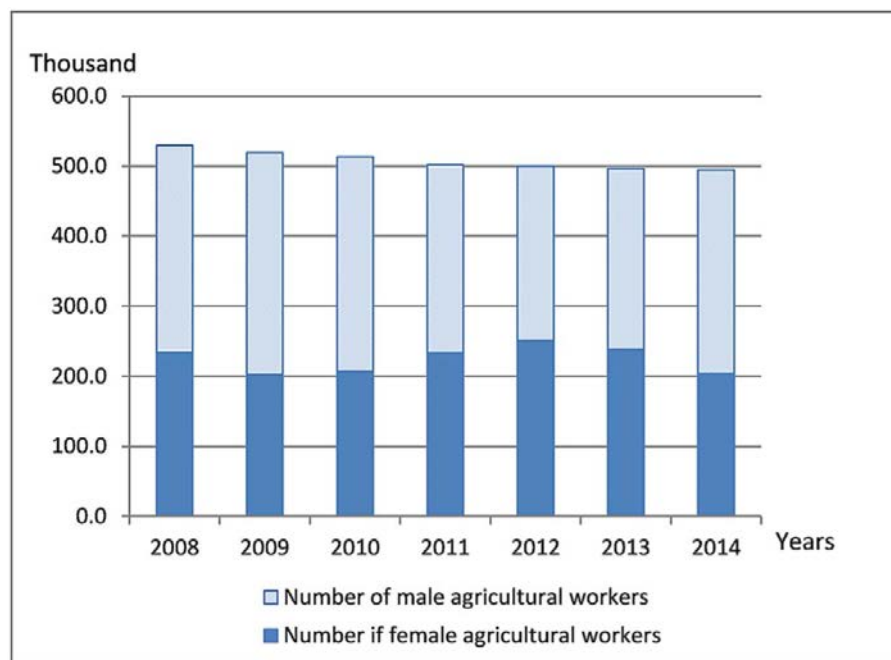


Figure 2-3. Change in total employment of agricultural workers by gender, thousand persons.

Source: authors' compilation from the Ministry of Labor and Social Security and Statements of the Agency of Statistics of the Republic of Tajikistan.

Data from the Statistics Agency of Tajikistan (Figure 2-3) shows the declining number of men employed in agriculture, which can be attributed to low wages and the consequent outmigration abroad in pursuit of better paid employment.

The overall female participation in the labor force rose, with the total number of men and women in agriculture experiencing opposite trends. More women and fewer men worked in this sector until 2013, and the numbers of female agricultural workers began to decrease in 2014. This decline could be explained by various reasons including the fact that the statistical data does not include the informal agricultural labor in which female workers prevail.

Nevertheless, female wages are much lower than male wages (over 65 percent lower), which cannot be explained by age, educational attainment, or urban or rural locations (Sattar, 2013). Due to the seasonal migration of men (between 20 and 40 years of age), the majority of households can be classified as female-headed households (Kurbanova and Olimova, 2016; ILO, 2010). Average remittances received by Tajik households account for only 10 to 12 percent of total household income (Falkingham and Klytchnikova, 2006). In addition, the welfare system does not offer benefits comparable to those offered during the socialist system⁹. Hence, there is pressure on women to take low paid agricultural jobs. The average wage work income in the agricultural sector is currently around 40 dollars per month (TAJSTAT, 2015). Therefore, in general, a combination of several sources of income is required to ensure self-sustainability for rural households (Shahriari et al., 2009; Somach and Rubin, 2010).

⁹ In addition to free health care and education as well as cheap housing and transportation, the socialist system provided many types of family benefits. In-kind benefits included the provision (usually free) of crèche facilities, kindergartens, day care centers, and school meals. Cash benefits included family allowances, a birth grant, maternity leave at full pay, parental or childcare benefits (a monthly payment to the mother after maternity leave, and usually until the child was three years of age), paid leave for the care of a sick child, various tax allowances and credits, and a death grant (Sipos, 1994).

Households also rely on kitchen gardens, which have been evaluated as an important household income source (Abdullaev et al., 2009). For on-farm and kitchen farming activities, households also rely on the contributions of different generations (usually three generations live in one household) (Tandon, 2011). Kitchen gardens have gained considerable importance and contribute to the overall food security and livelihoods of people in Tajikistan, especially in the Sughd province (Figure 2-4. Map of the Sughd province within Ferghana Valley. Figure 2-4) where the contribution of household (kitchen garden) production to the total volume of agricultural production is considerable and has been steadily increasing (Yakubov, 2013).

Male labor out-migration has led to women filling the absent male position gap in the sector and forced female labor out of its conventional, cultural settings, effectively reducing the occupational segregation in agriculture. The feminization of rural employment in Tajikistan was further distinguished by Mukhamedova and Wegerich (2014a), who showed that each new policy on farm restructuring created not only new types of farms, but also triggered different kinds of contractual relationships between large collectives, private farms, and other agricultural actors including members entitled to own a land plot within former collective farms (*sahimdors*), wage workers occupied on cotton fields (*hektarchi*), and private farms and seasonal workers (*mardikors*) (Table 2-2). Substantially, these contractual relationships are labor agreements that are established between the farm heads, mostly men, and the workers, mostly women. This gender imbalance is due to the fact that men are not willing to accept low paid jobs in agriculture. Most of the contracts, except the position of *sahimdor*, are informal positions, which are not reflected in the official statistics, with unreliable incomes, working conditions and availability. Therefore, often, these newly acquired employment positions push women further into the informal labor market, where they are not registered as official workers and, therefore, are not eligible for social support or pension provisions. Farmers in the new market conditions have not been eager to offer official contracts due to tax burdens, market instabilities and possibly due to existing gender norms which push women into low payment groups. Migration reduces the domestic labor supply, and thus triggers the increase of the wage level expectation in the local job market. In this situation, some prefer to remain unemployed as they do not want to accept low-wage jobs rather preferring three times higher paid employment. However this induces informal labor relations (Abduloev et. al. 2011). Nevertheless, such informality of positions is found to be essential for rural women as it offers flexibility of time management and the opportunity to earn while also fulfilling other family obligations.

2.5 Introduction to case study and field research methodology

2.5.1 Background to farm restructuring in the Sughd province

The Sughd (former Leninabad) province is located in northern Tajikistan and covers about 26.1 thousand km² (Figure 2-4). The Sughd province was chosen as a representative location for our case study for two main socio-demographic reasons. First, the population in the district is large (2.5 million in 2015), which accounts for around one-third of the total population of Tajikistan, and the percentage of rural population is high at over 75 percent of the total population of the Sughd province (TAJSTAT, 2015). Second, the province is considered to be one of two provinces in Tajikistan with the highest migration rates (TAJSTAT, 2015). After independence and the economic transition, labor migration, particularly of the male population, reached approximately 62 percent within the Sughd province (IOM, 2012).

The feminization of agriculture in post-Soviet Tajikistan



Figure 2-4. Map of the Sughd province within Ferghana Valley.

Source: Produced by the first author using ESRI ArcGIS v. 10.5.

In 1972, the Leninabad (Sughd) province had 81 kolkhhoz and 32 sovkhoz farms which made up a total of 231 thousand hectares of arable land, 58 percent of which was irrigated (Big Soviet Encyclopedia, 1978). Land reforms triggered the gradual restructuring of collective agricultural enterprises into new forms of farms (dekhkan farms) provided in a general category of farm enterprises in official statistics. Variations in the numbers of farms reflected in Figure 2-5 show the percentage changes in numbers for three types of farming entities that were accompanied by periods of land reform implementation.

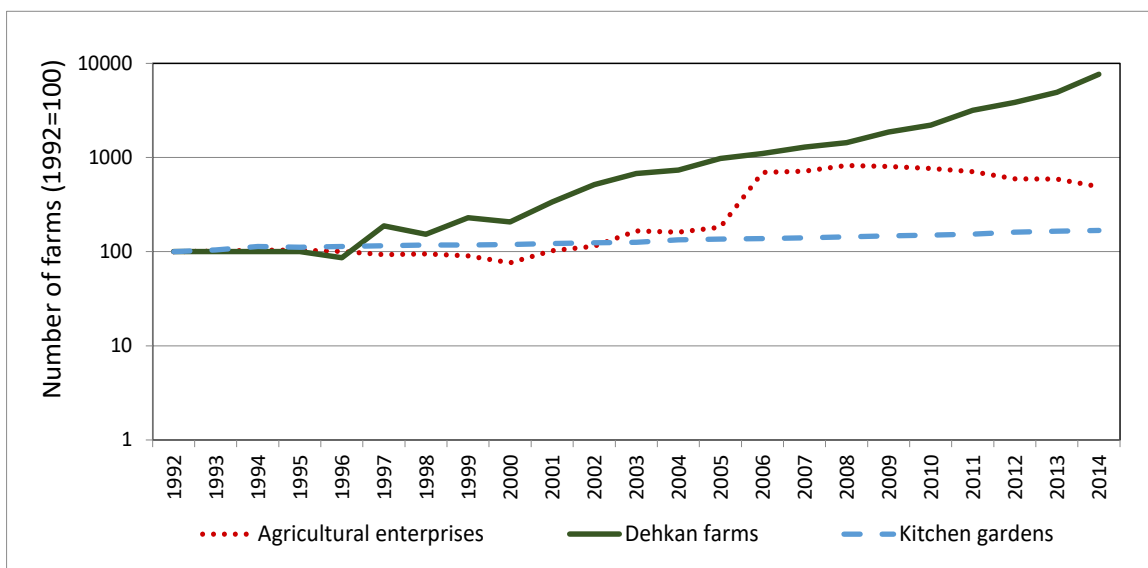


Figure 2-5. Farm dynamics for the Sughd province (relative to 1992)

Source: First Author's compilations based on data from Agency on Statistics under the President of the Republic of Tajikistan

Although statistics show that most of the collective farms were dissolved and the number of private farms increased significantly, there are considerable differences in ownership, management,

and organizational settings within the large group of dekhkan farms (Mandler, 2016) that function still as kolkhozes or sovkhoses.

Institutional reforms also took place within the country's water sector. Centrally functioning water management and allocation was altered by transformed institutional arrangements and the appearance of new water users. As a result, in the beginning of 2013 there were 21 Water Users Associations (WUAs) registered within the Sughd province. Along with farms using water for agriculture, households extensively use the canal/river water for a whole range of different household uses including subsistence gardening and often for drinking (Yakubov, 2013). The cooperative farms were created based on former kolkhoz boundaries and the WUAs were created on the administration-territorial areas of ex-kolkhoz farms and currently serve private dekhkan farms inside the WUA territory. The ongoing land and water reforms have resulted in the appearance of distinct forms and structures of farms.

Collective farms established during the Soviet Union varied in terms of area occupied, capacity of production, and workers. Once restructured, farms changed in form and size. The total kolkhoz land was supposed to be divided by the number of existing kolkhoz members. This assignment of lands to kolkhoz members turned members into *sahim*дор. Mukhamedova and Wegerich (2014b) point to the consequences of unequal land privatization processes and inequality between *sahims* of different divided kolkhozes as a possible key factor for explaining the establishment of private farms. In addition, as a consequence of the process, potentially small subsistence farms as well as larger farms were created from the start. The subsistence farms could possibly imply more *de facto* female heads of farms.¹⁰

2.5.2 *Case study methodology and data*

The qualitative design of this study involved data collected through site visits, participant observations, semi-structured in-depth interviews, and focus group discussions, which covered various topics linked with the overall research objective on the feminization of Tajik agriculture. The first author with the help of a local interpreter conducted 60 interviews in the Sughd province of Tajikistan during one month in 2011 and followed up with two weeks of visits in October 2012. Five focus group discussions were conducted with different types of workers including *sahim*дор, *hektarchi* and *mardikor*s in 2011.

To ensure the diversity of cases and inclusion of all existing employment varieties in the study region, we selected five formerly Soviet collective farms as units of study based on 1) their location relative to the main water source (Khodjabakirgan Sai): head, middle, tail; and 2) the variation of their legal status (after the reforms) and type. Current selection criteria were used to eliminate possible differences in structure, organization of labor, and performed activities connected with water access in this region. Location relative to the water source and farm type criteria were used to ensure internal generalization between agricultural laborers working in various settings that could create a bias in the answers of the respondents. The focus units were diversified to adequately understand and represent the diversity of the phenomena of feminization.

The interviews were conducted with agricultural laborers on private dekhkan farms and agricultural enterprises as well as with rural household members who were randomly available on the farm fields. Around two-thirds of all interviewees were women. In order to be able to find contrasts and/or similarities between the variations, we also carried out targeted interviews with Water Users Association (WUA) staff, independent water masters, and *mardikor* leaders of the region. These groups represented pure female, pure male, and mixed groups, and served to triangulate the data in our interviews. We provided open-ended questions concerning the

¹⁰ In addition to the inequality of the size of *sahims*, the location of the kolkhoz along the canal or *sai* appears to be a key factor for the economic activity of women. Possibly because they are located disadvantageously at the tail end of the canal and of the Khodjanbakirgan Sai River, women of this WUA are more active as *mardikor*s.

feminization of agriculture, new gender roles within rural societies, and the organization of mardikor labor groups. Interview responses were then transcribed, coded, and based on typical cases and issue topics identified during the theoretical and empirical literature reviews as well as open coding.

We analyzed the data by creating major categories, and defining and differentiating links between them (Corbin and Strauss, 2008). We considered definitions of employment groups as well as types of groups that are further used for creating categories of employment within the Central Asian context. In the field study sites, the majority of the represented agricultural workers were women, whereas men were mainly represented in managing positions and as official staff of the Water User's Associations or community representatives. The categorization of interviewees by their job position is presented in Table 2-1. The age range for female agricultural workers was between 18 and 65 years with the average respondent being 40 years old. The category of dekhkan and collective farm representatives included both employers and their workers (sahimdors). Seasonal workers were represented by hektarchi and mardikors.

Table 2-1. Categorization of interviewees.

List of Interviewees	Total	Female	Male
WUA representatives	7	0	7
Mahalla (community) representatives	12	12	0
Dekhkan and Collective farm representatives	29	15	14
Seasonal workers (<i>hektarchi</i> , <i>mardikors</i>)	12	10	2

Source: Field report produced by the first author.

2.6 The feminization of agricultural production

2.6.1 Manifestation of feminization

Structural changes occurring in the Sughd province forced households to rely on several economic activities including food and cash crop farming, farm wage work, off-farm work, and migrant remittances. High risk aversion among the rural population triggered a diversification of jobs to improve the stability of incomes, and up to a certain level, to provide more efficient use of household resources. In comparison to their male counterparts, female farm owners, accounting for 15.4 percent (TAJSTAT, 2015) of the total number of dekhkan farms in the Sughd province, rely more on other income sources such as agricultural wage work, non-farm jobs, kitchen gardening, and remittances.

The actors and status of their participation are considered to be the main drivers in the process of changing roles in agricultural employment (Bolwig et al., 2010). We distinguish between three different types of contractual relationships of rural feminization in agriculture: sahimdor, hektarchi, and mardikor (Table 2-2).

Sahimdors, due to their labor book, have the most formal position. However, it is necessary to note that this formal position does not provide livelihood security, although it may potentially lead to a farm plot (varying in size) as well as a small pension (which, however, is still not sufficient for livelihood security)¹¹. While the hektarchi position offers flexibility and stability, only in-kind salary

¹¹ The tradition of children taking care of elderly parents and living with them has been preserved in Central Asian societies to the present day. The youngest son must prepare himself to take care of his parents in their old age (Ember and Ember, 2001). Therefore, pensioners often rely more on their children and less on pensions. Parents work hard to cover the needs of their children for education at least to primary school level, "putting them on their legs," meaning to support them in finding jobs and establishing their own families.

is obtained. While from the outside this could appear to be an undesirable position, cotton sticks are allowed to be gathered at the end of the harvest season, which provide essential energy sources. They are crucial for food preparation or for heating during the winter. The mardikor position, which could likewise be considered undesirable in terms of social security compared to other agricultural employment groups, is actually considered the most preferable and provides the highest income. Therefore, this position would be the best for covering daily household expenses. The remuneration of *sahimdors* is stable and based on formal contracting as only the in-kind reward can be harvest dependent. The *hektarchi* job position, although attached to the cultivation of only one crop (cotton), is dependent on the agricultural season as wages are only provided during that time. *Mardikors* take the least secure position, which is sensitive both to the seasonal availability of jobs and the harvest yields. *Mardikors* work under pre-agreed-upon outputs in days and hectares and receive daily payments (*kun-bai*).

Table 2-2. Characteristics of agricultural employment groups. Summary table of interviews gathered in five organizations situated in the Sughd province, Tajikistan.

Types of groups	<i>Sahimdor</i>	<i>Hektarchi</i>	<i>Mardikor</i>
Definition of employment group	Shareholder and formal employee of a Collective Farms (CFs) or a Dekhkan Farms (DFs). The land shares can be inherited. <i>Sahimdors</i> can obtain land certificates through registration a process but as members of DFs or CFs they don't have decision-making power over what to plant or how to distribute the profits.	Informal farm worker who can make an inquiry to the farm managers about taking a small cotton plot. Informal agreement about tasks to be performed and receiving agreed-upon remuneration. Well performing <i>hektarchi</i> might receive up to 3 ha of the farm plot.	Seasonal wage workers who appeared after the collapse of the Soviet Union. Majority of <i>mardikors</i> are women who are involved in seasonal work on private <i>dekhkan</i> farms growing fruits and vegetables.
Females % from total # of workers	Over 50%	Over 95%	Over 98%
Age ranges	40-80	25-65	16-60
Period of seasonal work	April-November	April-December 3-4 days per month	April-December
Types of work performed	<ul style="list-style-type: none"> Land preparation Cotton planting Weeding Trimming the top foliage of cotton plant Cotton harvesting Gathering fire wood from the cotton fields Performing agro-technical jobs on all other crops on the farm 	<ul style="list-style-type: none"> Land preparation Cotton planting Tilling and weeding Trimming the top foliage of cotton plant Cotton harvesting Gathering fire wood from the cotton fields 	<p>Mardikor female group members</p> <ul style="list-style-type: none"> Tilling and weeding Harvesting vegetables, potatoes, fruit trees, rice
Remuneration type: Cash payments	Contractual (formal) Salary: 30-80 USD/month	Non-contractual (informal) Wage: 180-200 USD/season	Mardikor group members Non-contractual (informal) Fee: 3-5 USD/day and person
Remuneration type: In-kind payments 1 USD = 4,8 TJS Date: Nov, 2011	Variable crops: rice-100 kg, wheat-150 kg, vegetable oil-10 kg, fodder-20 kg, flour-50 kg. <i>Total</i> ~ 150 USD/season In-kind compensation is constant	Variable crops: fodder, corn, firewood-700 sheaf of cotton stems <i>Total</i> ~ 300 USD/season In-kind compensation is constant only for firewood (cotton stems)	DF harvest offered to <i>mardikors</i> at below market prices
Organization of work	<ul style="list-style-type: none"> Individual and/or family work Hired to do mandatory job in collective enterprises Plots are not assigned on constant basis to <i>sahimdors</i> but rotated due to annual replanting process	<ul style="list-style-type: none"> Individual and/or family work <i>Hektarchi</i> are given 1-2 ha and do various jobs 3-4 times per month	<ul style="list-style-type: none"> Individual work in a group Individual <i>mardikors</i> jointly appoint a woman leader

Source: First Author's compilation based on thematic qualitative analysis of the interviews. Note: 1 USD = 4,8 TJS Date: Nov, 2011.

Mukhamedova and Wegerich (2014b) present a classification of the occupations *sahimdor*, *hektarchi*, and *mardikor*. They distinguish between formal or informal, and secure or flexible, highlighting overlappings in agricultural positions. Flexibility of positions, type of remuneration, as well as various household needs guide women's choices in accepting formal and/or informal jobs. Although female unskilled agricultural workers have not moved far from the type of activities they were performing before farm restructuring, the organization of labor along the production value chains and the dynamics of relations among the agricultural actors have changed. Women took over several new niches in the agricultural service sector and stepped into market relations, which allowed them to increase their bargaining power. Restricted in access to land and farm management as well as to permanent, high paid jobs (ADB, 2010; Mandler, 2016; Boboyorov, 2013), the majority

of rural women in Sughd have been opting for mardikor jobs (Mukhamedova and Wegerich, 2014b). These jobs became attractive due to their flexibility in labor arrangements and the highest short-term cash remunerations. Since the mardikor position is the best paid job, it has also contributed to a shift in bargaining power within the household. Hence, through the new position as mardikor, women receive recognition as income earners and providers for the family. The social system that existed during the Soviet times has been reduced to pension payments guaranteed by the government and based on registered years of experience (minimum three years) as well as the average salary for the last 10 years of work. Nevertheless, dekhkan farms prefer not to register workers as official staff members, and very often hire wage workers for temporary, informal agreements to avoid taxation and supervision costs. Therefore, mardikor jobs also fall under farmers' preferences.

2.6.2 *Mardikor teams*

With the rise of female mardikor workers as well as the rise of private dekhkan farms, there appears to have been an increase in the organization of female mardikor workers. While in the beginning mardikor workers might have gathered in specific places—so called mardikor bazaars (markets)—currently mardikor workers appear to be organized in groups directly under a leader (brigadir). According to interviewed mardikors, mardikor brigadirs are selected from within the mardikor group of the local mahalla¹² (community), and are more widely described as older (40–50 years old), trusted, and respected. Mardikor leaders did not make reference to a selection process, but only mentioned their experience in working and specifically communicating with different administrations (former kolkhoz). There appears to be competition between mardikor brigadirs regarding clients (dekhkan farms as well as still existing kolkhozes), as well as individual mardikors. All mardikor brigadirs try to uphold their quality of service provision to acquire and maintain farmer clients as speed and quality of work are important if they wish to compete with other groups. Some mardikor brigadirs have a list of farmer clients which hire them every year. The benefit for the dekhkan farmers is that they don't have to spend time and effort gathering and monitoring the work of the wage groups, but can contact senior mardikor brigadirs to manage a group of mardikors in their field. The fact that mardikor groups generally consist of over 90 percent women also makes it inappropriate for male farmers to gather such groups on their own, especially if the workers must be found outside of the farmer's village. Mardikors pick their leaders based on their ability to communicate clearly, organize work continuously, and provide better daily wages.

Mardikor brigadirs receive a fee for organizing a mardikor team from their clients. Having different teams for different clients at the same time would imply multiple fees (the trade-off for the mardikor brigadir is less quality and time control). Different dekhkan farms mentioned that while some mardikor brigadirs also work in the field with the other mardikors, others only organize the mardikor team, transport them to the farm, and provide performance control. A group of mardikors has about 30–50 members, depending on the type of work and the size of the dekhkan farm land. The emergence of mardikor brigadirs as well as the competition for clients and labor force is a proof of increasing specialized businesses providing labor services. Within the context of local traditions in rural Tajikistan, this labor service provider business is gendered and allows for brokering services between the male-dominated labor demand and female-dominated labor supply side. Given other country evidence, it is not certain whether the former higher position of women on the collective farms, the cultural setting, or the high number of new farms competing over labor triggered an exclusively female-dominated organization of female agricultural laborers. Domination of female workers can also be attributed to agricultural cropping patterns. The dependency of the Sughd

¹² Mahallaisaresidentialcommunityorganizationandrefersbroadlytoaneighborhood or local community. According to Sievers (2002), mahalla has several institutional channels that mediate between mahalla and family, mahalla and culture, mahalla and survival, and mahalla and commerce. Fundamental mahalla divisions include family, sex, and status. Often mahalla is differentiated on the basis of administrative subordination.

province on cotton during the Soviet period has been inherited by the present farming system, as well as the organization of agricultural employment that relied heavily on manual female labor for cotton harvesting. Considering that the other regions of Tajikistan have distinct agricultural characteristics and cropping patterns, more comparative research is needed to understand the development of agriculture related occupations that are becoming feminized and the reasons behind this development.

2.7 The feminization of agricultural services

The diversity of feminized contract relations provides an important step in understanding the nuances of women's livelihood strategies within agricultural production (Mukhamedova and Wegerich, 2014b); however, essentially, it still portrays feminization as women taking on agricultural labor positions only. Feminization goes beyond the role of women working as laborers on farms. It appears simultaneously on multiple spatial and social scales and impacts various levels of the value chain for different inputs of agricultural production, such as water management and other non-farming activities that position women beyond being unskilled agricultural workers.

The process of feminization grew from a need to take on jobs and the role of the breadwinner, and led to women gaining knowledge and experience in new employment positions. The growing decision-making power and income earning possibilities provided by dekhkan farms established a female-dominated service sector, which allowed for contracts to be brokered between female labor groups (mardikor teams) and male farmers.

Women, to some extent, have also taken over roles in irrigation services. These roles include women working as mahalla (community) mirobs (water masters) and as mirobs of private dekhkan farms. A mahalla woman representative shared her opinion about female mirobs:

Our daughter-in-law is a mirob; she distributes water to 200 households. She takes the water from the canal and distributes it to smaller ditches according to the turns assigned to each household. All the households know that every two hours they have to pass the water to the next household and the mirob is responsible for making sure everybody gets the water. Three times per week she is involved in irrigation. She has three children and that is why she cannot go far for seasonal work; too far so we offered her the position of mirob in our mahalla. (Interview: 17112011_6).

The importance as well as utilization of kitchen gardens in rural communities increased due to the economic and political transition. Social changes placed female members of households as the primary users and managers of kitchen gardens. In one of the interviews, a female respondent said:

It is better if men are doing the irrigation, but it's a fact that whether in Tajikistan or Uzbekistan many men are leaving in search for jobs in Russia. And many women are left to do all the work by themselves. Men do not create any obstacles for women to work and women are performing well. There are women who are even more effective than men in irrigation since the main recipients within the households are women (Interview: 17112011_3).

Water allocation to rural households is very limited due to the overall water scarcity in peak irrigation seasons and prioritization of state ordered crops. Therefore, the competition over water resources within villages is high. However, because of the feminization of villages, the role of male mirobs began to be contested and the implementation of water rotations became difficult. The reason for this lies within the cultural setting: traditional and religious distancing of females from other non-relative men (Interview: 171111_2). A man must never enter a home where there are only women, and a girl must never be left alone with a boy. At large social gatherings, men and women are often separated (Countries and Their Culture, 2013). A female mahalla representative said:

I think it's possible for a woman to become a mirob although it is considered to be a man's job. Male mirobs, who worked previously, had difficulties communicating with women water recipients. In the absence of a male representative, a male mirob would not be able to enter a house with only women or shout at a woman in case of a turn violation or water theft, neither could he fine her nor restrict her off-take. A woman mirob is in a better position to be strict and shout at the women who do not fulfill the irrigation turn rules and do not pay for water. (Interview: 16112011_1).

The collection of water fees from rural households presents a similar case. In different settlements of the research area, multiple women were involved in water management as well as fee collection. Women do not have the direct responsibility of irrigating kitchen gardens, but they are responsible for organizing and enforcing agreed-upon turns. Hence, women are responsible for water governance issues among female users in the village. However, the WUA mirobs who deal with water deliveries to main off-takes of farms and villages are males (Interview with female village mirob: 22112011_1).

Within some of the farms, women were also mirobs at the farm level, providing water to male farmers. A male WUA accountant explained: "At night usually men are doing the mirob job. Even though we have a lot of men in Russia there are still some men left, but where there is no other option, of course, women do the irrigation." (Interview: 18112011_1). A female mirob (Interview: 22112011_1) stated that two other female mirobs were working in her district. However, all three female mirobs were working at existing kolkhoz type collective farms and were brigadirs for a certain area within these farms—they did not work for a WUA.

The female mirob (Interview: 22112011_2) explained how she came to learn irrigation management skills: "I worked as a leader of a brigade in the kolkhoz [during Soviet times]. We had a pensioner mirob and he asked me one day, 'how long are you going to wait for men to do the irrigation?' He explained and taught me all the skills for becoming a mirob. I think it took me two to three weeks to learn the tasks of a mirob and the rest is long-term experience on the field." Today, there are few experienced male mirobs left. Due to the shortage of younger men, women are learning the mirob job. However, this learning process is on-the-job training only. The female mirob continued: "Now [end of November] there are men available, but at the peak of the agricultural season when men are in need, the majority of them are not available. That is why women also have to handle irrigation services. Some older mirobs might remain and they have to join forces with women to do the irrigation."

Finally, private dekhkan farms are also employing female mirobs (Interview: 17112011_1, Director of a WUA). The newly established private dekhkan farmers were former kolkhoz members, and therefore specialized workers. Private dekhkan farmers already employ mardikors; therefore, they also do not hesitate to hire female mirobs. Due to the fragmentation of land and the pressing need to irrigate with scarce water resources within a given time period, dekhkan farmers hire specialists—in this case, newly trained female mirobs. Although women still consider irrigation to be a man's profession they recognize the importance of women's involvement in the irrigation of farm lands. A mirob woman from the Gulakandoz district said:

I am a mirob working within a farm and I, by myself, irrigate all the lands on a dekhkan farm. I started working on Khodji Inoyat farm after the division of our kolkhoz. As the mirob was too old there were no other candidates and I agreed to be assigned to manage the irrigation activities on this farm. I have two women that work for me as my assistants. I think that irrigation is a man's profession but women can also do this job (Interview: 18112011_3).

Cases of women working as mirobs within village communities highlight the fact that service providers such as water providers to rural settlements found themselves having to turn to a female

labor force to engage with the now dominant female clients. The shift to female employees can be traced to existing cultural settings and a lack of men willing to take on low paid work. It is likely that this shift is not limited to the water sector as door-to-door billing and fee collection from the households is additionally common for other utilities as well as for gathering taxes. Because women were also responsible for the enforcement of water turns it is likely that other roles of responsibility will see some form of feminization such as mahalla organizations or policing to keep harmony within the village. Similarly, it is likely that some crafts will undergo a feminization due to the demand for only female craft masters to enter the house.

Women working as mirobs within collective farms or for private male-dominated farms manage and are involved in decisions concerning irrigation methods, amounts to be applied, and negotiations with other water users. Interviews within the case study area show that some of the old organizations as well as new male players within the agricultural sector have already adapted to the situation of feminizing rural societies by hiring female specialists in various sectors. It is likely that the absence of men initially triggered the shift to hiring female specialists. However, it is also likely that trust and confidence based on the quality of the services of these first female specialists led to a wider acceptance among male farmers and, therefore, triggered a rise in female apprentices in this field. While originally the mirob position was a male position, the case study highlights the way in which feminization has changed this and thus a female mirob has become acceptable to both men and women.

2.8 Conclusion

Our results confirm the previous findings (Katz, 2002; Deere, 2005; World Bank, 1999; Standing, 1999) that suggest economic and social transition as well as structural changes in farm systems may alter the occupational segregation of labor towards a feminization of positions conventionally attributed to men. Existing local systems of power, male-dominated relationships, and a social structure based on patriarchal values are being challenged due to male outmigration resulting in a feminization of the labor force as well as recipient clients. The present empirical study set out to explore and categorize gender roles in a post-Soviet society in transition. Structural reforms in the agricultural sector of Tajikistan and the continued gender-based assignment of activities influenced the formation of social roles and decision-making power of rural men and women. A systematic review of reforms and social changes occurring since the collapse of the Soviet Union and the beginning of the transition period in Tajikistan has shown that various types of contractualization were constructed from a mix of historical gender system legacies (cultural, religious, and political elements), socio-economic and legal transformations, as well as labor market changes. Economic transition, agrarian reforms, male outmigration, and the subsequent increase in women's labor participation facilitated changes in gender norms and contractual relations.

This study reviewed previously unobserved new contractual relationships based on women filling a gap within the agricultural services sector. The new actors within the agricultural value chain were faced with a reduced labor force which needed to be supplemented by rural women who were ready to work for low wages. Similar to Taylor et al. (2006), we find that economic and social transition as well as structural changes led to the erosion of traditional roles. New employment positions acquired by women follow patterns of informality (Standing, 1999; Katz, 2002), which, in our case study region, is considered to be essential because it offers flexibility of time management and the opportunity to earn while also fulfilling other family obligations. In transition countries such as Tajikistan, although the jobs women perform remain subject to low protection, security, and earnings, increased participation in the labor force is a sign of their entrance into a wider spectrum of labor opportunities as well as greater sensitivities to economic, social, and political events and the growth of their decision-making power. The vitality of often informal employment relationships grew through the building of trust on the part of the male employer and the performance of female workers in various positions as well as their mutual cooperation. The break from the male-dominated

society and patriarchal values in our case study is based on structural reforms and economic changes and the development of new social environments (out-migrating men, and women becoming the majority in rural areas). The feminization of agriculture has brought about some modification of social behavior and cultural norms, yet it is still under question whether these changes are positive and sustainable over time.

The involvement of women in collecting fees and their direct participation in irrigation activities shows how the feminization of agriculture led them into jobs in support services. Cultural norms restrict male water masters in the communities from entering houses for collecting fees or arguing with women about water provision. Women laborers in this case are more able to negotiate and collaborate with female households. Thus, female water service providers have become important where the predominant users of water are women. The involvement of women in farm irrigation activities has allowed them access to some shares of land for cultivation within farms, providing them with production and income control as well as chain ownership opportunities. The cases mentioned in this paper have shown how women evolved from being outsiders to become participants in value chains and move beyond the conventional female positions. However, the feminization of agriculture differs within various family contexts and has both positive and negative impacts on women. Women are involved in an occupation in which they were previously not allowed to participate. Nevertheless, the feminization process is accompanied by low wages and an informal job status that excludes women from access to public social security benefits. Further analysis should be conducted to look deeper into occupational gender segregation in agriculture with special attention to social security measures and farm employment regulations and policies in Tajikistan.

3 Coping with constraints: Crop diversification and soil salinization in two Central Asian cotton regions¹³

3.1 Introduction

Widely portrayed in the international media, the devastation of the Aral Sea has become emblematic for the environmental strains that decades of large-scale irrigation and cotton monoculture have put on the population of the Soviet successor states in Central Asia (Micklin et al. 2014; Spoor 1998). Another environmental consequence of the land and hydraulic expansion is the soil salinization that accumulated gradually over the years of intensified production and due to deterioration of drainage and irrigation infrastructure. Agrarian systems in Central Asia differ in their evolution of reforms and socio-ecological systems but have a common legacy of Soviet agricultural practices, hierarchical organizational structures and production policies. State interventions, quota and production targets on strategic crops and various experimentations with farm size, government loans intend to keep the large scale production and state control of farmers' decisions.

In the literature a variety of constraints affect farmers' decisions such as biophysical or geophysical conditions; labor and input market constraints; policy constraints; availability of production technology; social norms; lack of skills or knowledge. Such restrictions in combination with personal characteristics and attitudes also shape the willingness of the farmers to sacrifice current income for long-term improvements for example in soil fertility, risk-reduction, or improved yields (Bowman and Zilberman 2013).

As one of the promising options to enter a more sustainable development path, both economically and ecologically, crop diversification away from cotton has figured prominently in debates among researchers and donors (Giese et al. 1998; Micklin 2014). Diversification in the literature is defined as the addition of more crops into the existing cropping system and as a measure that increases the farm income and is used as a risk management practice by rural households and farms. It is assumed that farmers make choices so as to increase their income, reduce their financial and physical risk, and reduce labor requirements and pursue activities that are convenient and increase their well-being. Crop diversification may increase water productivity, thus secure rural incomes by less water spending, making farmers less vulnerable to drought and crop failure, and mitigating labour peaks during harvest works (Bobojonov et al. 2013; Petrick and Djanibekov 2016).

However, in-depth studies of crop diversification in Central Asia are still scarce and are mostly based on experimental results and hypothetical scenarios (such as in Bobojonov et al. 2013). Moreover, the threats of land degradation are commonly assumed to be almost universally present in Central Asia (Bucknall et al. 2003).

Regionally detailed evidence is often not reported or not available, so that global assessments fail to take into account of the heterogeneity likely to be found in local circumstances (Robinson 2016). In fact, the linkages between soil salinity and crop choices can be multiple: farmers may try to escape from the threat of soil salinization by changing their cropping portfolio, but degraded soils may also prevent such diversification in the first place. Pre-existing salinization of soil in the region inhibits change that may lead to lower salinity levels in the long run and create a "salinity trap". Once salinity levels are high, it is increasingly difficult to reduce them by moving to other crops than cotton and diversify. Further, the causality clearly also runs the other way, as crop choices and cultivation

¹³ This chapter is co-authored with Martin Petrick and was presented at the Workshop "Soil Degradation and Shifting Agrarian Orders in Central Asia" February 5-6, 2018, Tübingen, Germany.

practices today will influence soil conditions and salinity levels in the future, creating a trap for the farmers. Agricultural policies driven by past Soviet legacies and the uncertainties of new reforms and orders of the state contribute more substantially than any other hurdles of diversification, constraining farmers' decisions in the region.

At a broader level, we try to understand the main drivers of crop diversification choices made by farmers. Our research questions are thus the following:

- What is the state of soil salinization and cropping patterns in South Kazakhstan and Samarkand?
- How is soil salinity driving crop diversification in the irrigated areas of South Kazakhstan? Which are the main drivers of farmers' crop choices?
- What is the role of salinity in crop diversification decisions by farmers in Samarkand? Which other drivers are important?
- How have recent policy initiatives affected the diversification decisions in South Kazakhstan and Samarkand and what is the outlook for future policy reform?

This paper is an output of the research project "Institutional change in land and labour relations of Central Asia's irrigated agriculture (AGRICHANGE)". In this article, we use data from a unique farm survey conducted in 2017 as well as qualitative evidence from interviews with farmers and official statistical information to disentangle the linkage between soil salinity and crop diversification in two Central Asian cotton regions. Our farm- and plot-level data collected among 200 farmers in South Kazakhstan and 450 farmers in Samarkand as well as in-depth interviews provide detailed insights into current farming practice. Based on multiple research topics covered by the project design, two projects sites were identified: South Kazakhstan and Samarkand province of Uzbekistan. The six districts in the study including: Maktaaral, Sayragash and Baidibek of South Kazakhstan as well as Paiarik, Pastrodargom and Jomboi of Samarkand province, which allow instructive comparisons of the effects of environmental constraints and different policy environments (Figure 3-1).



Figure 3-1: Map of the study districts

Source: The map is prepared by the first author in ESRI ArcGIS v. 10.5 in 2017.

Maktaaral is a district, where salinity is a major problem, but where the government had widely retreated from intervention in the early 1990s and thus allowed farmers to modify their crop rotations (Petrick et al. 2017). In two other project districts in South Kazakhstan, mixed and partly

rained farming prevails. On the other hand, we study three districts in Samarkand province (Uzbekistan), where the state cotton mandate persists in two out of three districts. Overall we find farmers in Maktaaral who move from cotton into melon production when prices make this profitable, but soil salinity constrains such diversification. Samarkand presents a contrasting case, where reporting of salinity could serve as a mitigation or a protection tool from unfavourable policy measures, uncertainties in implementation and eventual consequences of reforms in order to diversify into high-value crops other than cotton or wheat. As our analysis below concludes, the salinity trap limits crop diversification therefore, appropriate assessments of soil conditions and measures to improve the irrigation and drainage infrastructure would be important to allow continuing agricultural activities. Strategies of improving access to services such as credit or machinery promise to boost crop diversification in the future. Introducing new salt tolerant crops in the region could further raise farm incomes, increase food security, and contribute to a healthy diet and environmental improvement.

In the following section, we give an overview of past and current agricultural policies and techno-environmental conditions created by the past legacies in Central Asia. Section 3 portrays the study sites and the methods used during data collection. Sections 4 and 5 in turn present our main findings with regard to South Kazakhstan and Samarkand provinces. Section 6 concludes and points out the significance of our results in the light of recent policy developments.

3.2 Agrarian and environmental legacies and new policy agenda

3.2.1 *Crop choice and salinity in Central Asia*

Aptly called a threat to humankind, researchers described land degradation, risk of drought, groundwater pollution and deteriorating human health as the imminent consequences of a persisting but all too one-sided agricultural strategy (Aleksandrova et al. 2014; Saiko and Zonn 2000). In vast steppes of Central Asia, intensive irrigation from surface rivers and a poorly managed drainage channel system lead to on-site salinization of soil and groundwater (Bucknall et al. 2003; Toderich et al. 2008). Deterioration or absence of drainage systems led to salinization of soils forces farmers to apply ever-greater quantities of water and use the ‘leaching’ the method of washing out the salt from the soil. This short term solution, however is also the cause for upward mineral flows to occur and hardening of the topsoil. On-site salinization in turn impedes the ability of plants to absorb waters which is then reflected in lower yield levels. According to the latest nationally representative figures, soil salinity affects almost 40% of arable land in the region (Table 3-1).

From an agronomic point of view, salt tolerance and water requirements are two major determinants of crop choice in any arid environment. Figure 3-2 depicts these parameters for a range of crops commonly cultivated in Central Asia. Planting water-demanding crops requires a high-performing irrigation infrastructure to be in place and it increases the risk of crop failure and soil salinization in its absence. If soils have turned saline already, the water requirements increase and the choice may be restricted to salt tolerant crops in the first place. Cotton, barley and sugar beet are the most tolerant crops followed by moderately tolerant and sensitive crops like wheat, melons, maize and vegetables (World Bank 2008).

Table 3-1: Soil salinization in Central Asia

Country	Year	Irrigated area	Area affected by salinization	
		1,000 ha	1,000 ha	% of irrigated area
Kazakhstan	2016	2,148	353	16%
Kyrgyzstan	2016	1,024	105	10%
Tajikistan	2016	754	95	13%
Turkmenistan	2012	1,723	1,652	96%
Uzbekistan	2016	4,293	1,956	46%
Central Asia		9,942	4,161	42%

Source: Compiled by the first author from: Kazakhstan: Ministry of Agriculture answer letter dated 31.01.2018 № 02-37. Kyrgyzstan: Statistical yearbook; Tajikistan: Statistical yearbook Uzbekistan: Ministry of Agriculture and Water Resources of the Republic of Uzbekistan (2016); Ministry of Water Economy of the Republic of Turkmenistan (2014).

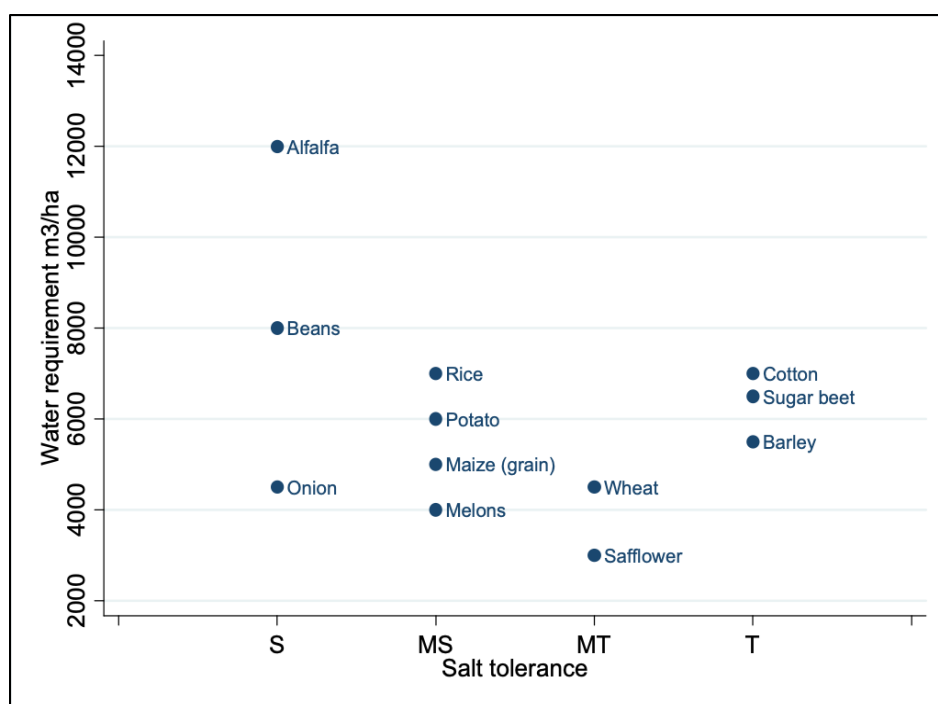


Figure 3-2: Salt tolerance and water requirements of major crops grown in the irrigated lowlands of Central Asia

Note: Key to salt tolerance labels: S - sensitive, MS - moderately sensitive, MT - moderately tolerant, T - tolerant. Water requirements reflect rough averages that can vary under local conditions. The salt tolerance of a crop is designed by plotting its relative yield as a continuous function of soil salinity (Kenneth and Neeltje 2002, p. 135) and is not related to separate regions. New varieties of crops could have some changes to their salt tolerance characteristics. Water requirements are provided in an average for the categories of crops.

Source: Authors based on FAO (1986) for water requirements and World Bank (2008) for salt tolerance.

Toderich et al. (2008) observed that farmers' crop choices in Central Asia depend on the actual salt tolerance of the crops, as moderately salt-tolerant crops are planted on soils perceived as

highly saline. Although cotton is a salt tolerant and less water demanding crop, with moderate salinization of the soil, the yields decrease by 20-30% and with high salinity, by 50% and over. Dominated by low-lying deserts and flanked by extensive mountain ranges, the Central Asia region has been dependent on irrigation water conveyed by river streams since the beginning of civilization (O'Hara 2000). Water availability determined the location of early settlements, but ancient agricultural producers learned how to use this scarce resource as effectively as possible by establishing widely branched irrigation networks, water lifts, and accompanying management systems (Dukhovny and Schutter 2011). Ancient river oases like Bukhara, Samarkand or Merv thrived on their ability to economize on the precious resource used for many livelihood and commercial activities including agricultural. The cultivated area of Samarkand province expanded first due to an irrigation system based on small derivations from mountain streams and underground springs. Later a vast network of canals was built in the eighth and seventh century BC, further expanded during the centuries before the Soviet period.

The advent of first Russian Tsarist and later Soviet control of Central Asia undermined the traditional systems of water management. Central Asia became a major cotton exporter to the rest of the Soviet Union, as vast areas of former desert and steppe land were turned into irrigated cotton plantations.

3.2.2 Soviet past and agrarian restructuring in Central Asia

Following World War II and until the 1980s, the Soviet administrators of Central Asia promoted the expansion of irrigation into areas that due to their geomorphological conditions are naturally prone to high salinity (Matley 1994). One such area is the Hunger Steppe, or Mirzachol Sahara, extending to the west of Tashkent, today including Maktaaral district of South Kazakhstan and Syr Darya and Jizzakh provinces of Uzbekistan.

Around one third of the irrigated land of Kazakhstan is concentrated in South Kazakhstan (559,000 ha). The region has been transformed into an intensive cotton production site since 1924 and cotton became the third largest export item of Kazakhstan during the Soviet Union. After independence, the Kazakhstani government enabled the restructuring of cotton production which moved from large kolkhoz farms to private farms and enterprises that are connected to other actors in the cotton value chain maintained after the collapse of the Soviet system: ginneries and input suppliers supported by the state (Shtaltovna and Hornidge 2014; Petrick et al. 2017).

The irrigated area of Samarkand province in Uzbekistan (379,700 ha) is considered as one of the most ancient irrigated regions of Central Asia where irrigated agriculture of the floodplains was combined with breeding and herding in the uncultivated steppe. In spite of low rainfall and arid environmental conditions, the region could develop its agriculture due to a complex irrigation network (Stride et al. 2009). Average crop yields per hectare declined during the 1980s and early 1990s, mainly because of new steppe lands added to the irrigated area, since these were initially less productive and required huge expenses for infrastructure and maintenance in order to improve the soils and remove accumulated salts. The hydraulic expansion promoted by the Soviets, especially through numerous pump stations, increased the irrigated area of Samarkand province and established intensive cotton production as in the rest of Uzbekistan. The Soviet agrarian legacy appears not only in the massive infrastructure but has also transferred into post-independence reforms, agrarian institutions and decisions.

Since their independence, Central Asian countries have been in a search of new effective organizational forms of agriculture. Restructuring of the previously governing state (sovkhoz) and collective (kolkhoz) farms and privatization/long term lease of land were one of the important attributes of reforms in their transition from central to market-oriented economies. Central Asian agriculture went through several stages of agrarian reforms that were in each country diverse in their

governance and production strategies. The choices on how to restructure the old and create new agrarian system for Kazakhstan and Uzbekistan were partly determined by the initial conditions: capital intensity of the pre-reform production processes, agricultural specialization, and reform policies: land tenure and privatization patterns, institutional design of new forms of production and strategies.

In Uzbekistan, the fragmentation of large scale state/collective farm system promoted the establishment of individual commercial or smaller, family-based farms. The restructuring of state and collective farms began only hesitantly and superficially (Djanibekov et al. 2012) and new categories of rural agricultural actors legally were presented in three types of farms: collective farms (shirkats), commercial farms (fermer khojaligi) and household based farms (dekhkans). Although the reforms opened access to long-term land lease for the rural population, the state reserved full land ownership and farmers do not operate as autonomous actors. In contrast to Kazakhstan, independent Uzbekistan kept the cotton production state monopoly. Cotton and wheat have remained the major state-order crops produced by farmers under assigned quotas of production up to present year (2019). For Uzbekistan prioritization of these two strategic crops was chosen as a path to continue with previously [Soviet] established crop production for generating export income, securing self-sufficiency and public contribution. In this respect, the majority of farmers in Uzbekistan that have to follow the state crop quotas took up Soviet farming structure and organization of agricultural production. For Kazakhstan the role of agricultural sector changed with the advancement of oil and industrial sector. The state did not impose quotas, however, it maintained a ownership restricting policies over agricultural land (Petrick et al 2018). Nevertheless, the implemented agrarian policies seem to push towards large farms by offering subsidies and supporting establishment of cooperatives and promote production of selected crops. Although there is no government control over production, land use is monitored for quality maintenance. The vertical, hierarchical coordination of the farmers by ginneries also includes provision of input subsidies: renting harvesters and providing seeds, fuel and fertilizers. Thus ginneries have a strong bargaining power over small cotton producing farmers. This parallels in a way the case of Uzbekistan's subsidies to their cotton farmers, however in the Kazakh case, the cotton prices are not fixed and are directly connected with international markets, which makes cotton growing on the one hand attractive, and on the other hand, risky.

The partiality of reforms and a mixture of old and new institutions have created many contradictory conditions and requirements for farmers in both states. The new order maintained a quota system in Uzbekistan and subsidized cotton and wheat crop in Kazakhstan, thus promoting its production and exports. However, the state no longer was acting as a caretaker and as responsible for maintaining inherited infrastructure and the environmental consequences of massive cultivation as during the Soviet regime. The decentralized responsibility over infrastructure and production, exists alongside competing interests that appear between the state, farmers and other agricultural agents.

3.2.3 Kazakhstan's agricultural policies

In Kazakhstan on the other hand, private land ownership was established, although not fully distributed and three types of formal actors appeared: agricultural enterprises, individual farms and households (Shtaltovna, Hornidge 2014). Recent policy initiatives in Kazakhstan had mixed effects on crop diversification and soil rehabilitation, and some of the policies were contradictory. Diversification continues to figure prominently on the current policy agenda. Since the 2015-2016 slump in oil prices reminded the country of its one-sided export strategy, the presidential administration of Kazakhstan has emphasized the need for a diversified economic base more than ever. In 2017, it introduced a new "State Programme for the Development of the Agro-industrial Complex 2017–21", promoting import substitution in the agri-food sector with a specific focus on small and medium farmers. The principal tool to boost their competitiveness is seen in the formation

of state-mandated farmers production and service cooperatives (Ministry of Agriculture of the Republic of Kazakhstan 2016).

Within the agricultural sector, the government regards cotton as a potential export crop to be promoted further. After the liberalization steps during the 1990s, the administration rediscovered the cotton sector as an arena for regulation in the new millennium, culminating in the “Law on the development of the cotton sector” passed in 2007. However, the new legislation failed to invigorate the sector. According to Petrick et al. (2017), the new policies imposing borrowing restrictions on cotton ginneries, introducing producer subsidies, and stimulating the formation of a “cotton cluster”¹⁴, caused the nascent private cotton industry to decline and contributed to the decrease in cotton areas portrayed in Figure 3-6.

At about the same time, the provincial government of South Kazakhstan had drafted a comprehensive plan for the diversification of cropland in Maktaaral district, which counteracted the cotton strategy in many respects. The main stimulating instrument was a hectare-related payment for the production of alternative crops, in particular vegetables and melons. It went along with an information campaign carried out by local authorities explaining to the farmers the possible benefits from switching to crops other than cotton (Kazinform 2013). National agricultural policies continued to stimulate crop diversification by paying higher subsidies for export and high value crops. They support farmers by promoting moisture-saving technologies (drip irrigation and no-tillage), and compensate the costs of mineral fertilizers and herbicides.

Rehabilitating saline land requires investments into drainage infrastructure, which is mostly operated using electric pumps. It is thus expensive for small family-operated farms. Implementing a complex program of crop diversification and soil rehabilitation, state agencies have taken over the management of irrigation and drainage systems recently, after failed attempts to install decentralized water user associations (Zinzani 2015). Moreover, the World Bank is supporting the rehabilitation of irrigation and drainage infrastructure with a 103m USD loan within the Second Irrigation and Drainage Improvement Project (IDIP-2) 2014-2021. While potentially improving soil conditions in the long run, the project is currently facing implementation delays (World Bank 2017).

3.2.4 Uzbekistan's agricultural policies

People in the agricultural sector have been restricted in their production choices for a long time and were demotivated by high costs and low profitability of cotton and wheat state order crops. Low profitability, partly caused by environmental degradation, contributed to the outmigration of the agricultural labour force to Russia and Kazakhstan. After three decades since independence the state-mandated cotton production, diversification of agriculture and the downsizing of the cotton area have become prominent features of Uzbekistan’s modernisation strategy endorsed by the new President Shavkat Mirziyoyev. The new transition of the economy has come with numerous changes and amendments to the current legislation and initiation of new reforms including in the agricultural sector. In the beginning of 2017, the Government adopted and began implementing its Strategy of Actions for the Development of Uzbekistan for 2017–2021, which outlined its political, economic, and social priorities, including measures to liberalize the economy. The National Development Strategy identifies the need for diversification out of cotton into high value-added and labour-intensive production and processing, which is expected to contribute to significant growth of rural jobs, food security and exports. The Presidential decree #2460 “On agricultural sector reforms and development for 2016-2020” already included measures to reduce the cotton area and to promote alternative crops. By 2020, it is planned to decrease production of raw cotton by 350,000 tons.

¹⁴ Agricultural cluster systems were initiated in 2018. Establishment of such institutions started with cotton clusters- through artificial merging of farmers and textile industry representatives to form a complete value chain from growing cotton till a ready product to be sold in local market or for exporting.

Former cotton area should be released for the cultivation of potatoes, vegetables, forage and oilseeds, creating new intensive gardens and vineyards. The strategy also sets as a priority the development of multi-profile farms, which could be engaged in agricultural production and processing, preparation, storage, marketing, construction works and provision of services.

Reforms also took the direction of strengthening the value chains and giving support to farmers to be able to directly export the produce without going through the government monopoly Uzagroeksport. In another push for facilitating agricultural diversification, the requirement that exporters sell part of their hard-currency earnings to the state in exchange for national currency was abolished. These steps towards more freedom in crop choices and strengthening of agricultural value chains provide a positive outlook for Uzbekistani farmers and their workers

3.3 Study districts, data and methods

In the framework of the research project qualitative and quantitative data collection was implemented in two stages (Table 3-2). During the first, Mukhamedova carried out a qualitative field study in November 2016 to conduct in-depth interviews with farmers on the selected project sites. District choice was based on farm characteristics: average land size/endowment, number of farms, and distribution of arable land as well as crops. The interviews covered 60 farmers in total who were selected through purposeful and snowball sampling (Flick et al. 2004) within the project districts. The interviews were transcribed and analyzed through thematic and evaluative content analysis. This process included the interpretation of interviews, comparing and reformulating assumptions and identifying relevant categories, coding and data linking. Some of the original quotes of interviewees are anonymized, coded and are presented in Appendix 1 with references to the date and place of each interview.

Table 3-2: Overview of survey and qualitative interview locations and sample size

Project provinces	Number of districts		Number of villages		Number of respondents (sample size)	
	Survey	Qual. interviews	Survey	Qual. interviews	Survey	Qual. Interviews
South Kazakhstan	3	1	6	10	450	30
Samarkand	3	3	6	14	450	30
Total	6	4	12	24	900	60

The second stage consisted of a survey conducted in January-March 2017 among 900 farms in South Kazakhstan and Samarkand province of Uzbekistan. About 750 of them operate irrigated field crops and were thus included in the following analysis. The questionnaire was developed by the members of the AGRICHANGE project and the survey was conducted by a professional data collection company. Respondents were selected randomly using lists of farmers' phone numbers. The interviews were conducted with the top farm manager or the person determined by him/her at the respondent's work place.

The project districts receive irrigation water from the surface rivers Syr Darya and Zerafshan and numerous irrigation and drainage canals. However, in Maktaaral, only 35-40% of the water

withdrawn from irrigation systems is used for the crops and the rest is lost via filtration, evaporation and discharge (Ibatullin et al. 2009). High losses of irrigation water and poor drainage in Maktaaral are expected to further reduce irrigated area in the future (Bekbayev 2016). Hence, salinization is a major concern in Maktaaral. Salinity levels in the irrigated areas of Maktaaral increased over the years and reached almost 40% recently (Table 3-3). According to one account, annually around 2-3% of irrigated area of the Hungry Steppe is taken out of crop production due to salinization. During the past twenty years, the area of medium and highly saline lands increased, reaching 22.4% of the total irrigated lands of South Kazakhstan in 2016. During this same period, 10.5% of irrigated land went out of use (Anzelm 2017). Samarkand, on the other hand, is much less affected, possibly due to geomorphological conditions allowing a deeper water table and natural drainage.

Table 3-3: Agricultural area by salinity levels, South Kazakhstan and Samarkand

		Samarkand	South Kazakhstan	Maktaaral
Total irrigated area (1000 ha)	1995-1996	370.3	482.7	125.9
	2000-2003	374.7	498.1	133.0
	2015-2016	379.5	565.7	147.1
Total non- & slightly saline area (1000 ha)	1995-1996	364.0	434.6	93.6
	2000-2003	371.7	426.1	96.9
	2015-2016	379.2	456.6	89.7
Total medium & highly saline area (1000 ha)	1995-1996	6.3	48.1	31.8
	2000-2003	3.0	63.9	36.1
	2015-2016	0.3	102.4	57.4
Medium & highly saline area in % of total irrigated area	1995-1996	1.70	9.96	25.26
	2000-2003	0.80	12.83	27.14
	2015-2016	0.08	18.10	39.02

Source: First author's compilation based on Anzelm (2017); Ministry of Agriculture and Water Resources of the Republic of Uzbekistan (2016); Toderich et al. (2008); World Bank (2008).

A descriptive evaluation of the survey data allows a first insight into land and water use patterns in the study districts that is more fine-grained than the data usually available from official statistics. Figure 3-3 illustrates the relative importance of irrigation in the six districts. Baidibek district has a large rain fed area and less irrigated. While Jomboi has extensive irrigated area it is situated very close to the Zeravshan river and enjoys a natural drainage system and easier pumping of water to the fields.

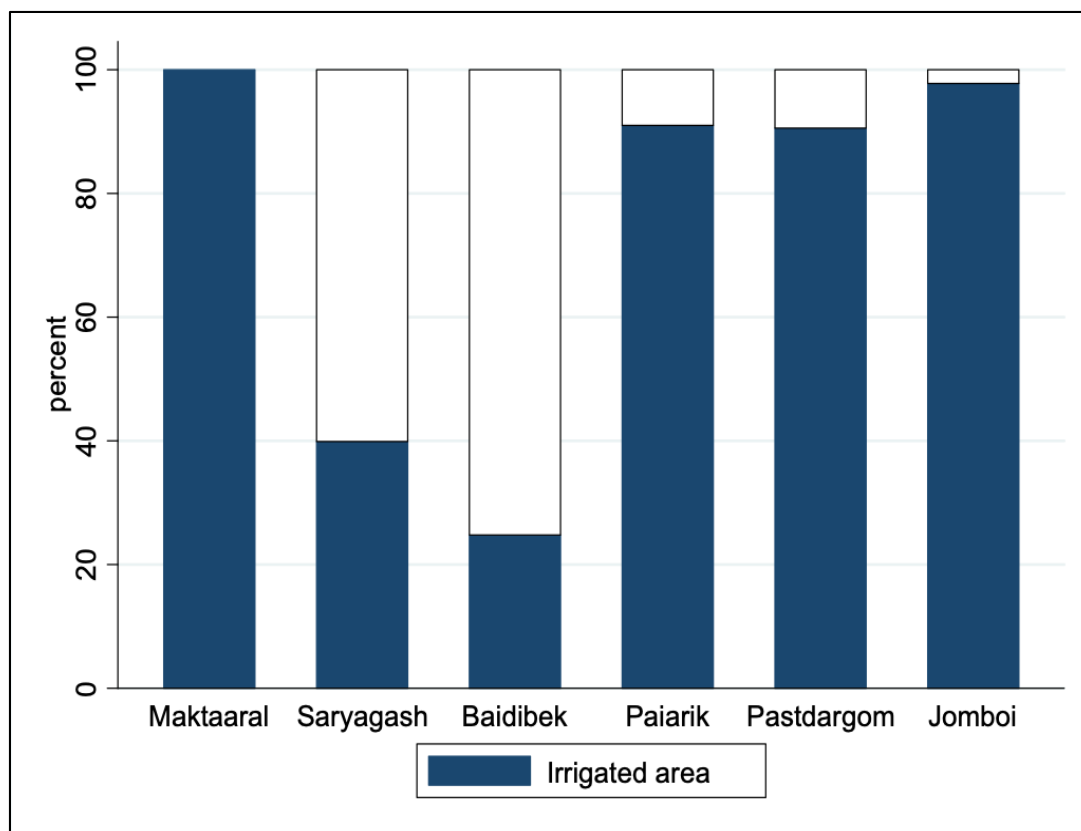


Figure 3-3: Irrigated area in percent of total cropland in survey farms by district, 2016

Source: AGRICHANGE Farm Survey 2017.

Access to irrigation water determines the crop and land tenure choices in Maktaaral as well as in the Samarkand study sites. In the case of Maktaaral, Paiarik and Pastargom, issues with irrigation restrict farmers' crop production choices or significantly decrease the quality and quantity of output. As one farmer from Maktaaral reported during the qualitative interviews: "The water here is pumped, we have a separate canal called 'Independence'. The water coming from the 'Dostlik' canal is not enough to reach this place as there is not so much water coming through it and the location is far and there are many water losses. So the hydropost in Dostlik is closed and the water is pumped directly from the Syr Darya" (Farmer 02, Appendix 2).

The land here is not only saline but also subject to water deficiencies, meaning that the planting will also be late and it goes as a chain reaction - the harvest is also very late and prone to climatic changes. This year [2016] we experienced water scarcity so there were farmers who received water and those who got very little. Under such conditions, we irrigate the cotton only once, but according to the norms [Soviet norms of irrigation established for each crop type] you have to irrigate two-three times per season." (Farmer 01, Appendix 2). Based on the individual self-perceptions of respondents, Figure 3-4 displays the extent of soil salinization and thus confirms the considerable heterogeneity among the study regions already visible in Table 3-2. Based on a five point scale from non-saline to very saline, Maktaaral farmers reported that over 60 percent of their crop land was considered moderately or highly saline.

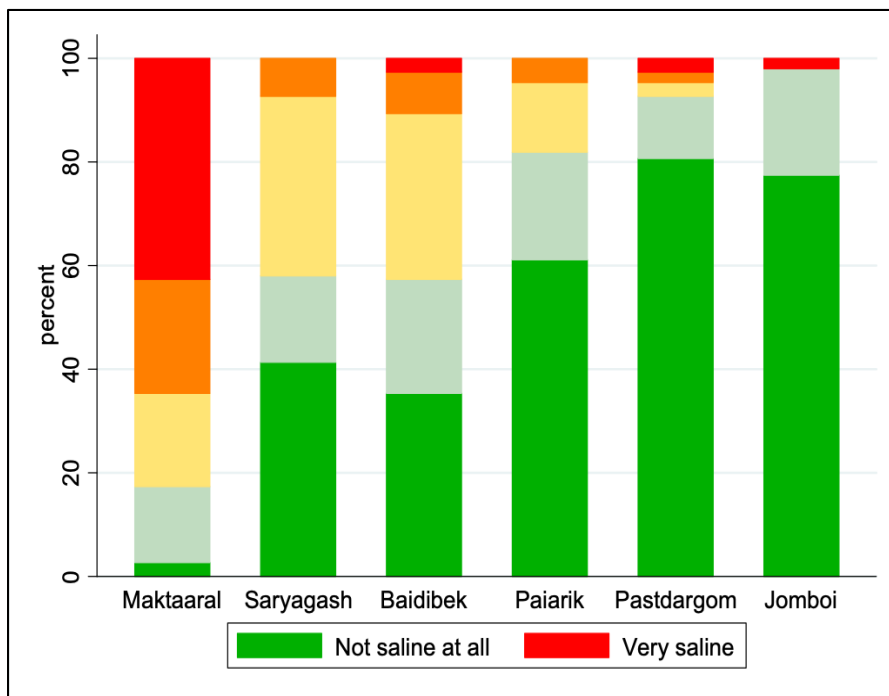


Figure 3-4: Distribution of arable land area by salinity levels in survey district, 2016

Note: Based on farmers' self-assessment using a five point scale at the plot level.
Source: AGRICHANGE Farm Survey 2017.

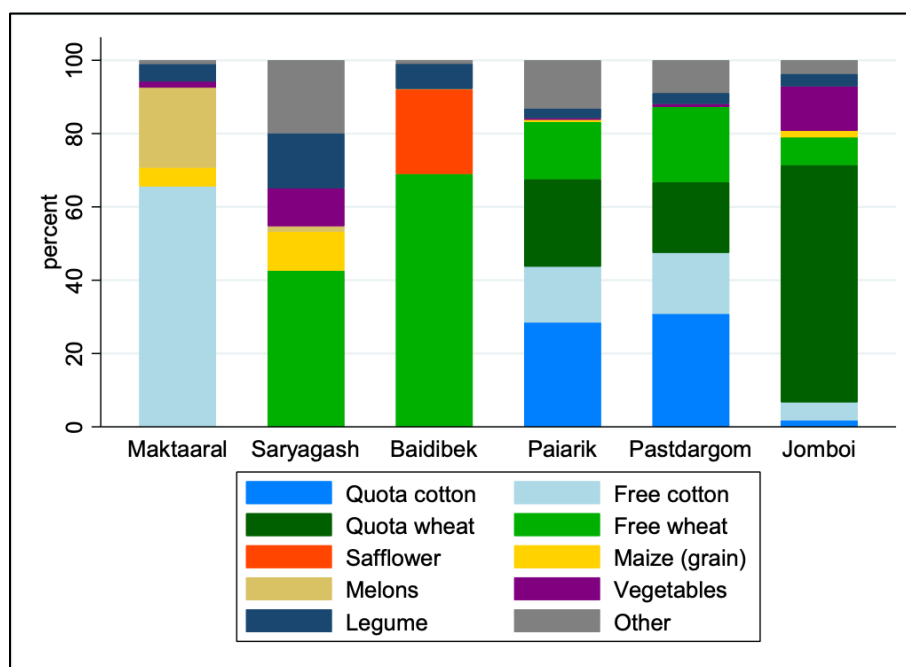


Figure 3-5: Distribution of crop area in survey farms by district, 2016

Source: AGRICHANGE Farm Survey 2017.

All chosen six districts contrast in their environmental conditions, but share a common cotton production history from the Soviet period. Maktaaral (Kazakhstan), Paiarik and Pastdargom (Uzbekistan) have been traditional cotton areas since the post-WWII Soviet cotton expansion. Parts

of Saryagash and Baidibek are characterised by rainfed crop farming and extensive grazing. Figure 3-5 lists the major crops currently grown in the study districts. Maktaaral is dominated by cotton, whereas wheat is the main crop in the other two South Kazakhstan districts. Melons and safflower are important alternative crops, where the latter is cultivated on rainfed land. The cropland in Paiarik and Pastdargom is split more or less evenly among cotton and wheat, the two crops mandated by the Uzbek government. Jomboi was released from the cotton mandate in 2012 and almost no cotton is grown there, however wheat quota remains. Farmers in Uzbekistan were asked whether their plots were subject to state administration, if so, they were labelled as “quota crops” in the figure.

In Uzbekistan it is not entirely clear how cotton could be produced outside the state mandate, since the only marketing channel is through state and any other sales are not legal. Some farmers may be engaged in cotton seed propagation, which is considered much more profitable than lint production, or farmers may voluntarily contribute to other people’s production quotas, e.g. from neighboring districts where the crop mandate is in place. Free wheat quota cases could be reported because of the partial obligations of farmers to sell 60 percent of their total wheat harvest to the state and the rest remains for farmers own use or commercial sale.

3.4 Salinity and crop diversification in South Kazakhstan

We now explore the qualitative and quantitative data to disentangle the drivers of crop diversification in our Kazakhstani site. Specifically, we ask whether farmers diversify their crop rotations as a response to the threat of soil salinization and therefore our analysis will focus mainly on mainly Maktaaral district.

In Maktaaral, the key crop to consider as an alternative to cotton is melon. Most farmers grow muskmelons (cucumis melo), but water melons (citrullus lanatus) are also present. Since circa 2007, the area under melons has consistently been increasing in Maktaaral (Figure 3-6).

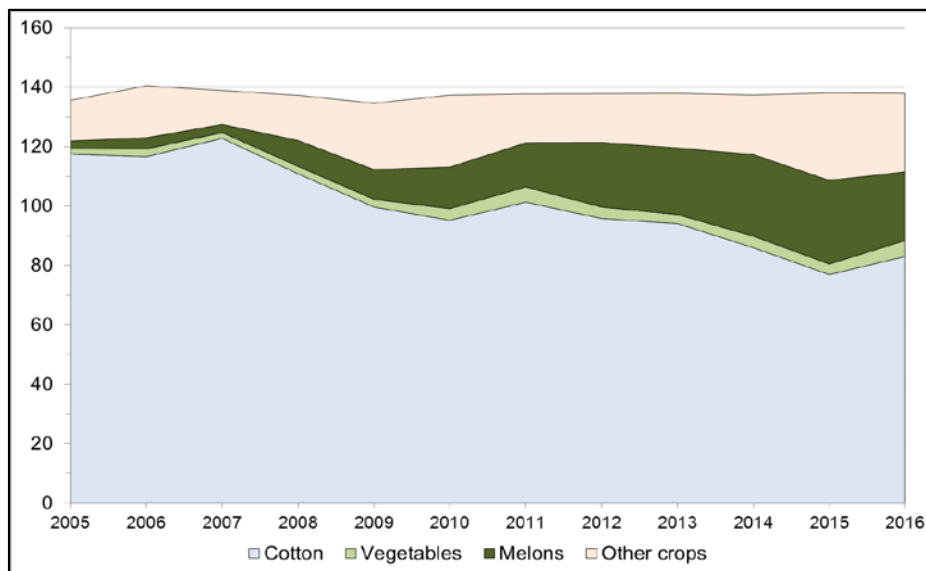


Figure 3-6: Land use by crop, Maktaaral district 2005-2016, thousand ha
Source: National Statistical Office of the Republic of Kazakhstan.

Vegetables represent a second alternative. In Southern Kazakhstan province in total, vegetables and melons together occupied about one quarter of the arable land allocated to cotton until 2005. According to official statistics in Maktaaral district, cotton has been grown on less land than vegetables and melons together since 2012. This fact provides evidence of changing cropping

choices and some diversification that could be driven by several points, for instance, as a coping mechanism in case of price changes or land quality constraints, in particular soil salinization.

In order to isolate the effect of a given degree of soil salinization on crop choices more rigorously, a theoretical account (a “model”) of crop diversification is required that controls all other possible determinants. Following the economic literature on technology adoption, we assume that a farmer chooses the crops to be grown in a given year in order to pursue the goal of utility maximisation subject to economic and environmental constraints (Feder et al. 1985). Arguments of “utility” may include income and leisure time, and utility may be shaped by risk and time preferences. The relevant constraints include input and output prices, the available land, labour and liquidity resources as well as environmental conditions (especially soil salinity) and access to knowledge (Foster and Rosenzweig 2010).

From the interviews, we know that melons are considered to be alternatives for cotton as they are recognized as a good source of income for the farmers, are moderately sensitive to salinity and require less water than cotton. Melons grow during a shorter period than cotton, but incur higher costs, require relevant cropping know-how and can be a risky crop due to production, marketing and price uncertainties. During the interviews, farmers report that the massive extent of melon planting started in 2015 when the cotton prices went down. In the following years, farmers with sufficient land access planted both cotton and melons. Marketing of melons is considered viable using trading agents that export melons to Russia or Europe. Although melons are considered risky in terms of sales and costly especially in terms of labour, a growing number of farmers have chosen to diversify away from cotton, even farmers with small plots or without land.

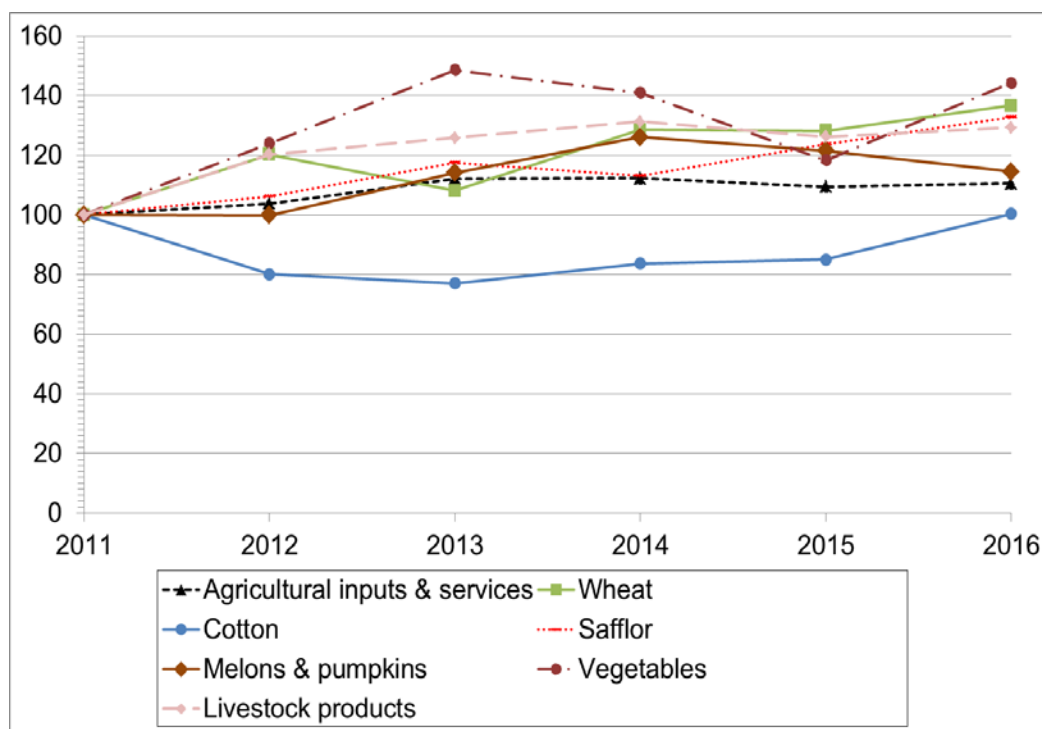


Figure 3-7: Prices of crop output and agricultural inputs, South Kazakhstan 2011-2016, 2011=100

Note: Inputs: cotton, safflower and melons aggregated at national level.

Source: National Statistical Office of the Republic of Kazakhstan.

This account is fully consistent with Figure 3-7, illustrating the relative price developments of cotton, melons and other crops grown in Maktaaral. When cotton prices went down, prices for melons and vegetables picked up. As prices for the latter crops grew even faster than input prices, farmers' profit margins increased.

Based on our survey data from the South Kazakhstan project districts, we compared cotton and melon growers to better understand the driving forces behind this choice. We defined pure cotton growers as those farmers who grew cotton but planted no melons at all in 2016 and consider them "non-diversified". Our counterfactual group of "diversified farmers" consists of melon growers who planted a minimum area of land with melons and may have also continued to grow cotton on some other land including their own, shared or rented from other farmers. The "diversified" group hence includes pure melon growers and mixed cotton-melon farmers. Farmers under this first definition practically all originate from Maktaaral district.

In a second stage, we expand the definition of the second group to also include vegetable growers (Table 3-4). In South Kazakhstan, 143 farmers fell under the first definition (cotton vs. melons), of which 43% diversified. 203 farmers fit the second definition (cotton vs. melons or vegetables), 61% of which diversified. About one third of these farmers originate from Saryagash and one from Baidibek districts, due to less cotton specialization.

In the following, we use the survey data to estimate a binary decision model of the probability to diversify away from cotton:

$$P(d = 1|x_1, x_2, x_3, \dots, x_k),$$

where d is the binary diversification indicator defined before and $x_1, x_2, x_3, \dots, x_k$ represent the explanatory variables listed in Table 3-4. They include land and labour endowment, self-perceived salinity levels, and a range of farm characteristics and personal characteristics of the farmer. A farmer was considered credit-rationed (or liquidity-constrained) based on the survey responses if he/she could not obtain as much credit as desired (quantity rationing), he/she feared the risk of default (risk rationing) or the application procedures were considered too cumbersome or costly (transaction-cost rationing), see Petrick et al. (2017a) for further details. Risk aversion and time preference were measured according to the one-dimensional scales provided by Falk et al. (2016).

Table 3-5 displays results of a probit regression that recovers the marginal effects of the explanatory variables on the probability to diversify (see Wooldridge 2016 for an overview on probit regression). Results are presented separately for the two definitions of crop diversification given above. As shown in the table, salinity is a key determinant of the diversification decision, but the effect is negative. Keeping all other farm characteristics constant, moving up one grade on the self-assessed salinity scale reduces the probability of diversifying away from cotton by 9.5 percentage points.

During the qualitative interviews in Maktaaral, farmers confirmed that it is rarely possible to plant a second crop on their land due to salinity and a lack of irrigation water. During an in-depth interview in Maktaaral, one of the farmers reporting high salinity levels stated: "We have salty land and usually such farmers, including me, can plant only cotton or forage. Land with a bit better quality is used for planting melons" (Farmer 02, Appendix 2).

Table 3-4: Descriptive statistics from survey data

	South Kazakhstan			Samarkand		
	Mean	Min	Max	Mean	Min	Max
Diversify into melons (1/0)	0.43	0	1	--	--	--
Diversify into melons or vegetables (1/0)	0.61	0	1	--	--	--
Diversify into non-quota crops (1/0)	--	--	--	0.32	0	1
Diversify into crops other than cotton or wheat (1/0)	--	--	--	0.09	0	1
Cropland (ha)	12.82	0	200	20.09	0	200
Salinity level (1=non saline .. 5=very saline)	3.27	1	5	1.41	1	5
Family labour (FTE)	3.13	0	14.88	4.64	0	59.5
Hired labour (FTE)	2.64	0.17	17.11	4.2	0	61.84
Age of farmer (years)	47.90	24	77	46.24	27	63
Farmer has agricultural education (1/0)	0.24	0	1	0.92	0	1
Educational level (1..8)	4.70	3	6	5.22	1	6
Female farmer (1/0)	0.12	0	1	0.08	0	1
Credit rationed farm (1/0)	0.88	0	1	0.28	0	1
Risk aversion (0..10)	5.19	0	9	2.45	0	9
Time preference (0..10)	2.67	0	9	2.29	0	8
Livestock units	0.83	0	86.6	9.77	0	500
Owns tractor (1/0)	0.45	0	1	0.73	0	1
Owns mechanical cotton harvester (1/0)	0.12	0	1	0	0	1
Direct sales to consumers (1/0)	0.12	0	1	0.27	0	1
Contract farming in crops other than cotton and wheat (1/0)				0.01	0	1
Jomboi district (1/0)	--	--	--	0.34	0	1
Païarik district (1/0)	--	--	--	0.33	0	1

Note: South Kazakhstan: N=203; Samarkand: N=450. FTE=full time equivalent, i.e. 242 working days per year. Source: Authors based on AGRICHANGE Farm Survey 2017.

Table 3-5: Regression of diversification decisions in South Kazakhstan

Dependent variable	Diversify into melons		Diversify into melons or vegetables	
	Marginal effects	p-val.	Marginal effects	p-val.
Cropland (ha)	0.003	0.140	0.001	0.699
Salinity level (1..5)	-0.095 ***	0.003	-0.125 ***	<0.001
Family labour (FTE)	0.069 ***	0.001	0.079 ***	<0.001
Hired labour (FTE)	0.014	0.577	0.023	0.244
Age of farmer (years)	-0.009 **	0.021	-0.004	0.128
Farmer has agricultural education (1/0)	-0.127	0.157	-0.143 **	0.046
Educational level (1..8)	-0.002	0.964	-0.017	0.671
Female farmer (1/0)	-0.089	0.430	-0.057	0.494
Credit rationed farm (1/0)	0.231 **	0.017	0.093	0.253
Risk aversion (0..10)	0.009	0.530	0.020 *	0.070
Time preference (0..10)	0.029	0.250	0.019	0.343
Livestock units	0.141 *	0.054	0.079	0.142
Owns tractor (1/0)	0.150 *	0.068	0.033	0.609
Owns mechanical cotton harvester (1/0)	-0.329 ***	<0.001	-0.290 ***	0.005
Direct sales to consumers (1/0)	-0.003	0.988	0.102	0.419
Pseudo R2	0.244		0.332	
Chi2 (p-value)	41.60 (<0.001)		72.23 (<0.001)	
N	143		203	

Note: Marginal effects based on probit regression. Marginal effect is discrete change from base level for dummy variables. * (**, ***): significantly different from zero at the 10 (5, 1) % level, based on robust standard errors.

Source: Authors based on AGRICHANGE Farm Survey 2017.

Furthermore, the regression results suggest that farmers only diversify if they have enough family labour available and if they own a tractor. A lack of labour force or transport capacity may thus prevent diversification. Labour often is a stumbling block, as farmers with insufficient family labour

are forced to hire workers which are usually costly if hired among the local population in Kazakhstan. There is also cheaper labour offered by labour migrants from Uzbekistan. However, access to seasonal workers from Uzbekistan may be unreliable due to unexpected border closures and costly due to transaction costs for crossing the border, registering the workers or if labour alternatives, such as higher paid employment options elsewhere, e.g. in Russia are available. Small scale farmers informed us about their difficulties in obtaining credits or being constrained in funds and collateral for buying their own harvesting machinery or tractors. At the same time, since their land plots are smaller (3-4 hectares) compared to large farms they prefer to rent tractors and use hired labour.

According to the regression results, diversifying farmers tend to be younger on average, they are liquidity constrained and they also diversify in other directions, e.g. livestock. Moreover, they did not invest in a mechanical cotton harvester in the past.

Among the farmers who diversify into either melons or vegetables, the salinity effect is even stronger and those farmers are less likely to have an agricultural education. Age, credit rationing and tractor ownership appear to not affect this second, broader diversification strategy. On the other hand, farmers who diversify in either melons or vegetables are significantly more risk averse than pure cotton farmers. There is no evidence that farm size measured by cropland, formal education, gender or the availability of direct sales channels influence the diversification decision.

The credit rationing effect appears to be fairly strong for farmers diversifying into melons. Everything else kept constant, shifting into a liquidity constrained regime reduces the likelihood of melon cultivation by 23 percentage points. However, the direction of causality may be questioned. As noted before, melon cultivation requires high cash expenses during the growing season (e.g. for wages), so that the crop choice may be the driver of the liquidity constraint in the first place.

As we know from the qualitative interviews, farmers apparently imported the know-how of growing melons from neighboring Uzbekistan. Most of the interviewed melon growers mentioned that they plan ahead and invite farmers from Uzbekistan, often coming from neighboring Syrdarya province, where similar salinity issues as in South Kazakhstan exist. According to interviewees in Maktaaral, farmers from Uzbekistan with expertise in melon and watermelon growing are invited to oversee and manage the production process. These seasonal workers are typically offered a fixed salary in cash for the four to five months of melon planting and the ripening period, or they agree on a sharecropping contract upon which the harvest profit is shared. Experienced melon producers are also ethnic Kazakh farmers who lived and worked in Uzbekistan before:

“I arrived from the Gagarin village of Djizzakh province [Uzbekistan] back to Kazakhstan and obtained 3.5 ha of land. There are many such families who moved in the 1970’s that originally lived in South Kazakhstan and moved to Uzbekistan as the Mirzachol desert was turned into irrigated agricultural areas and collective farms. People who came back starting 1996 are called ‘oralman’. They diversify their crop production and introduced many crops that were not grown in Maktaaral before, such as melons, beans and some vegetables” (Farmer 03, Appendix 2).

Our survey data suggests that farmers growing melons tend to have a longer melon growing experience than they have grown cotton (Figure 3-8), whereas those farmers with the longest cotton cultivation experience remain cotton monocroppers. This is consistent with our finding from the regression model that older farmers and those with a formal (probably Soviet) agricultural education often tend to stick to cotton. At the same time we can assume that the experienced cotton growers have good access to production inputs including harvesters and could have established long-term relationships with ginneries that provide favorable terms and satisfactory prices for farmers’ cotton.

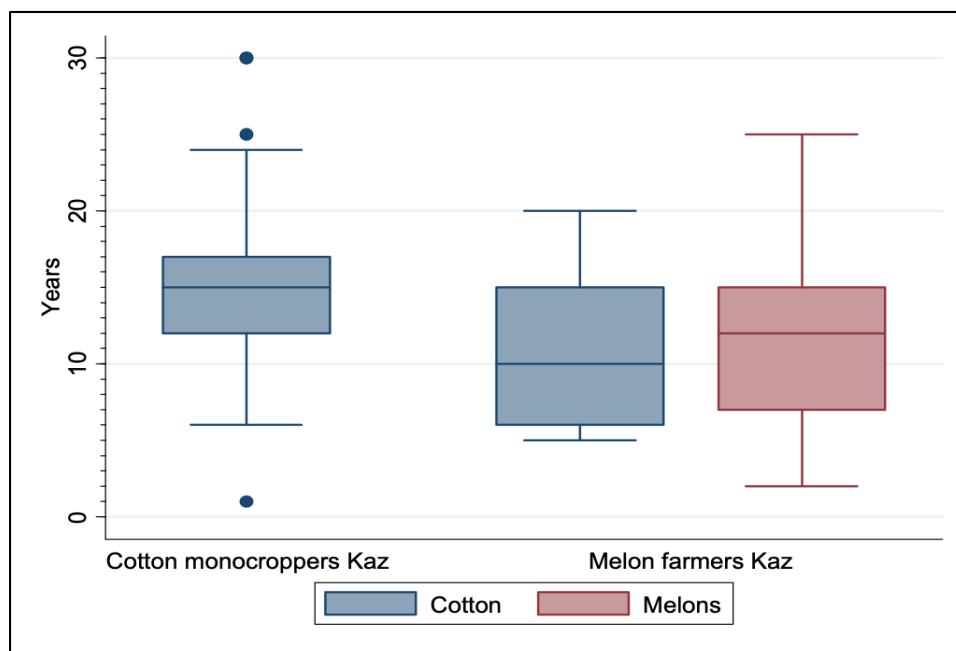


Figure 3-8: Years of cultivation practice, cotton and mixed cotton-melon farmers, South Kazakhstan

Note: Answers to the question: “For how many years have you been cultivating this crop?”

Source: AGRICHANGE Farm Survey 2017.

The qualitative interviews suggest that salinity levels not only determine crop choice, but also whether the land not under own cultivation can be rented out. Lower quality land can be rented out for cotton planting and land with lower salinity is rented out for melons and other crops. As a measure of soil rehabilitation, farmers with more land often rent out a part of their land for free to rice planters. Rice planting temporarily helps to wash out (leaching) the salt in the surface levels of the soil, however as one farmer warned:

“The rice is planted by farmers who know the technology of planting rice but also have enough investments as rice planting costs a lot and requires copious irrigation. The rice planters are invited to wash out the salinity from the land, however not many people understand that the salt washed will come out from the neighbors land. So the salt is never out of the soil and just circulates around.” (Farmer 04, Appendix 2).

Getting rid of the salinity issue independently or even jointly seems almost impossible for the farmers in Maktaaral and all respondents of in-depth interviews expected that eventually their lands might turn useless, unless long-term perspectives and strategies are offered by the state. Such thoughts create a feeling of instability for the farmers and intensify agriculture activities towards rapid resource [land quality] extraction.

3.5 Alternatives to cotton in Samarkand

In our Uzbekistan sample, we slightly reformulate our definition of crop diversification. Cropping patterns have been less dynamic and focused mostly on conventionally established crops (Figure 3-5). However, the state administration of cotton and wheat production has been a prevalent feature of farmers’ cropping decisions since national independence (Pomfret 2007; Djanibekov et al. 2012). From the survey data, we know that a substantial share of farmers consider a part of their cotton and wheat “free”, i.e. not produced under state quota. In Jomboi district, vegetables to be sold in nearby

Samarkand city occupy about 12% of the arable land (Figure 3-5) At the same time, here multi-time cropping per season takes place and therefore the intensity of production on the same arable land is even higher.

In the cotton mandate districts, diversification is possible if farmers have access to excess land beyond what is needed to fulfil the quota, either due to a generous land endowment or via “second crops”. According to an interview in Samarkand,

“the free land or the land available after the first [state] crop is used for second cropping [also called ‘kora ekin’, black crop, in Uzbek], given to permanent workers to plant any crops they want. The only restriction with the plots where wheat is supposed to be planted is that the first crop should be harvested on time for planting the second crop, as it might become too hot for planting.” (Farmer 05, Appendix 2).

Second crops are seen as cash crops for farmers and their workers, while state-order crops are considered as a burden and not profitable. Second cropping is not always reported to the authorities, but would certainly reflect a diversification of crops in Samarkand province and farmers’ cropping choices in absence of state quotas in general.

Farmers also informed us that there were “processing companies that enter into a contract with farmers, with similar conditions to state quotas, concerning the planned amounts and fixed prices for produce.” (Farmer 06, Appendix 2). This sort of contract farming was reported by three farmers in the Samarkand survey and by most of the respondents of qualitative interviews in Jomboi district where only wheat quota remained.

We thus explore the drivers of farmers’ diversification into non-mandate crops, such as “free” wheat, vegetables, or legumes. In the following, we estimate two regression models with different dependent variables (Table 3-6). The first model examines the probability to shift from state mandated crops to non-mandated crops, including “free” cotton and wheat. This applies to 32% of the farmers. The second model analyses the probability to give up cotton and wheat completely and produce only other crops, mostly vegetables. This second option is what 9% of farmers in the Samarkand sample did in 2016 (Table 3-4).

Farmers’ assessments of soil quality show that other than in Maktaaral, farmers in Samarkand tend to diversify if their land is more saline. However, average salinity levels are much lower than on the Kazakhstan site (Table 3-6). In fact, farmers may be forced or at least feel pressured to use the best soils for the quota crops. A positive relationship of diversification with salinity is not expected and is contrary to results found in South Kazakhstan, especially, when farmers in the qualitative interviews make statements about being able to produce three crops annually on their plots, at the same time considering water availability as the one of the major issues. However, opinions expressed by farmers can be often influenced by the expectations during surveys and thoughts of possible consequences of their statements after the survey. For example, statements about imagined salinity could be caused by the feeling of suspicion and fear that the quota on the land plot could be increased or vice versa. Or farmers’ might see an opportunity to claim non-saline lands as saline, to help decrease or release cotton-wheat quotas on their land.

Table 3-6: Regression of diversification decisions in Samarkand

Dependent variable	Diversify into non-quota crops		Diversify into crops other than cotton or wheat	
	Marginal effects	p-val.	Marginal effects	p-val.
Cropland (ha)	0.004 ***	<0.001	<0.001	0.962
Salinity level (1..5)	0.050 **	0.050	0.028 **	0.020
Family labour (FTE)	0.003	0.500	0.001	0.462
Hired labour (FTE)	-0.001	0.812	-0.002	0.584
Age of farmer (years)	-0.004	0.273	-0.002	0.216
Farmer has agricultural education (1/0)	0.013	0.875	0.032	0.336
Educational level (1..8)	-0.009	0.542	-0.023 ***	0.002
Female farmer (1/0)	0.005	0.946	<0.001	0.994
Credit rationed farm (1/0)	-0.092 **	0.039	-0.075 ***	<0.001
Risk aversion (0..10)	0.035 **	0.043	0.028 **	0.010
Time preference (0..10)	-0.014	0.504	-0.034 **	0.021
Livestock units	<0.001	0.653	0.001 ***	0.007
Owns tractor (1/0)	0.188 ***	<0.001	0.043 *	0.077
Direct sales to consumers (1/0)	0.076	0.129	0.146 ***	<0.001
Jomboi district (1/0)	-0.022	0.661	0.098 **	0.010
Paiarik district (1/0)	<0.001	0.986	0.022	0.525
Pseudo R2	0.114		0.261	
Chi2 (p-value)	46.16 (<0.001)		72.93 (<0.001)	
N	448		448	

Note: Marginal effects based on probit regression. Marginal effect is discrete change from base level for dummy variables. * (**, ***): significantly different from zero at the 10 (5, 1) % level, based on robust standard errors.

Source: Authors based on AGRICHANGE Farm Survey 2017.

During the qualitative interviews farmers were rarely complaining about salinity, but about the soil quality and its wrong assessments:

“The points of fertility¹⁵ [ball-bonitet] of the soil on my plots was assessed too high two years ago to be 81 points. The assessment with same results was done during Soviet times 35 years ago or even earlier and those who came to reevaluate the quality did not measure and put the old Soviet grades. According to my own estimates the land quality is much lower around 49-50 balls as the productivity is significantly low. Very often the quality of lands are misestimated as the quotas for cotton and wheat are based on ball bonitet of your land. So sometimes its not fair” (Farmer 07, Appendix 2).

Here, evidence from Khorezm province of Uzbekistan (Trevisani 2010) could serve as a comparison to salinity conditions of Maktaaral, and at the same time to Paiarik and Pastargom districts where cotton and wheat are crops under state mandate. In Khorezm, besides the farm size, the importance of “terms of trade”, that include overall land use conditions and the cropping agreements made with the local authorities, are regarded key to profitability by the farmers. Environment and land quality [which compared to Samarkand is very low and saline] in the Yangibozor district of Khorezm province was considered to play still a subordinated role, whereas farmers considered personal networks and status to be important for success in agricultural production. The Interference of the state and frequent changes in reforms related to farm size, production and marketing requirements create mistrust and are reflected in protective attitudes among farmers and cautious about their farm production and decisions. For this reason, farmers try to create security nets through social capital and are eager to protect or improve their farm production status by exaggerating or hiding of information. Such behavior of farmers can also explain the surprising reporting of salinity in the survey by farmers in Samarkand province to which it is hard to make statements without the social context that plays significant role in their activities and success.

According to the regression analysis, farmers endowed with more land are slightly more likely to turn to crops not under the state mandate, especially wheat. However this could be explained, as mentioned earlier, with partial quota for wheat that obliges the farmer to sell only 60% of the wheat produce to the state.

In our Samarkand sample, diversifying farmers are less liquidity constrained but, as in South Kazakhstan, more risk-averse and own tractors. Farmers diversifying into vegetables possess a lower formal education and a lower time preference and are more likely to also keep animals.

Although diversification may mitigate the risk exposure of risk-averse farmers, vegetable growing also entails specific risks. Seeds may be hard to obtain and expensive, such as for onions or potatoes, and these crops are due to considerable price fluctuations. Vegetable producers in Samarkand are more likely to use direct sales channels to local consumers and are concentrated in Jomoi district, where no cotton quota exists. 8% of “free” wheat producers in Samarkand province said they directly sell to consumers, while almost two thirds sell to processing or procurement enterprises. The remainder sells to independent traders. This fact indicate major problems in marketing and sales opportunities for wheat growers which are often connected with the low quality of the wheat and availability of better quality imported wheat grain.

While widespread migration of men has transformed gender roles in other Central Asian settings (Mukhamedova and Wegerich 2018), female farmers are not more likely to diversify than men.

¹⁵ The word ‘point’ translated from the Russian word ‘ball’. Ball bonitet is an integral indicator of land fertility which was an accepted norm of measurement in the Soviet agriculture and continued to be used by most of Central Asian successor countries.

3.6 Conclusions

Taken together, our findings permit unique insights into recent diversification activity among farmers in our two study sites and they allow disentangling the linkages between soil degradation and farm management decisions. Farmers in Maktaaral increasingly replaced cotton with melons and, to a lesser extent, vegetables. Relative output price developments appear to be a main driver of this change. Soil salinity is a constraint to the diversification into melons, not a driver, as melons are less salt tolerant than cotton. According to a probit regression analysis of farm survey data, farmers diversify into melons if they have more family labour available, are better mechanized and did not invest in mechanical cotton harvesting operations in the past. Diversifying farmers are younger and also run more diversified operations in other respects, e.g. by keeping livestock. Possibly due to high wage expenses for melon cultivation, diversifying farmers express a higher demand for finance and thus tend to be more liquidity constrained than pure cotton farmers. Melon farmers often have accumulated cultivation experience in this crop for many years, which allows them to increase or downsize the melon area according to market signals. Immigrants from Uzbekistan or returning migrants (oralman) appear to have introduced the know-how necessary for cultivating melons in Maktaaral. Farmers diversifying (also) into vegetables are more risk averse than those focusing on melons alone, so that vegetable production may serve as a risk mitigation strategy. In Maktaaral, diversification decisions seem to be insensitive to farm size and do not depend on local sales channels. Most melons are bought by traders and sold in the urban centers or abroad.

Other than in Maktaaral, farmers in Samarkand diversify if their land is more saline. Salinity appears to be even used as a justification that permits diversification into high-value crops other than cotton or wheat. However, average salinity levels are much lower. According to our regression analysis, farmers endowed with more land are slightly more likely to turn to crops not under the state mandate, especially wheat. Farm size plays no role in the diversification into vegetables. Vegetable producers in Samarkand are constrained by the availability of direct sales channels to local consumers and are concentrated in Jomboi district, where no cotton quota exists.

We conclude that farmers in the liberalized economic environment of South Kazakhstan chiefly react to market signals if soil salinity, labour, liquidity and mechanization constraints permit. In Maktaaral, soil salinization typically prevents farmers from introducing more diversified and more water-productive high-value crops. Pre-existing salinization inhibits change that may lead to lower salinity levels in the long run and creates a sort of salinity trap. Once salinity levels are high, it is increasingly difficult to reduce them by moving to other crops than cotton. For South Kazakhstan, updated and new innovation knowledge on infrastructure through extension services and administrative coordination as well as higher institutional transparency is essential for further diversification to existing and new salt tolerant crops or even to other possible agricultural activities.

In Samarkand, the least saline soils appear still to be reserved for cotton and wheat under the state mandate. But salinity is not hampering farmers' diversification into high-value crops. Vegetable farmers are rather constrained by restricted access to land, machinery and sales channels. Informal diversification happening through second cropping is not acknowledged properly and cannot always be captured statistically, however acknowledgement of it could show production capacities and expertise of farmers in order to specialize and upscale diversification effects.

Soil salinity thus continues to threaten farmers across Central Asia. Apart from posing an imminent danger to human health and environmental safety, we demonstrate how it prevents agricultural operators in South Kazakhstan from adopting more profitable and more flexible cropping patterns. Although crop diversification globally serves as a risk management tool in both countries and provides wider opportunities and benefits to the farmers. There are contextual risks constraining the decisions and possibilities to diversify. These are connected either to old risks taken

by Soviets by changing the landscape dramatically and eroding infrastructures and knowledge; or newer consequential challenges of policy making such as: restrictions on farmer's production decisions, absence or limitations on land ownership and continuous restructuring of farming entities. In the latter case, farmers restricted by policies and sales avenues acquire careless attitudes and investment little into the land, water quality improvements or infrastructural developments. As governments in both Kazakhstan and Uzbekistan emphasise the need for a more diversified agricultural sector that serves the needs of export customers abroad, salinity should be of high concern to them. The Kazakhstani administration has engaged in long-term reforms of water management, it pursues significant investment into the rehabilitation of irrigation and drainage infrastructure, and it subsidises farmers to diversify their crop rotations. These strategies appear promising to combat salinization in the long term. Yet past policy initiatives suffered from overly top-down implementation and the incompetence of government agencies in charge of executing them. They thwarted entrepreneurial initiative by crowding out private funding sources and provided inconsistent incentives to producers (Petrick et al. 2017). Effective implementation is thus critical.

At the same time, salinization patterns are not uniform across Central Asia, and different regions are exposed to ever so varying degrees. Whereas other provinces of Uzbekistan are seriously affected by salinization, farmers in Samarkand complain little about this issue. The diversification strategy stressed by the current presidential administration may further relax the cotton and wheat production mandates that have been constraining farmers for decades. If implemented effectively, it may provide a unique window of opportunity to improve farm incomes, increase food security, and contribute to a healthy diet and environmental improvement. While our study focused on diversification choices that were actually observed among farmers, the future introduction of crops not yet grown in the region could provide further benefits of the sort described before. These crops include sorghum, which has the potential to grow on salinized soils and even reduce salt content, or indigo, a high-value crop used for dyeing (Bobojonov et al. 2013). Yet, in Uzbekistan, more thorough and effective reforms of agricultural service provision will be required to achieve this goal. As our findings suggest, a strategy of improving access to credit, machinery and sales channels holds the promise to boost crop diversification in the future.

4 Integration of villages into WUAs – the rising challenge for local water management in Uzbekistan¹⁶

4.1 Introduction

Conventionally, public irrigation systems have been designated as being for agricultural uses only. Only rarely have multiple uses and users been incorporated in the design phase. Recently, more attention is being given to multiple uses (Meinzen-Dick & van der Hoek, 2001). However, although this is true conceptually, in practical terms the integration of multiple users and uses still presents a challenge, especially in relation to governance and management at local level (Thomas, Osmani, & Wegerich, 2011). At this level, attempts have been made to incorporate multiple users and uses into Water User Associations (WUAs), which were originally conceived as encompassing farmers only, with the intention of involving farmers in the governance and management of water for irrigated agriculture. As the interests of farmers have historically been paramount, including other users and uses in the governance and management structure as well as expanding the service provision to different client groups is proving to be challenging; and this challenge will increase with increasing population pressure and finite resources.

This paper explores a specific case of whether and how recently established WUAs in Uzbekistan are able to expand their client base and provide services to meet the rising demand from poor rural communities in the context of seasonal outmigration of male laborers and a feminization of rural Uzbekistan. The aim of this study is to draw attention to the changing situation in rural Uzbekistan and therefore provoke a shift in emphasis away from projects focusing solely on farmers and towards projects that target the rural population at large.

The paper continues with a brief framework section on existing water control in Uzbekistan and the growing challenges of new users and uses. The next section provides the background to both the Ferghana Valley and farming systems in Uzbekistan. This is followed by a case study of Yangi Chek and Pakhtakor settlements within the Akhror Mirob Muminjon WUA in Ferghana Province. Here, the special focus is on community (*mahalla*) ditch water masters (*mirabs*), infrastructure, and households' gendered strategies to claim water. The case study section is followed by a short reflection on the representativeness of the findings. The last section highlights the need to shift attention away from water efficiency improvement to reallocation projects and to the incorporation of the rural community at large into water governing bodies.

4.2 The new challenge to water control within irrigation systems

Mollinga (2003) distinguishes between three dimensions of water control in irrigation systems: technical, organizational, and societal, economic, and political. Treffner, Mioc, and Wegerich (2010, p. 229) state: "Societal, economic and political objectives are implicitly inscribed in controlling organizations and infrastructure." Ertsen (2007), referring to distinctive irrigation schools, highlights the different political objectives of three colonial powers, Britain, France, and the Netherlands, and how these political objectives are manifested both in different water control infrastructure designs and in the setup of irrigation departments. According to Mollinga (2003), changes in one dimension require changes in the other two dimensions. This rarely happens however. For example, Bolding, Mollinga, and Van Straaten (1995) show how Indian irrigation departments, by simply focusing on technical solutions, failed to adapt to agrarian changes. The political objective of reducing the costs of the irrigation systems by handing them over to farmers

¹⁶ This chapter of thesis was first published as: Mukhamedova Nozilakhon and Wegerich Kai (2014) Integration of villages into WUAs – the rising challenge for local water management in Uzbekistan International Journal of Water Governance, Volume 2, pp. 153–170.

(WUAs) was in many cases only a one-dimensional change (organizational) on the local level and often was not accompanied with changes in the other dimensions. With the increasingly popular concept of integrated water resources management (IWRM), which is based on the Dublin principles incorporating environment, participation, gender, and the economic value of water, but also bringing together multiple users as well as multiple uses of water resources, new demands are arising for water management on all levels or scales. Meinzen-Dick & Bakker (2000) identify other users within the irrigation system: herders, fishermen/women, other residents, as well as drawers of domestic water supply. Domestic water supply may be used for consumptive or productive purposes. Most often, WUAs do not take these domestic uses into account, possibly because domestic gardens are mainly the domain of women. So far, gender research has shown that water decision making and irrigation management are dominated by men almost everywhere in the world (Meinzen-Dick & Zwarteveen, 2001; Bustamante, Peredo & Udeata, 2005; Shyamala & Rao, 2002). At irrigation scheme level, this might be explained by the WUAs' membership criteria, which are based on landownership. Hence, the challenge for WUAs is how to integrate different users and uses within the organization. Thomas, Osmani, and Wegerich (2011) highlight the difficulty of integrating non-consumptive uses within WUAs. Rising population levels increase the demand side, and closing or already closed basins add to the pressure on water control. It is hypothesized that non-integration of multiple uses and users into governing bodies leads to non-rule conformity and therefore anarchy or informal arrangement.

4.3 Background to the Ferghana Valley and the case study area

Located in the south-east of the Central Asian region (Figure 4-1), the Ferghana Valley is divided between three former Soviet Socialist Republics: Kyrgyzstan, Tajikistan, and Uzbekistan (Figure 4-2). Geographically, the central part of the valley lies in Uzbekistan, the northern and eastern part belongs to Kyrgyzstan, and a small patch in the west and southwest is located in Tajikistan. Surrounded by the Ala-Tau Range in the north, the Alay mountains in the south, and the Tian Shan mountains in the east, the valley benefits from two main rivers and twenty-two small transboundary tributaries. The two main rivers, the Naryn and the Karadarya, unite in the valley to form the Syr Darya – the second largest river in Central Asia.

The Uzbek part of the Ferghana Valley is divided between three provinces (Namangan, Andijan, and Ferghana). Ferghana Province – the focus of this case study – occupies 6,800 km² and consists of fifteen districts and four major cities (Figure 4-3). The province borders Kyrgyzstan to the south-east and Tajikistan to its western side. Ferghana Province, with about three million inhabitants, is the most populated province within the Ferghana Valley.



Figure 4-1. Map of Central Asia

Source: <http://www.lib.utexas.edu/maps/asia.html>

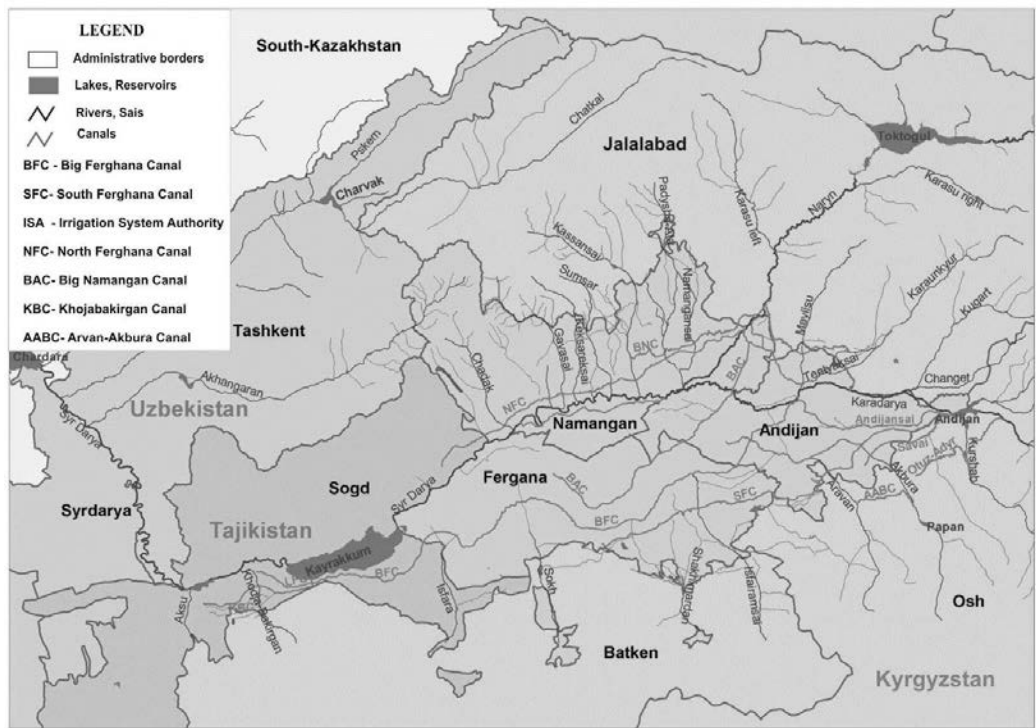


Figure 4-2. Map of Ferghana Valley

Source: Map prepared by the first author by using ESRI ArcGIS v. 9.3.1. software.

Integration of villages into WUAs – the rising challenge for local water management in Uzbekistan

In a recent study on Uzbekistan, the Ferghana Valley as a whole was identified as very poor compared to other regions in Uzbekistan (World Food Programme 2008), with an already high and still rising number of seasonal migrations of men and women (Scientific Information Center, 2011). Reeves (2010) contradicts these migration figures and highlights for one area (Sokh basin) within Ferghana province that seasonal migration is gendered and that the majority of season migrants are men, according to her the migration rate for men was over 98 per cent for the period 2000-2005.

During the age of the Soviet Union, a unified approach was adopted to construct the infrastructure, including irrigation infrastructure, within the valley (Megoran, 2004). Nevertheless, today, administrative boundary management dominates at the higher administrative level.

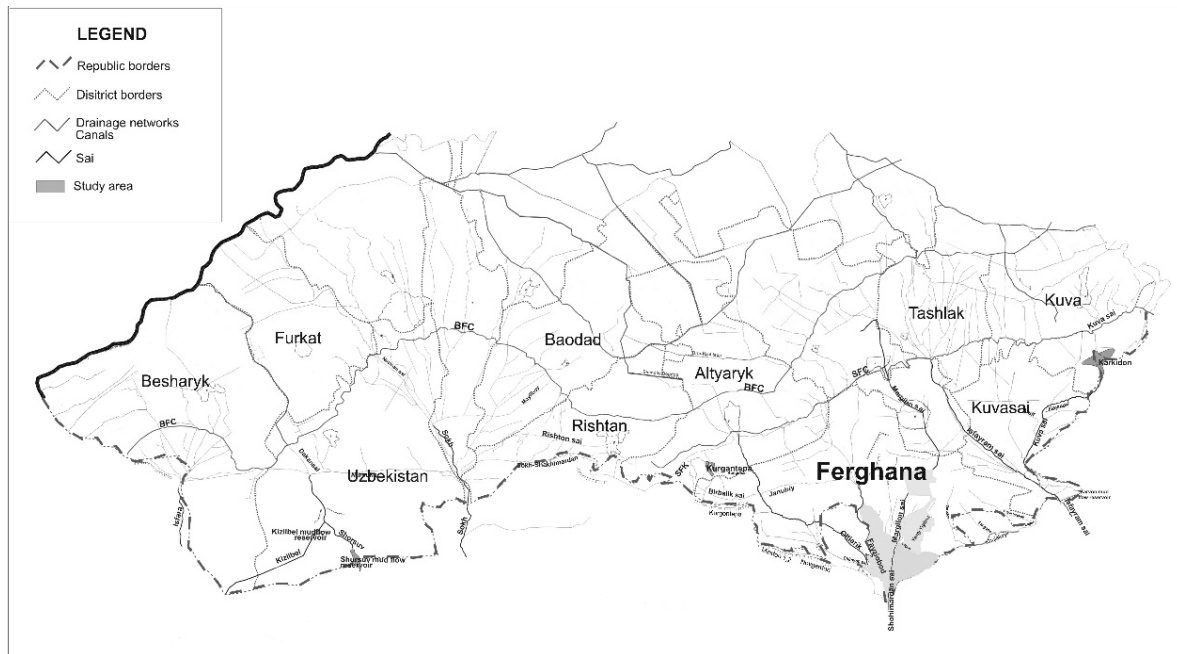


Figure 4-3. Map of Ferghana Province.

Source: Prepared by the first author by using ESRI ArcGIS v. 9.3.1. software

To manage the water resources within the Uzbek part of the valley, different management organizations have been set up, Basin Irrigation System Administrations (BISAs) – management units at the province level – oversee Irrigation Systems Administrations (ISAs), which manage water resources combining different water sources and allocate these resources to WUAs (Yalcin & Mollinga, 2007; Wegerich, 2009). WUAs allocate and distribute water to farmers (the main crops are cotton and wheat according to state order), gardeners (orchards and vineyards), and rural households (kitchen gardens and extended kitchen gardens (*dekhkan*¹⁷) (Veldwisch, 2008). In

¹⁷ The local terminology used in rural areas for various water users differentiates farmers - a farm enterprise growing only cotton and wheat. Gardeners – a farm enterprise growing mainly orchards and/or vineyards, sometimes combined with other crops. Dekhkans – a farm enterprise growing any agricultural products on extended household plots, kitchen gardens. Dekhkan plots can be maximum 0.35 ha of irrigated lands and 0.5 ha of non-irrigated lands. However, the law does not distinguish between farmers and gardeners (Law of Republic of Uzbekistan on "Farm Enterprises" #662-II, dated 30.April.1998, Article 3.3: A farm enterprise is an independent economic subject with rights of a legal entity. " Dekhkan Enterprise is a small-scale

Uzbekistan, farmers, land owners, are predominantly male. Of the 11,126 farms registered in Ferghana Province in 2010, only 516 were women-headed (Scientific Information Center, 2011, p. 112).

The relatively small number of women farmers does not imply that women without formal land rights do not participate actively in agriculture. In fact, women's engagement in agriculture is even increasing (Kandiyoti, 2003). Due to the declining economic conditions in Uzbekistan and land reforms (targeted at economies of scale and continued high cotton production¹⁸), and later the optimization of farm sizes, male labor migration to Kazakhstan, Russia, and Korea is reported to have increased rapidly, particularly from the rural areas (ADB, 2005; Mansoor & Quillin, 2006).

In Uzbekistan, the focus in agriculture and therefore also in water management is mainly on farmers following the state order on cotton and wheat. Consequently, most government or donors' policy interventions targeting agriculture focus on these farmers, for example water productivity increases or even building institutions such as WUAs. However, kitchen gardens and extended kitchen gardens contribute to more than 80% of agricultural production (excluding crops such as cotton, wheat, rice) and ensure households' food security in the rural and urban areas (Alimdjanova, 2009).

Here it should be emphasized that since independence the land area allocated to kitchen gardens has increased significantly. Since 2000 the population of the Ferghana province has increased from 2.7 to 3.1 million in 2010, in the same period the number of communities has increased from 312 to 395 (Scientific Information Center 2011, p. 112). Until recently, settlements expanded into the irrigated areas (Table 4-1).

Table 4-1 Changes in land allocations to kitchen gardens in Ferghana Province

Years	Total irrigated area, ha	Including crops and kitchen garden lands (ha)						Kitchen garden/Total irrigated area %
		Cotton	Wheat	Alfa-alfa	Orchards	Other crops	Kitchen garden	
1980	323,049	188,822	0	39,925	22,487	53,190	18,625	5.77%
1990	354,151	140,698	0	52,821	37,744	68,911	53,977	15.24%
2000	357,736	126,384	90,793	9,977	33,435	147,953	39,987	11.18%
2010	361,978	103,600	111,700	3,718	47,628	144,718	62,314	17.21%

Source: Compiled based on BISA Ferghana Province

Kandiyoti (2003) highlights the role of women regarding kitchen gardens and their contribution to household food security. Whereas in the past fertile land was given for the establishment of new settlements within existing agricultural lands, this policy changed recently. "Now the state is building settlements in areas which are not fertile and have not been previously under agricultural production. It is anticipated that the population within the new settlements must improve the land" (Interview with Ferghana Province BISA representative, 15/02/2012).

In Uzbekistan, an 'optimization process' has led to an increase in farm size and a decrease in the number of farmers. The process sought to increase agricultural productivity and profitability by

enterprise engaged in commodity production. A dekhkan enterprise may exist as a legal entity as well as without legal establishment. (Law of Republic of Uzbekistan on "Dekhkan Enterprises" #604-I dated 30.April.1998, Article 1).

¹⁸ The land reforms in Kyrgyzstan were intended to stabilize rural livelihoods; therefore each collective farm employee received a land plot (Spoor 2004).

increasing the land size of farms (Djanibekov, 2012), at the same time the process reduced the number of farms significantly. As a consequence, generally one off-take from the secondary canal is utilized by one main user, a cotton and wheat farmer, alone. However, often before or after reaching the farmer's field, water resources are shared by gardeners, *dekhkans*, or village streets supplying kitchen gardens. Veldwisch (2008) points out that these users, either the group of *dekhkans* or the different kitchen gardeners in one street, are not connected to the WUA, and therefore at this level there is unsupervised and unguided water utilization. Abdullaev et al. (2009, p. 9) report on informal water user groups (WUGs) at the "tertiary canal or village ditches" level. They report very positively about existing informal WUGs, stating that they maintain the ditches, practicing quite accurate water accounting, being a democratic system with members having 'a say'. However, despite their saying (2009, p. 8–9) that:

"The social networks supporting interaction between WUG members are rather indigenous fabric of social life in the localities than exogenous intervention by state or projects. Therefore, the main lesson from the studies of informal WUG is the formation of such groups cannot be done on top-down manner,

they still go on to say:

Within the framework of IWRM FV project four major interventions were identified for replication of the success of informal WUGs: (1) formation of the Water Users Groups (WUG) in the areas where they do not exist; [...] (5) improving link between WUA, WUGs and local rural communities, e.g. kitchen garden water users."

Current Integrated Water Resources Management Ferghana Valley (IWRM FV) project staff confirm that villages, and therefore kitchen garden users in Uzbekistan, have not been taken into consideration. WUGs have only been established in the Kyrgyz and Tajik territories, mainly in the agricultural areas and not in villages (Kazbekov personal communication, 2012). Nevertheless, Mirzaev (2012, 9) mentions in a Scientific Information Center's (SIC) IWRM FV project activity report that village involvement and participation in WUA decision making (WUA councils) in the IWRM project areas in Uzbekistan is successful and covers 30% of all WUAs. Mirzaev claims (2012, p. 14) that all of these 160 village committees were part of local WUAs in 2011 and have concluded contracts with them. However, fee collection from kitchen gardens is still low at 19%.

4.4 Methodology

This research employed a case study approach based on fieldwork using a number of data collection methods. Most data were collected through semi-structured in-depth interviews with WUA staff, farmers, household members, and community leaders as well as through a study of WUA statutory and operative documents, site visits, and participant observation of both formal water allocation and informal water abstraction practices. The interviews focused on topics relating to allocation, management, users, and uses of water resources as well as participation in WUAs and WUGs along the gender lines of households, farms, and irrigation service provision. A total of fifty in-depth interviews were conducted over a period of three weeks in September 2011, 60% of which were with women (Table 4-2).

Table 4-2. Categorization of interviewees

Interviewee types	Female	Male	Total
WUA staff	3	0	3
WUA <i>mirabs</i>	0	6	6
Village neighborhood <i>mirabs</i>	0	4	4
Farmers	2	2	4
Households	25	8	33
TOTAL	30	20	50

In accordance with the research design, three different village settlements in each of three WUAs were purposely selected within an irrigation system in Ferghana Province, Uzbekistan ¹⁹ (Figure 4-4). The criterion for their selection was that they should be at different locations along the irrigation system to maximize differences in the sample in terms of ease or difficulty of access to water resources. Rather than being representative, the study aims to be a thick description of an irrigation scheme with the focus on water management and/or distribution to rural households.



Figure 4-4. Research area within Ferghana Province.

Source: Prepared by the first author by using ESRI ArcGIS v. 9.3.1. software

¹⁹ It was proposed to conduct the research project in the South Ferghana Canal irrigation zone in Andijan Province. This zone is part of the IWRM FV project. Focusing on water allocations to villages within a main canal zone would have been more representative for Uzbekistan. In 2011 the area was under the domain of the project partner SIC, and the province water management organizations prohibited the proposed research. Therefore, the research was conducted within the IWRM FV project area under the domain of IWMI. In 2011, IWMI's IWRM FV project area covered only areas outside the main canal irrigation zone and in the catchment area of the small transboundary tributary Shakhimardan sai (Wegerich et al. 2012). Nevertheless, given that both project areas would have had the same awareness raising on the integration of village WUGs into WUAs, it is to be assumed that there would be little difference regarding governance and integration.

4.5 Case study

The research was conducted within the Ferghana district of Ferghana Province and covered a purposive sample of three local WUAs: Akhror Mirbo Muminjon WUA (2354 hectares in 2011), Yuqori Vodil Yahshi Niyat WUA (1728 hectares in 2011), Nurmat Quchqorboy Mirob (2457 hectares in 2011) with a focus on water delivery and distribution to and within local village settlements. All three WUAs were established in 2008. Although data were gathered within all three WUAs, here the focus is on the Akhror Mirob Muminjon WUA. The data gathered within the other two WUAs were used to confirm the legal and organizational settings within WUAs as well as to validate general trends on population, outmigration, and gender issues.

In all three WUAs studied (Akhror Mirob Muminjon, Yuqori Vodil Yahshi Niyat, and Far Nurmat Quchqorboy Mirob), labor migration of 60% of young men (aged 20–35 years) to Russia or Korea were reported (HHF2, HHF3, HHM10, MMM1, FF1; Appendix 2). “Almost every household in our settlement has one person working in Russia or Korea” (HHM7; Appendix 2).²⁰ Although remittances are often the main income for these rural households, the kitchen garden serves not only to ensure stable food security but also to generate income. Interviewees reported growing vegetables (potatoes, tomatoes, cucumbers), grapes, and fruit trees. Some fruits and vegetables are reportedly sold to Tashkent but also to Russia (HHF2, HHF3, HHM10, MMM1, FF1; Appendix 2).

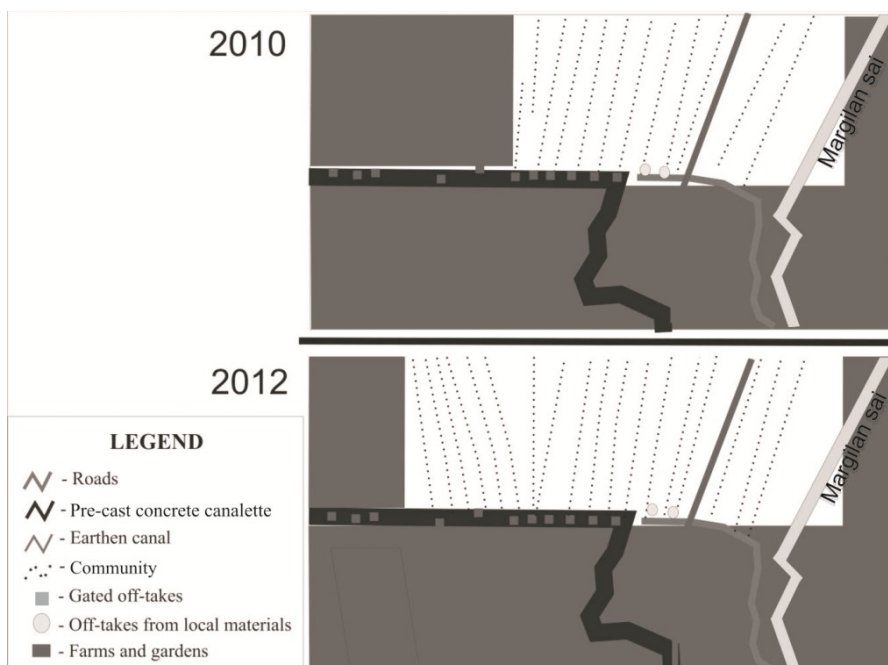


Figure 4-5. Population growth in Yangi Chek settlement/Vodil village 2010 and 2012.

Source: Prepared by the first author based on the local maps and field observations.

As previously mentioned, settlements have expanded in Ferghana Province. In the Akhror Mirob Muminjon alone, a rapid increase can be observed in recent years. A comparison of satellite

²⁰ Many families gather money to send their children, brothers, or relatives to Russia or Korea. The reported average salary of young men working in construction in Russia is US\$ 500–700/per month (HHM19, WDM2). The average official minimum wage is far below the internationally recognized poverty line of US\$ 1 per person per day and much lower than the recommended poverty line for Central Asia of US \$2.15 per person per day (World Food Programme 2008, 17), and in addition official wage payments are often delayed.

images from 2010 and 2012 shows that the Yangi Chek settlement within Vodil village at the tail-end (see details below) has increased (Figure 4-5).

All three WUAs have the same charter, which states: “The association’s founders, farms, *dekhan* farms registered as legal entities, individual households that possess kitchen gardens within the WUA area and who are organized into legal entities can be accepted as members of the WUA” (WUA Memorandum). Common in all three WUAs was that kitchen gardens did not have individual membership, since they are not legal entities, but were rather represented through one appointed representative for a group of settlements (administrative boundaries only). Neither village ditches form legal entities, and therefore they do not have individual representation within the WUAs either. Similarly, *dekhkan* farmers (less than 1 ha of land) are not legal entities and therefore are not represented within the WUA. Therefore, Akhror Mirob Muminjon WUA had thirty-four members only: sixteen farmers, twelve gardeners, one cattle breeder, and five groups of settlements with a total population of 25,000 in 2011. Yuqori Vodil Yahshi Niyat WUA had thirty-six members only: thirteen farmers, eighteen gardeners, one cattle breeder, and four groups of settlements with total population of 10,300 in 2011. Far Nurmamat Quchqorboy Mirob WUA had sixty-five members: twenty-nine farmers, thirty-one gardeners, and five groups of settlements with total population of 6,800 in 2011.

Although these entities are officially WUA members, the WUA is responsible for distributing water only up to the off-take, either that of the registered farmer or of the settlement ditch. Officially, farmers pay 17,000–25,000 UZS per ha, gardeners 80,000–110,000 UZS per ha, and *dekhkan* farms (kitchen gardens) 500 UZS per 0.01 ha per season (US\$ 1 = 1,800 UZS official rate and US\$ 1 = 2,800 UZS market rate) to the WUA. The average salary of a WUA water master (*mirab*) providing water to the off-take is 160,000 UZS monthly (about US\$88, official rate or US\$57, market rate). Although officially owners of kitchen gardens pay 500 UZS per 0.01 ha per season, the payment does not guarantee that they will receive water.

As already mentioned, water control has technical, organizational, and politico-socio-economic components. To understand the situation in the particular case, it is important to understand the setting; here, we focus on the Akhror Mirob Muminjon WUA and two major settlements: Pakhtakor and Yangi Chek.

The Akhror Mirob Muminjon WUA has seven secondary canals taking water from Shakhimardan sai and distributing water to total of twenty-eight farmers and gardeners as well as five settlements consisting of 3800 households in total. Of the five settlements of Vodil village, two were selected: Pakhtakor, which is at the head-end of a secondary canal, and Yangi Chek, which is located at the tail-end of a secondary canal (Figure 4-6). The water supplied through the irrigation system serves not only to irrigate the rural household gardens but also domestic purposes such as drinking water for people and livestock, washing dishes and clothes (HHF1, MMM1, HHF2, HHF3, HHF4; Appendix 2).

Pakhtakor was established in 1980 (after a mudflow destroyed former settlements in 1977). The settlement is structured into three communities (*mahallas*), which all have individual off-takes and ditches. In total, Pakhtakor has about 500 households. Whereas the first community (the furthest upstream) receives water from a separate canal originating in Kyrgyzstan, the two lower communities receive water from a secondary canal (Chinor aryk). After the off-takes to the two communities, the secondary canal reaches the agricultural areas. The two community ditches are earthen, but have gated off-takes. None of the three ditches had water masters.

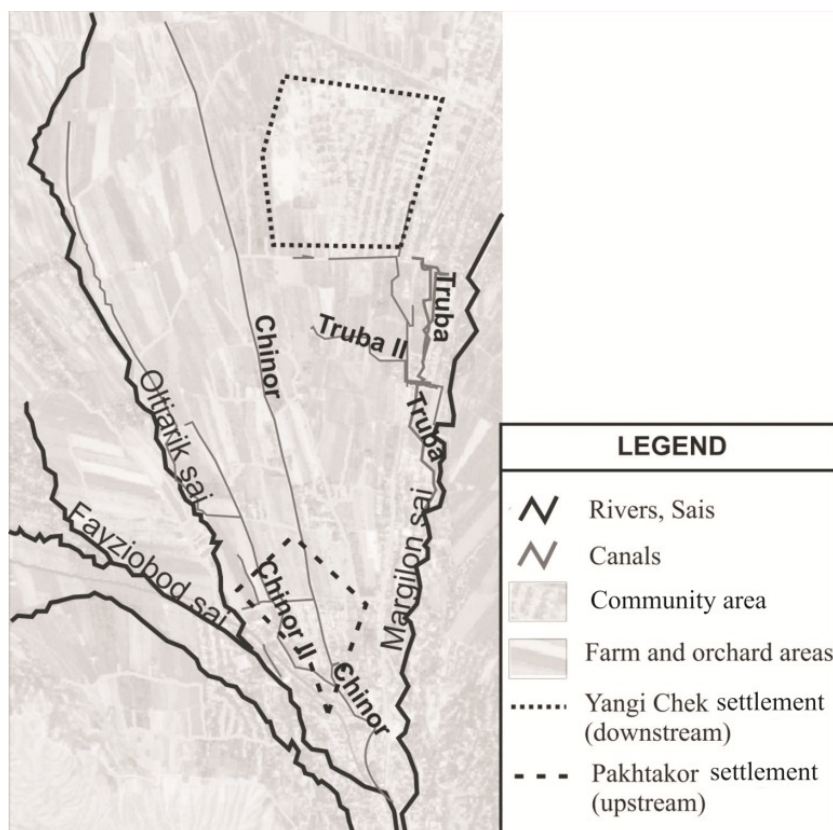


Figure 4-6. Akhror Mirob Muminjon WUA with two settlements

Source: Prepared by the first author based on the local maps and field observations.

Yangi Chek settlement in Vodil village was established in 1977 and consists of about 1,000 households during the fieldwork period. Within the settlement, there are ten ditches leading to kitchen gardens (Figure 4-5.). Two canals that take water from the same source provide water first to farmers and after that to these ten ditches. One canal is earthen, providing water to three ditches, and the other is a pre-cast concrete canalette²¹, providing water to seven ditches. Seven of the ten off-takes to the ditches were equipped with metal gates in 2010. All ten ditches behind the off-take are earthen. The ten ditches have eight water masters, and one each for the off-takes equipped with metal gates and one for the three ditches which did not have metal off-takes and which received water from the earthen canal. Community (*mahalla*) *mirabs*²² take water from the main hydropoint that divides water to farm lands and households. Community *mirabs* are elected during the annual spring celebration of *Darashona*.²³

²¹ A pre-cast concrete canalette is a concrete ditch.

²² Mahalla mirabs are community water masters. The boundaries of mahallas could vary from location to location. In the study area, within the same settlement, the term mahalla made in one case reference to a group of streets and in another case to one street only. Similarly, mahalla mirabs were responsible for either a group of streets/ditches or for one individual street/ditch. For consistency reasons the term mahalla mirab is used.

²³ Darashona is an annual celebration of the arrival of spring. According to various opinions, men and women participate in Darashona. Men usually discuss all the work that has to be done before the vegetation season starts and have the opportunity to voice their opinion during the elections of mahalla staff members. Women contribute

Even though it is clearly spelled out in Uzbek law that drinking water needs have priority over agricultural water needs, during the cotton season (May-November) officially water is allocated first to cotton farmers (WDM1, WMM1, MMM1, HHF4, HHF3; Appendix 2). Given the cotton priority policy as well as the financial incentives for the WUA water masters to supply cotton/wheat farmers and gardeners first, it is understandable that the water supplied to the communities or community ditches at the head or at the tail are not sufficient. In Pakhtakor settlement at the head-end of the secondary canal, one of two metal gated off-takes, diverting water to the community ditch, was broken by the village residents. Although the WUA director ordered the community elders to pay a fine and to repair the off-take, the village residents did not comply. At the time of the research, the off-take had already been broken for one year (WMM1, HHM18, HHM19; Appendix 2). In the two head-end off-takes, ditch water masters are not employed (WMM1, WMM3, HHM13, HHM18; Appendix 2). The WUA water master responsible for providing water to farmers explains the situation as follows: “There are no water masters here, only in Yangi Chek. You cannot make people pay here” (WMM1). The WUA water master’s statement also implies that the Pakhtakor residents do not pay the 500 UZS per 0.01 ha per season.

In the case of Yangi Chek settlement, the recently (in 2010) installed water control infrastructure (a pre-cast concrete canalette through the farmers’ fields as well as the construction of off-takes) has increased the amount of water supplied to the settlement as well as eased allocation between the community ditches. Although the technology to bring water has improved, this still does not mean that water is sufficient for the six ditches in Yangi Chek settlement that receive water from the canalette. Nevertheless, compared with the three ditches that receive water through the earthen canal running to the farmers’ fields, the situation is better. However, water rotation has still to be applied between the seven ditches (HHF4, HHF6, HHF7 WMM2, WDM1; Appendix 2). Each off-take is supposed to receive water for one to two hours depending on the size of the garden, which usually varies from 0.06 to 0.16 ha. *Mahalla mirabs* do not take responsibility for water delivery to the kitchen gardens, it is the users which are guarding their water supply. If the *mahalla mirabs* closes the off-take, this does not mean that they are not re-opened without authorization. “Then the water masters go and close that off-take and we go and open it again, or could be a noble person who would open it [...] when there is not enough water, we just go and open it” (HHF12, Appendix 2). The off-takes are opened, although it is clear to the persons opening them that other streets will receive less water. “Women can open the small ditch; for example I open the small ditch at the start of our *mahalla*. We are situated at the start of the street, but there are other streets that are deep inside the settlement and they are always in need of water” (HHF15).

The community ditches are still earthen. With water not plentiful and demand high, it is not astonishing that most ditches in Yangi Chek settlement have their own *mahalla mirabs*. These *mahalla mirabs* are not WUA employees, with the exception that a WUA *mirab* might take on this responsibility as well, as was the case in Yuqori Vodil Yahshi Niyat WUA (WDM2, WAF1, WMM4, WMM5, Appendix 2). It was explained that “usually *mahalla mirabs* are elected from within the street and from those who are currently jobless. Before, the *mahalla mirabs* were leaders or elders within the communities; today, these are mainly young people” (HHF8, Appendix 2). Although women are active in using and taking the water for their kitchen gardens, they do not participate in the election process. “It’s a men’s gathering and they elect. I don’t much like going. I have my husband go to those

by preparing food for this event and in some cases vote to appoint a woman to handle women’s issues and support in various community events. Mahalla staff usually include: mahalla aksakal (elder) and his assistants: postbon (watchman), mahalla mirab, and mahalla-dasturhonchi (a woman responsible for women’s issues and various events). During the celebration, hashar (community joint work, which also includes the cleaning and repair of canal infrastructure) needs and timing are discussed and decided upon. The celebration is also used by WUA staff to spread information about the rules, fees, and warnings connected with irrigation and maintenance of irrigation facilities.

meetings” (HHF11, Appendix 2). It was reported that households pay 1 kg of meat per 0.01 ha per season (about UZS 17,000) to the ditch water master (WDM1, WDM2, FF1, MMM1, HHF6,7, WMM2, Appendix 2); this amount in addition to the UZS 500 that every household is supposed to pay to the WUA. However, within the ditch in water-scarce tail-end areas within the village settlement, households pay 1,000 to 2,000 UZS a week to the ditch water master.

To divert water into the kitchen gardens, households use “stones, plastic bags, hay, which allow also neighbors to manipulate these off-takes and to use the water without any control even with ditch water masters present” (HHF4, HHF12, HHF15, HHM14, WMM2, WMM3, Appendix 2). “In cases of *mahalla mirabs* handling water allocation between households where there are no proper technologies, they cannot guarantee the provision of water to everybody because of the lack of control, there are cases of households at the head and middle ends stealing water and heavy seepage” (FF1, MMM1, WMM2, HHF6, HHF7, HHF4, HHF5, Appendix 2). “The neighbors that are situated before the others, they just take the water saying that their garden did not drink enough, then the neighbors get into an argument” (HHF6, HHF7, Appendix 2). It appears that often it is the women of the household who steal water rather than the men. Being aware that taking water without authorization can lead to conflict between men, households may send women to reduce the conflict potential. “I don’t let my sons [25–28 years old] go out for water as it’s dangerous and there are cases that neighbors start fighting over water” (HHF16, Appendix 2). “Usually my dad goes and asks for water, and my mother usually just goes and opens whenever she needs it. My dad never does it without permission. If my mother asks my dad about it he will forbid stealing water. So my mother does it together with her elder daughter-in-law in the way that my dad doesn’t know. Negotiations are usually done by men. Women are more into stealing” (HHF4, Appendix 2). Even though, this quote would suggest that young and elder women would steal jointly, it appears that mainly young women (25-35 years old) are taking the water. A young woman from the tail-end of one street stated “Very often I go and open the water in the beginning of the street even if it’s not our turn as otherwise our kitchen garden does not get enough water” (HHF20, Appendix 2). A male elder within the community confirmed that stealing was mainly done by young women “The main conflicts arise when the *kelin* (young bride/daughter-in-law of the household) goes out and opens the water when she is not supposed to. Either the male neighbor complains and then might get into trouble with the husband or with other men from the *kelin*’s household, or he holds his peace and does not say anything, letting the *kelin* take the water” (HHM10; Appendix 2). Elder women take a different role. Elder women take charge of enforcing the contracts with the *mahalla mirabs*, the WUA *mirab*, or even at higher administrative levels. An elder woman stated “We go out to talk with the *mahalla mirabs*. If he does not solve the problem, we don’t give him his money” (HHF7; Appendix 2). “We address the *mahalla mirabs* or the village elder. Once, the women from my street gathered together and also convinced me to go to the village mayor, and if not to the district governor, to complain about the water issue. The next day the water was distributed. There was also a case that the [women of the] street behind us went with complaints to the district governor” (HHF7, HHF4; Appendix 2). The WUA *mirab* confirmed: “Women sometimes come out and complain to me that there is no water. I tell them that if I have water from my boss I can distribute. From where can I provide additional water? Once they addressed the WUA director. Within one hour the director called me and begged me to take these women out of his office. There were five women, and they even wanted to go up to the district governor. Finally, they got what they wanted, and I provided additional water.” When it comes to guarding water, particularly at the tail-end, young and elder women join hands. “We go out with all our women of the family and then we guard the water. We usually gather with several neighbors and go at night to open all the outlets and bring the water to our households” (HHF9; Appendix 2). It appears that tail-end households seem to realize that because of their position along the ditch/street individual activities would fail to succeed. Hence, women from different generations of different households join to guard water supply to their kitchen gardens.

4.6 Conclusion

Overall, the data show that individual households are not represented, and *mahallas* are underrepresented in WUAs. This neglect may be built into the Soviet priorities and current rationales of projects within Uzbekistan. Most agricultural water projects focus on water efficiency and the productivity of farmers and/or on integrating farmers within WUAs. Hence, small users, kitchen gardens, are ignored and therefore also the focus on reallocation of water or priority setting for the overall rural livelihoods.

As highlighted by the situation in Ferghana Province, the rural population is increasing rapidly. This has led to an expansion of the irrigated area under kitchen gardens from about 5% in 1980 to 17% in 2010. Although within Soviet agricultural production kitchen gardens had already some significance, after independence and with less rural employment as a result of the dismantling of collective farms and a steady increase in male seasonal outmigration, kitchen gardens are significant not only for agricultural production but also for securing the livelihoods of rural households.

Probably because of the combination of the priority given to cotton and wheat farmers, the economic hardship in rural communities leading to an outmigration of male season laborers, but possibly also because of the culturally protected role of women in Uzbek society, women have become more active in irrigation and water management within the village boundaries. It appeared that the new roles of women are often defined according to age groups, while young women (*kelins*) irrigate, elder women negotiate with men, including *mahalla mirabs*, WUA *mirabs* and director or other local authorities. Increased involvement of female small water users challenged traditional irrigation-specific gender roles as well as village norms. So far, these new roles for women have not been institutionalized within the village setting (*mahalla* staff) or within the organizations that have been set up (WUAs). Therefore, women irrigators are still operating outside the new institutional setting and the traditional setting. Being outside these settings excludes them, but non-involvement can also be an advantage and enable them to manipulate the settings.

5 Conclusions

The transition process in Central Asia is a complex process, which probably will continue evolving through various stages and years until the coordination and matching of institutions, actors' interests, and institutional environments will take place. The analysis of agrarian transition in three Central Asian countries showed that design, formalization of institutions and their implementation through policy reforming tools are not enough to guarantee a change. Behaviors, strategies and responses of actors in the reform process can become critical in setting shapes and patterns of institutional change.

The three topics covered in the thesis indicate the need of a holistic view on rural societies and accounting for factors which can potentially impact the course of implementation or modification of initiated reforms. In all cases presented in the thesis we observe the persistence of path dependent agrarian structures, which are driven by history or political interests. Even though formal institutions are fully or partially changed, their impact may be insignificant and outcomes unpredictable and unintended.

Structural reforms in the agricultural sector of Central Asian countries and a gender-based assignment of activities influenced the formation of social roles and decision-making power of rural men and women. It would have been difficult to imagine in the beginning of the transition and agrarian reforms that informal institutions such as existing local systems of power, male-dominated relationships, and social structure based on patriarchal values in Tajikistan would be challenged and changed. We observe that as a result of economic and social transition triggers, as well as structural changes, the traditional gender roles began to erode. Furthermore, acquired employment positions followed a pattern of informal arrangements by choices of farmers (e.g. for taxation reasons) and decisions of female workers (such as: time flexibility and earning options). Although women in Tajikistan moved away from conventional female positions and became included into the agrarian value chains, they have also acquired heavier responsibilities and became restricted in their formal rights to land. Moreover, the feminization process is accompanied by low wages and an informal job status, which excludes women from access to public social security benefits and keeps them subject to low protection, security, and earnings. However, increased participation in the labor force opened a gateway to a wider spectrum of labor opportunities and advanced women's roles in primary agricultural production as well as in the service supply sector, and is providing them a certain amount of control over their own lives.

Similar unexpected and unintended responses appear from the establishment of Water Users' Associations. The reasons stem from three different directions. The first reason encompasses government controls and regulations of the agricultural sector and its actors that make the changes to water governance and reforms partial. Second, the design and institutional rules of Water User Associations have been artificial and established in a top down manner. This led to uncertainties, disinformation, lack of responsibility and, most importantly, to the exclusion of the majority of water users. The third element, which has hindered and at the same time has responded with utilizing alternative informal institutions, is the actors themselves: households, farmers, WUA staff. The partiality of reforms and path-dependent institutions have led to negative outcomes not in favor of actors. The political agenda of reducing the costs of the irrigation systems by handing them over to farmers (WUAs) was in many cases only a dimensional change (organizational) on the local level and often was not accompanied with change in other dimensions. In order to adapt and regain access to water resources, actors started creating their own or utilizing old informal institutions suitable for them. Institutions are, therefore, subject to constant manipulation by social actors who do not follow all norms and rules blindly but, according to the specific situation and circumstances, weigh them against each other (Lewellen 2003).

After almost three decades, Central Asian countries began to realize the essentiality of crop diversification for future internal market and exports. This is certainly a positive trend and can boost agricultural profits, only if environmental and the relevant market freedoms and mechanisms are tackled through formal institutions. Partiality and reversibility of reforms can affect formal institutions to become semi-formal. Such mode pushes actors to form protective strategies which can be structured in the framework of formal institutions, however possess informal, hidden or illegal patterns. Informal diversification through second cropping and subjective answers of farmers on salinity in Samarkand can be considered as responses to semi-formal institutions. In conditions of uncertainty, farmers may try to create security nets through social capital and if needed are eager to protect or improve their farm production status through informal institutions or simply by exaggerating or hiding information. Though constrained by a soil salinity trap, relatively liberal economic conditions and decision making freedoms induced farmers in Kazakhstan to diversify their production into more salt tolerant crops. Nevertheless, farmers are still limited in their further development by environmental conditions and their doubts on further changes to land reform. Soviet legacy issues are still not institutionalized and a constant clash between old (collective use of infrastructure and water) and new (private and commercial farms) institutions and structures is not over. One of the responses of farmers to the partiality of agricultural reforms and semi-formality of land ownership in both countries studied is the lack or absence of private investments into land and infrastructural improvements. Informal arrangements, thanks to which diversification was happening in Uzbekistan, cannot be captured statistically, but should be acknowledged and considered to understand how and why they exist.

A tempting question to ask is whether a combination of modern and traditional or Soviet components has created new institutions which last. Most probably, not yet, since reforms are still partial, ongoing and incremental changes trigger further transformations and diverse responses.

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Appendix 1: Timeline of land reforms with changes in structures and members (Chapter 2)

Period	References to legislation	Institutional characteristics	Characteristics of reform implementation in the study area	Employment and gender related changes
1930–1987	Soviet law and legislation specific to Tajik SSR	Establishment of <i>kolkhoz/sovkhov</i> collective farms	State owned collective farms, subsidized by the state, with a state monopoly on cotton crop	Establishment of positions: <i>rais</i> (leader), <i>brigadirs</i> (foremen), members/workers Men and women are members and workers of collective farms, entitled to salaries based on the common Soviet labor code Members become individual or group tenants (<i>hektarchi</i>)
1987–1990	Law “On Leasing in Tajikistan”	<i>Kolkhoz/sovkhov</i> farms allowed to function as lease enterprises (<i>podryad/pudrat</i>)	<i>Kolkhoz/sovkhov</i> restructuring. Each member responsible for 2–3 ha of land to increase productivity and motivation	
1991 Independence of Republic of Tajikistan				
1991–1993	Law No. 544 of the Republic of Tajikistan “On Dekhkan Farms” Law No. 604 of the Republic of Tajikistan “On the Land Reform”	Division of <i>kolkhoz/sovkhov</i> into dekhkan farms (DFs), lease share enterprises, agricultural cooperatives Every member entitled to a land share (<i>sahim</i>)	Restructuring formalized but not implemented Members entitled to land shares, but do not always receive them (often because of <i>kolkhoz/sovkhov</i> debts)	<i>Rais, brigadirs</i> , members/ workers positions maintained and individual dekhkan farmers appeared Establishment of Women's and Family Issues Committee Tajikistan becomes a member of the Convention on the Elimination of All Forms of Discrimination against Women CEDAW
1992–1997 Civil War				
1995	Presidential Decree No. 342, “On the Assignment of 50 Thousand Hectares of Lands for Personal Husbandry of the Citizens” Decree No. 621 “On the Structural Reorganization of <i>Kolkhoz/Sovkhov</i> Farms and Other Agricultural Enterprises”	50,000 ha. allocated to household plots (presidential lands) Land continues to be allocated to DFs in 1997 Unprofitable farms reorganized into lease share enterprises Profitable farms reorganized into collective farms	Presidential lands allow only crops to be planted and are allocated from poorly irrigated lands Land share size and locations not defined Management of reorganized farms follows old state order style	Establishment of collective enterprises, new dekhkan farms, presidential land owners, <i>sahimdors</i> , and <i>hektarchi</i>
1996	Presidential Decree No. 522 “On the Reorganization of the Agricultural Enterprises and Organizations”	Reorganization into collective/ corporate farms Distribution of land certificates to all ex- <i>kolkhoz</i> members	Ad-hoc issuance of land use certificates and uneven implementation caused by unclear rules, water availability, enforcement of rights by members, collective farm leaders unwilling to comply and dependence on government authorities <i>Sahim</i> (share) owner, however, is not entitled to make cropping or production decisions Intra-farm and government intervention in farm planning dominates farm planning	No significant change
1998–2000	Presidential Decree No. 1021 of the President of the RT “About Ensuring the Right to Land Plots” Resolution No. 244 on “Measures for Implementation of the Decree “On Realization of the Right to Land Use”	Farms scheduled for restructuring determined and land use certificates issued within collective enterprises, dekhkan farms, joint ventures, cooperatives, joint-stock companies, associations	Reforms trigger the need for additional workers in areas of marketable vegetables and crops such as rice, onions, and potatoes	In 1998 the Government of the Republic of Tajikistan approves a national action plan for increasing the status and role of women 1998–2005 In 2000 the country ratified the CEDAW Protocol
2002–on-going	Law “On Dekhkan Farms” (replacing the 1992 law)	Establishment of individual farms, family farms, associations and dekhkan farms (partnerships) <i>mardikors</i> , land use owners and tenants, farm <i>mirobs</i> .		Implementation of the state policy for Ensuring Equal Rights and Opportunities of Men and Women in Tajikistan for 2001–2010 Law On Reproductive Health and Reproductive Rights (December 2002)

Appendix 2 Details of interviewee codes referenced in the thesis.

Code	Interviewee	Location	Date of interview
Farmer 01	Farmer	Yntymak Village, Maktaaral district, South Kazakhstan.	18.11.2016
Farmer 02	Farmer	Qizilabad village, Maktaaral district, South Kazakhstan.	17.11.2016
Farmer 03	Farmer	Eraliev Village, Maktaaral district, South Kazakhstan.	18.11.2016
Farmer 04	Farmer	Dostyk Village, Maktaaral district, South Kazakhstan.	11.11.2016
Farmer 05	Farmer	Paiarik district, Samarkand province, Uzbekistan.	24.11.2018
Farmer 06	Farmer	Jomboi district, Samarkand province, Uzbekistan.	22.11.2018
Farmer 07	Farmer	Paiarik district, Samarkand province, Uzbekistan.	24.11.2018
HHF1	Household member female	Leshoz	17.09.2011
HHF2	Household member female	Kaptarkhona	17.09.2011
HHF3	Household member female	Near the hydropoint and gardens	14.09.2011
HHF4	Household member female	Okhunboboev mahalla/ Yangi Chek	14.09.2011
HHF5	Household member female	Tail end of the Okhunbabaev /Tinchlik mahalla, Yangi Chek	18.09.2011
HHF6	Household member female	Beruni Mahalla/Yangi Chek	18.09.2011
HHF7	Household member female	Beruni Mahalla/Yangi Chek	18.09.2011
HHF8	Household member female	Mahalla parallel to Yoshlarobod Mahalla/Yangi Chek	18.09.2011
HHF9	Household member female	Okhunbabaev, Mahalla/Yangi Chek	18.09.2011
HHM10	Household member male	Along the road near the entry of the Truba2 canal	14.09.2011
HHF11	Household member female	Beruni Mahalla/Yangi Chek	18.09.2011
HHF12	Household member female	Near Chinor arik Pakhtakor village	23.09.2011
HHM13	Household member female	Chinor canal, lives in a household close to the hydropoint in the division	23.09.2011
HHM14	Household member male	Chinor canal, the household is elevated from the canal	23.09.2011
HHF15	Household member female	Along Chinor canal	23.09.2011
HHF16	Household member female	Okhunboboev mahalla/Yangi Chek	14.09.2011
HHM17	Household member male	Upper mahalla of Qora Yantoq	16.09.2011
HHM18	Household member male	Kaptarhona	17.09.2011
HHM19	Household member male	Kaptarhona	17.09.2011
HHF20	Household member female	Mahalla parallel to Yoshlarobod/Yangi Chek	18.09.2011
WDM1	WUA director	Akhror Mirob Muminjon WUA	13.09.2011
WDM2	WUA director	Yuqori Vodil Yahshi Niyat WUA	16.09.2011
WAF1	Accountant	Yuqori Vodil Yahshi Niyat WUA	15.09.2011
WMM1	WUA mirab	Chinor canal 1	24.09.2011
WMM2	WUA mirab	Truba canal	14.09.2011
WMM3	WUA mirab	Chinor canal 2	23.09.2011
WMM4	WUA mirab	Kaptarhona canal	19.09.2011
WMM5	WUA mirab	Korayantok canal	16.09.2011
MMM1	Mahalla mirab	Yangi Chek village	16.09.2011
FF1	Farmer female	Fayzabod and Chinor canals	14.09.2011

Statement of contributions

The main parts of the thesis are the product of collaboration among the author and other researchers. The contributions of co-authors particularly to framing questions, developing methods, conducting analysis, discussion of results and writing the articles are detailed below.

Chapter 2 Substantial suggestions and reviews to the content of the chapter paper were provided by the author's supervisor Martin Petrick and co-author Kai Wegerich. The author developed the framework, contributed with her field work data collection, analysis as well as discussions and conclusions of the paper.

Chapter 3: This study is based on data collected by the authors in the "AGRICCHANGE - Institutional change in land and labour relations of Central Asia's irrigated agriculture" research project funded by the Volkswagen Stiftung within the funding initiative "Between Europe and the Orient – A Focus on Research and Higher Education in/on Central Asia and the Caucasus". The author's supervisor Martin Petrick proposed the initial idea of the paper and contributed to developing the framework, to analyzing survey data as well as to discussion and conclusion sections. The author incorporated her qualitative study insights and wrote the introduction, background and main parts of the case study sections, discussions and conclusions. The board and other members of AGRICHANGE provided useful comments and reviews of the paper.

Chapter 4: The author developed the initial and final versions of the framework, gathered and analyzed the data, contributed to discussions and the conclusions of the paper. Kai Wegerich contributed by providing ideas on the framework and provided substantial revisions to the discussion and conclusions of the paper.

SELBSTSTÄNDIGKEITSERKLÄRUNG

Hiermit erkläre ich, dass ich die vorliegende Arbeit " Responses to Agrarian Transition in Central Asia,, selbstständig angefertigt und keine anderen als die angegebenen Hilfsmittel benutzt habe.

Halle , 25.03.19
Ort, datum



Unterschrift der Antragstellerin

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“Coping with Globalized Finance: Recent Challenges and Long-term Perspectives” (2007), UNCTAD/GDS/2007/2, United Nations Publications – contributed with research assistance.

Mukhamedova N., (2005): The role of the third sector in solving social problems in Uzbekistan, 18th International Plekhanov Readings Book, p-18.

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