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# **Sustainability of Irrigation in Uzbekistan: Implications for Women Farmers**

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Additional information is available at the end of the chapter

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## **Abstract**

This chapter focuses on a discussion of how global efforts to align local irrigation management with the good governance principles affect the lives of the rural poor, specifically women. Drawing in empirical data collected in post-soviet Uzbekistan, I illuminate unexpected effects of an apparently well-intended irrigation project on those categories of farmers whose connections to state apparatus of agricultural commerce of cotton were weak. Using fieldwork data from a village largely affected by desiccation of Aral Sea, I describe the everyday struggles by these people, who are mostly women, engage to make their living and provide subsistence to their families in situation of economic trauma, environmental disaster, and massive outmigration of male population. This analysis puts forward the local voices of real people whose lives are being restructured by sustainability oriented actions. Such perspective is often missed in scholarly and professional literature. These findings are hoped to assist policy developers in formulating irrigation programs in ways that would embrace sustainability both in terms of environmental and social justice.

**Keywords:** irrigation, gender, women farmers, sustainability, Aral Sea

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## **1. Introduction**

This chapter focuses on a discussion of how global efforts to align national irrigation management with the good governance principles affect the lives of the rural poor, specifically women. Drawing in empirical data collected in post-soviet Uzbekistan, I illuminate unexpected effects of an apparently well-intended project aimed at establishing sustainable water practices on those categories of farmers whose connections to state apparatus of agricultural commerce of cotton were weak. Using fieldwork data from a village largely affected by desiccation of

Aral Sea, I describe the everyday struggles these people, who are mostly women, engage to make their living and provide subsistence to their families in situation of economic trauma, environmental disaster, and massive out-migration of male population. This analysis puts forward the local voices of real people whose lives are being restructured by sustainability oriented actions. Such perspective is often missed in scholarly and professional literature. These findings are hoped to assist policy developers in formulating irrigation programs in ways that would embrace sustainability both in terms of environmental and social justice.

## 2. Water politics in Uzbekistan

Contemporary Uzbekistan, or formally, Republic of Uzbekistan, is one of the independent post-Soviet Central Asian States. It was created in early 1930s, when the decision of Moscow defined its geographic boundaries, as well as those of other several republics, on the territory which was then called the Soviet Turkestan [1]. The political objective of that time was to boost Soviet Union's economic performance within which the Soviet Uzbek Republic acquired a specialization in the political economic system of the Soviet Union—it supplied cotton for Russian textile mills [1]. Cotton production mediated important links between Moscow, local elites, and regional elites which altogether ensured that the cotton production plan was fulfilled [2] in exchange for additional financial transfers from Moscow [2].

Uzbekistan's cotton agriculture was based on the irrigation where the main canal feeding the farms had been constructed in Fergana Valley three centuries earlier and supplemented with 1960s irrigation infrastructure built to draw vast amounts of irrigation water from the region's two major rivers, Amu Darya and Syr Darya [3]. The Soviet planners insistent on maximum cotton output and the country engaged in an intensive monoculture to foster cotton production through expansion of irrigated areas. Between 1960 and 1990, the irrigated areas in the country increased by 2 million hectares (about 60% of all irrigated land in Central Asia) [2]. The Soviet administration enforced a specific organization of agricultural work through massive collectivization to consolidate individual landholding and labor into collective farms called "kolkhoz" (collectively owned) and "sovkhoz" (state owned) forms of agricultural production cooperatives [4]. In a kolkhoz, the workers received a share of the farm's product and profit according to the number of days worked. In a sovkhoz, the workers received a fixed salary. The Soviet state administration developed and imposed work programs for these collective farms and nominated their preferred managers (brigadirs). By 1990, Uzbekistan had about 940 kolkhoz and more than a 1000 of sovkhoz [5]. In mid-1990, the Soviet Uzbek Republic adopted a Law on Land, which allowed individual to hold land for private plots and individual farms on long-term lease [5]. The law permitted tenure to be inherited but did not permit agricultural land to be privately owned.

In 1991, the USSR collapsed and Uzbekistan gained sovereignty. The Government of independent Uzbekistan initiated a policy of transition from the Soviet centrally planned economy to a market economy [6]. Farm restructuring was one of the major components of the transition agenda with land management and water reforms that ensued. Policy shifts took place in the context where the trading links with other republics which were previously orchestrated

by Moscow were now disrupted and resulted in shortfall of grain. Dissolution of collective farms led to massive unemployment and livelihood insecurity among the population, especially in the rural areas [2]. The Uzbek government responded to the shortages by expanding the acreage of land devoted to wheat production and increased the size of private plots that population became entitled to [2]. The agrarian reform oscillated between increasing access to private land, structural reform agenda imposed by international donors, and measures to tighten and restrict private access to land in an effort to control the production of cotton [2].

Agrarian reforms transformed collective farms to collective enterprises, then, again, restructured them as joint-stock companies and, lastly, established private enterprises such as independent farms [7]. The private farms were made distinct from peasant farms in that they had a legal status, had a leasehold of up to 50 years, had a minimum of 10 hectares for cotton and wheat, and their land use was restricted to specific agricultural activities as specified in the lease contracts [2]. The peasant farms had optional legal status, had a life-long inheritable tenure, could only use family members and relatives as labor, had a maximum size up to 1 ha, and might use their land for any agricultural activities. The private farms were the subject to a mandatory system of production quotas and state orders on production of cotton and wheat [6]. Prices were fixed by the government-controlled agencies and well below the market prices. The state used a system of contracting private farmers, whereby they became bound to continue to plant a certain acreage of cotton [2]. Should they fail to supply the expected amount, the producers were subject to punitive measures such as revoking their leases. In return, producers were supplied with rationing of inputs such as land, water, equipment, etc. As Kandiyoti [2] argued, this was an attempt of the government to pass on the production risks to the independent farmers, while maintaining the state control over the procurement of strategic crops such as cotton and wheat. The small holders endured no state demands aside from land tax.

As in Kandiyoti [2], Uzbekistan's agrarian reform systematically disadvantaged women. For example, when the members of collective farms were redefined as shareholders, women received much smaller shares than men because those were distributed on the basis of the length of service and final salaries. Women, most of them were unskilled workers with shorter working years and frequent maternity leaves fared considerable less than men. The notion that farms were to be managed by men was becoming a fact.

The importance of land for sustaining rural livelihoods also underwent changes. In contrast to the Soviet period, where individual holding did not play a significant role, in sovereign Uzbekistan, subsistence and informal income from individual crop cultivation became central to families surviving strategies [8]. When waged employment became permanently deficit, state benefits became irregular and curtailed, reliance on households and subsidiary plots for self-subsistence increased substantially, and rural households turned to self-provisioning and sale or barter of produce [2].

In contemporary Uzbekistan, agriculture accounts to 30% of GDP, 60% of foreign exchange receipts, and about 40% of employment [9]. Private farms carry on producing cotton for the state international commerce and make Uzbekistan now the world's fourth largest producer of cotton [10]. This happens despite the fact that the Uzbekistan currently suffers a serious water shortage [10]. The country continues to use the same irrigation sources and infrastructure, mainly from Syr Darya and Amu Darya rivers, which feed the landlocked Aral Sea which

used to be one of the world's largest saline lakes. But when the Soviet government decided to divert these rivers to irrigate the desert areas surrounding the Sea to supply irrigation to agriculture, the inflow was reduced from more than 50 cubic kilometers of water in 1960, to 42.5 in 1973, 8.3 by 1980, and 0 by 1982 [5].

The Aral Sea started to desiccate, and in later 1990s, its water level was only one-fifth of what it used to be four decades earlier [3]. By 2007, the Aral Sea had shrunk to 10% of its original size [3, 11]. Today, it is recognized as one of the largest environmental disasters, an environmental, social, and economic tragedy which poses environmental, social, economic, humanitarian, public health, and other risks [11]. Today, people living around the Aral Sea (about 60 million people) are some of the poorest in Central Asia and suffer declining fresh water supply, pollution, violent sand storm, and public health risks [11].

Beginning in early 1990, global communities drew their attention to the Aral Sea problem and its insinuating links with regional and global security issues. At the 48th and 50th session of the UN General Assembly on September 28, 1993 and on October 1995, Central Asian Delegation appealed to the global community to help save the Aral Sea. In 2010, the UN Secretary General, Ban Ki-Moon called the Aral Sea crisis "clearly one of the worst environmental disasters in the world" [12]. He urged the central Asian leaders to cooperate and seek for solutions and promised that "all specialized agencies of the United Nations will provide necessary assistance and expertise" [12]. A number of UN programs were initiated to improve economic, food, health, and environmental security among the poor rural communities of the Aral Sea-affected areas. Under the auspices of the United Nations, in September 2015, the government of Uzbekistan initiated the establishment of a Trust Fund for the Aral Sea. In 2017, the current UN Secretary General, Antonio Guterres, visited the Aral Sea basin and made a public statement about it expressing his concerns and calling for remedial action [13].

Since 1991, many water-related programs and projects were implemented by the international donor communities and made significant contributions to the agricultural sector in Uzbekistan through infrastructure rehabilitation, installation of water monitoring systems, etc. Funding agencies included Asian Development Bank, Global Environmental Facility, Swiss Agency for Development and Cooperation, the World Bank, Food and Agriculture Organization, United Nations Development Programme, USAID, the German Agency for International Cooperation, European Union, Japan International Cooperation Agency, etc. One of the biggest projects was the Asian Development Bank's Amu Bukhara Irrigation System Rehabilitation project with funding of US\$ 320 million. All of these projects introduced important changes in the management of irrigation and fresh water, built local capacity, and produced large research-based knowledge; however, a short survey of these project demonstrates while the project self-describe themselves as successful, and they also demonstrate lack of attention to water-scarce regions of Uzbekistan and intra-project coordination and cooperation.

### 3. Sustainability project

Instigated by the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and its resultant international conventions on climate change (UNFCCC),



biodiversity (UNCBD) and desertification (UNCCD), some of the European countries started expressing interests in joining cooperation to address the Aral Sea crisis. In this chapter, the focus is on the German Government's response to the challenges posed by these three conventions and their importance for its national research and development strategy. In mid-1990s, The German Development Cooperation, a large government-sponsored worldwide organization for international cooperation, announced among its priorities combating desertification of Central Asian region through efficient water and land use in the Aral Sea region (in its report to the UN Secretariat for the UNCCD) [14]. Since 1992, German the Federal Ministry for Education and Research (BMBF), the German largest governmental funding agency that takes an overarching responsibility for science and research-related policies [15], BMBF cooperated with UNESCO providing funding for projects with the aim to assess and respond to damage to the Aral Sea's ecosystems. The first such project took place in 1993–1999 with a budget of US\$ 1.2 million and supported the network of 140 scientists from Central Asia and Russia who worked on 20 various subprojects.

In 2001, BMBF proposed the second project called "Economic and Ecological Restructuring of land and Water Use in the Region Khorezm, Uzbekistan", worth US\$10 million which lasted from 2001 to 2010. The Center for Development Research at Bonn University in Germany developed and implemented it in close cooperation with UNESCO and Urgench State University in Uzbekistan. The project (henceforth, BMBF-UNESCO project) aimed at addressing environmental, social, and economic problems in Khorezm, one of the three provinces in the Aral Sea zone "in the context of the Aral Sea crisis to provide sound, science-based policy recommendations for sustainably improving the natural resource use" ([14] p. 6). Part of the project focused on rational water and land use via a shift toward sustainable land and water resource management. It was expected that sustainable resource use would lead to more efficient agriculture and improve rural livelihoods. This project is the focus of this chapter where I show complexity of operationalizing the concept of sustainability in specific projects and programs.

The BMBF-UNESCO project was subdivided into phases. The first two phases were implemented in 2001–2006 with an overall goal to develop region-specific innovative technologies in land and water use via scientific modeling. During phases I and II, project scientists compiled databases and completed baseline investigations of groundwater and soil salinity, estimated water budgets for regional irrigations, assessed soil conservation agriculture, etc. On the basis of this knowledge, a number of the so-called "plausible solutions" were selected to be applied in real-life settings during phase 3. Phase 3 explicitly provided space for social issues within technical options for sustainable land and water use management. Phase 3 planners committed to notions of sustainability on the basis of participation, bottom-up approaches, and improved rural livelihoods. In one of the project components, it was envisioned that sustainable water use could be achieved by introducing community-based water management through an improved operation of the existing WUA. This was one of the promising solutions, an innovation to be followed. The idea was that target groups participated in testing the innovations together and used them independently once the proposed solutions proved suitable and sustainable. The work on WUA started in 2008 under the name "Social mobilization and institutional development (SMID)", whereby the project was to improve the local WUA which had been assessed as "weak." This work was expected to improve "the livelihoods of rural inhabitants and enhance productivity of the irrigated agriculture

through better water management” ([20] p. 5). The SMID approach relied on two major directions which were seen as appropriate for attaining the envisioned goal. One component of the work called Social Mobilization aimed at making the WUA known and understood by the villagers in order to generate “ownership, social, monetary and labor support from the water users to the WUA” ([21] p. 1) to its WUA and an overall wider “inclusion of the large share of water users and their concerns into the decision making processes of the WUA” ([20] p. 1). The second direction was called Institutional Development which stressed the importance of WUA’s organizational growth as an entity with managerial and governance mandates. Within this component of SMID, the WUA was expected to improve its capacities to manage water distribution, its financial operations, and resolve water-related conflicts. For the purposes of both, social mobilization and institutional strengthening of the WUA, the SMID approach prescribed a selection of so-called “social mobilizers,” that is, a widely accepted term for teams which conduct social mobilization [20]. The social mobilizers were responsible not only for the dissemination of the information about the role and usefulness of the WUA to the various stakeholders as mentioned above, but also (and with prior training) for the formation of subclusters identified as the Water User Groups (WUG). Formally, WUG were defined as autonomous informal self-organized groups of people united by the proximity of their land to a particular irrigation source, that is, canal/ditch/pump (later called a “hydrological unit”) who manage their own irrigation system to support WUA and account to it [22]. WUG, thus, represented a lower level in a multi-tier system of WUA, where the representative of each WUG participated in the decision-making by becoming a constituent in a WUA council.

#### 4. Local irrigation system

The BMBF-UNESCO project was implemented in Khorezm province, 1 of the 12 provinces of Uzbekistan, which adjoins the environmental damaged Aral Sea and where about third of population lives below the poverty line of 1 USD per day [16]. Located 250 km south of the present shores of the Aral Sea, it covers 6800 km<sup>2</sup> of dry arid desert of which 270,000 hectares are used for irrigated agriculture [16]. The climate is arid with hot and dry summers and cold winters with precipitation of less than 100 mm per annum [16]. Irrigated agriculture is the mainstay of economy in the province accounting for about 67% of the total regional GDP [17]. Of 1.5 million of Khorezmian population, over 70% live in rural areas engaged in cotton, wheat, and rice production as private farmers or peasants [4]. Private farmers crop cotton, wheat, rice, and fodder maize [4]. Cotton occupies 50% of irrigated cropland and consumes about 40% of the total water supply of the region [4]. It contributes 16% to the GDP and earns almost all of the total export revenues of Khorezm province [4]. As explained above, the production of cotton and wheat follows the state procurement system, that is, the government enforces regulations on the acreage for each crop and production quantities to be submitted to the state at the fixed price, also determined by the state. In return, it ensures supply and delivery of water, diesel, fertilizers, and some other required inputs [4]. All this applies to private farmers only. Small holders cultivate potatoes, vegetables, fruits, as well as wheat and fodder [18]. They have garden plots around their houses typically about 0.12 ha and an additional

plot of land of 0.13 ha called “tamorka” [18]. These tamorka plots comprise about 20% of the irrigated land of Khorezm and play significant role for the livelihoods of the households [18]. Crops in Khorezm are cultivated with a peculiar rural ecology due to high soil salinity annual leeching of the fields, and extensive irrigation are fundamental necessities [18].

Based on such a system of pre-determined production of strategic crops, irrigation management entities at national, regional, and local levels determine crop water requirements and develop delivery plans for each cropping season. Khorezm is located in the tail end of Amu Darya River and relies on upstream areas for water supply. Its irrigation infrastructure consists of about 5 km of water diverted from Amu Darya River through 16,000 km of irrigation channels [18]. During droughts, the water is reduced by 40% [18]. The arriving water is partly stored in a local Tuyamuyun water reservoir, and its volume is then rationed. Irrigation is a key factor for the fulfillment of production quotas. Quantity of water to be allocated is determined on the basis of the size of the irrigated areas, types of crops, and the irrigation norms determined by the state [6]. The allocation of water supply is carried out by the Ministry of Agriculture and Water Resources and passed on to basin irrigation system authority, to sub-basin irrigation authority to the Water User Association (WUA) [19].

The technical delivery of irrigation water through maintaining and operating the irrigation and drainage network is the responsibility of the state water management organizations such as the Main Canal Management units of the sub-basin irrigation system authority. But they are known to be unable to provide these services due to inadequate, human, financial, and technical resources [17]. Similar criticism applies to on-village operation of WUAs which are formally responsible for maintenance and operation of irrigation infrastructures within their areas [17].

## 5. Methodology

The aim of the research was to explore the everyday practices of the local women smallholders as their agriculture was being transformed toward sustainable practices. Fieldwork took place in Spring and Summer, 2011 in Khorezm province in Uzbekistan when the BMBF-UNESCO project was nearing its end. Ethnographic approach was selected for this study to capture and document the nuanced and complex nature of the everyday lives of the informants as immersed in social practices, institutional structures, and a local culture. Participant observations and in-depth interviews were used with individual women smallholders and members of their families. A total of 40 local women smallholders provided information in the in-depth interview and also allowed the researcher to conduct participant observations in their homes, fields, gardens, etc. All these women had kitchen gardens and tamorka where they cultivated and all of them had their male partners away from home in labor migration.

A total of nine key informant interviews were carried out with farm managers, representatives of WUA, and upper institutions of water management. Expert interviews were also carried out in Bonn, Germany, with the implementers of the BMBF-UNESCO project. Analysis of institutional text was also used.



## 6. Women's costs of sustainability

It is in this context that I find it important to describe the everyday struggle women smallholders in Khorezm live through as they ensure the livelihoods and subsistence for their families. These women typically cultivate a backyard garden and an additional plot of land located in some distance away from home. The backyard gardens are used intensively for growing vegetables and fruits. They till the land by hand with shovel and hoe. Double cropping is widely used to ensure harvest of potatoes and onions in the beginning of the agricultural season and late cropping of beans, carrots, maize, sorghum, and millet. The tamorka plots are used twice each season for producing winter wheat followed by rice or maize in the summer. Most households also keep animals and poultry. About 50% of the stallholders also work during the agricultural season on the private farmers' land for cash or in kind payment [23]. Household food production and agriculture are essential for the food and livelihood security for most rural households despite other income generating activities that the household members can become involved in [2].

The household labor is divided according to gender and generations [24]. Women are typically responsible for keeping the house in order, gardening the household plots and kitchen gardens, weeding, milking cows, processing food, and carrying out small-scale trade [25]. Women make up a large proportion of the sub-contracted workers in the private farmers' fields. Men, if they are not abroad seeking work, are normally responsible for arranging agricultural contracts, arranging irrigation turns, and irrigating the household plots. Children from age of 10 work alongside adults in the fields; at even younger age, they herd animals and help with gardening, food processing, and house chores. Elderly people often look after very young children, and their pensions provide extra cash income.

Labor migration has become an important source of income in Uzbekistan, and like in many post-soviet countries, rural households rely heavily on remittances for their cash income. Between 2000 and 2014, the total number of labor emigrants from Uzbekistan varied between 600,000 and 700,000 persons of which about 550,000 migrated to Russia [26]. Remittances from Russia only form 16% of Uzbekistan's economy [26]. Because migration is predominantly undertaken by males, women's workload has greatly increased [2]. Most labor migrants tend to be largely absent during the agricultural season leaving this burden entirely on the shoulders of those who stay at home. Women acquired new tasks such as soil fertilization, planting, irrigating and harvesting, as well as learning to organize their time to accomplish their intensified work. Ethnographic observations of smallholder women's everyday lives demonstrate their packed schedules which begin from dawn and last till midnight with only a short break in the extreme heat of the middays. The daily work includes cleaning the outside area, tending to animals and poultry, cultivating their fields, cooking meals, producing dairies, baking bread from scratch, doing laundry, harvesting vegetables or fruits, working in the garden, milking the cows, cleaning around the house, etc. Days become so busy for these women that sometimes ethnographic observations could not include conversing with them due to her attention labor-intensive tasks, noise, voices of crying or playing children around. All these activities are performed with little or no basic household equipment, running water,

or piped gas. For example, baking bread is done outside with the use of mud stoves heated by firewood that women must prepare in advance. This extends these women's labor inputs by large margins. Food security is maintained using various means including producing sufficient supplies of canned vegetables and fruits which women regularly do in the summer. Canning is a good example of the complexity of their everyday work. Observing one of the respondents, Nargiza, does it demonstrates that it involves an entire day of concentration, damage control, and coordination. Nargiza woke up earlier that morning to make sure that she does the cleaning and milking of the cow before her canning endeavor. She brought buckets of water from the community well and used it to wash about 30 big glass jars which were then sterilized with a use of an old boiling kettle. Each jar was put on the top of it upside-down and boiled for about 5 min. Lids were sterilized, too, in a separate kettle. At the same time, she washed cucumbers, onions, and garlic and cleaned them of endings. Then she washed tomatoes, chopped some of them and whirled the pieces in an old semi-automatic washing machine, and rubbed them through a sieve. The resulting tomato juice was then boiled in of the three large pots built-in the mud stoves outside the house. In another pot, she would boil the vegetables in water. She would then bring a hot sterilized glass jar from the house and fill it with boiling vegetables. For this she would use a ladle and fish the vegetables from it with her bare fingers. The jar will then be filled with boiling tomato juice. She would then put salt and vinegar and put the lid on top of the jar for further tightening. This work took place at 45°C heat and interrupted by occasionally feeding the oven with brushwood, bringing clean water and taking away the dirty one, and attending to small children to prevent them from harm.

This illustration is useful in understanding the reality of smallholder women's everyday routine work. Not to forget that cattle breeding and cropping, shared with male partners, are now completely done by women themselves. The double burden makes the lives of these women dense, busy, and hectic, even though they do not complain but see as something that simply "must be done." Most smallholder households grow in their field food that provides almost full subsistence for their families for at least 10 months. For example, tamorka fields normally yields about 1 ton of flour which is sufficient for 12 months for a family of 8 people. Families which planted potatoes after harvesting wheat would have enough to consume it throughout a year.

However, there are risks and serious challenges to women's successful small-scale agriculture, which may undermine wellbeing of family. I learn about these challenges as I talked to women who complained that they had very little opportunities to irrigate their fields. The irrigation water in the village is rationed and arrives once in 2 weeks and women often miss it. Nargiza, for example, said that she was away from home and did not "catch" the water twice in the season. Other respondents shared experience such as Munara's who "must open her ditch upon hearing about the water arrival. The water can arrive at any moment during a day or night. If a person is not at home, the water bypasses this person's land." The problem goes beyond women's not having consistent and reliable information. Some of them complaint that "even if we know that the water is there, the water is limited and there is no guarantee that it will reach us ..." Another respondent shared that last time the irrigation water arrived to their village, they "did not manage to irrigate their kitchen garden and field because after the private farmer had used the water, nothing was left for them." Such accounts clearly demonstrate that women-smallholders experience difficulties with accessing the irrigation water and suffer

a great degree of uncertainty about not only “when” but also about “whether” they would be able to irrigate their fields. This uncertainty worries them because failure to access the irrigation endangers the success of their agriculture. These women learnt to use their specific knowledge and engage in various strategies to ensure that they do irrigate their plots. One of the respondents from a tail end part of her village shared her strategy, “If I see that ilatkom [a member of a village council] is going to the village council leader I know they will discuss water. So, I wait till he goes back and then run to him and ask about when the water can be expected.” Another respondent said, “If I see on the street a hydro-technician, I run to him and ask when the water will come.” Another interview demonstrated even more ingenuity, as she told me: “I know that the water will come soon when I hear the gritting sound coming from the farmer’s land. I know this is his pump being started. Then I know there will be water.”

These methods, simplistic as they appear, are, in fact, hard work, too. The women must physically and regularly watch for the mobility of the individuals, stay alert to “catch” them as they move around the village. These methods require that women develop and maintain good relationships with these few individuals whom they turn for information. They are then required to engage in small talk, display friendliness, deference, empathy, concerns, etc., while simultaneously suppressing their own feelings, frustrations, and anticipations. Literature classifies it as emotional labor and describes the emotional labor economy is an unfair and stressful work factors associated with negative attitudes, behaviors, and poor health [27]. Women smallholders must maintain their everyday agriculture in the conditions of high uncertainty. When the water for irrigation will arrive, for how long and how much are the questions that are often left with no clear and systematic responses. Living with such level of uncertainty is also a hard psychological work which involves anxiety, worry, out of control, hopelessness, and helplessness. These women must learn to live part of their lives in the conditions of chaos and randomness which can be very scary.

Finding a way to manage and live with such uncertainty in order to bring a sense of order and predictability. But the reduction of uncertainty also involves considerable amounts of physical work. Uncertainty forces the women smallholders to resort to a number of time-consuming and labor-intensive strategies. Most women must physically go to canal to see if the water is flowing. The distance to the canal may range from 50 m to more than several kilometers of unpaved roads from a woman’s house. For instance, Firusa takes 2 h by her donkey-harnessed cart to reach her field and look at the canal. If the water is not flowing, this long journey is undertaken in vain. If the water is there, she queues with other smallholders and waits until she can open her ditch and let the water flow into her plot of land. Depending on the water pressure, irrigating one plot takes from 40 min to 5 h. This adds up to long hours of work, added to the additional hours of journey back and forth to the village. Mavluda walks or uses her bicycle to go to the canal. By bicycle, it takes her 20 min to reach the place, and she has to do this once in every 2–3 days during the vegetation season. She says: “There is no one to ask or to telephone. Once I was lucky and learnt about the water from a neighbor who is employed at the farm and knew about it.” However, regardless of the creativity, they introduce into their already multilayered and complex everyday work, they often fail to do the irrigation work because they either do not get timely information or do not manage to be physically present in their fields when the water comes, or else the water is already used up.

These outcomes, apparently, contradict the original policy/project promise and their effects in relation to these smallholders. The project's approach and participatory promise were to bring social assistance to the most vulnerable groups and, as mentioned above to "improve livelihoods of the rural inhabitants." Elsewhere, I explored in detail these contradictory findings and map out institutional process, which organized the local experiences in such a way [28]. Here, the argument focuses on making visible the voices of these women smallholders who were made invisible in how national and international address the Aral Sea crisis through bringing the concept of sustainability into these people's everyday lives. The national effort to make irrigation water use more efficient introduced the policy of rationing which was carefully regulated through established hierarchies, procedures, operations, etc. The international European actors engaged in transfer of knowledge and expertise and worked with the local WUA. Yet, they all missed not only the needs and interests of the women smallholders but also their potential contributions.

Ethnographic data show some presence of women smallholder organization within the village. To provide just one example, it is useful to turn to a smallholder woman whom I call Gulnara. Gulnara is a retired school teacher whose neighbors were refused irrigation services by the WUA due to a long history of fights between the WUA and the people. Gulnara took on a mediating role and served her street for the last 5 years. When interviewed, she supervised irrigation of about 50 households and managed the organization of the related processes through village level lobbying, mobilizing people to clean the irrigation infrastructure, collecting fees, and keeping careful accounting of her work. Stories like Gulnara's suggest that local women engage in social activism and actively engage in the kinds of local dynamics that the project aimed at attaining. However, neither Gulnara nor other women like her have never been invited to any project activities and remained unknown to the project staff. I tend to see this loss for the project's commitment to a bottom-up approach and its goal to bring more social justice.

## 7. Conclusion

Ethnographic data showed that women smallholders have specific needs and interests in having reliable and sufficient access to water to continue growing their crops. This was vital to their subsistence, livelihoods, health, and lives. These women also contribute to community-based local water management leading water distribution and taking control of shared resources. However, these active women experience hardships in obtaining dependable access to irrigation sources. In the context of lacking any systematic information about scheduling of irrigation water, its delivery and quantity, these women engage in a number of creative strategies to learn about water availability. However, these strategies involve considerable amounts of physical work as well as emotional labor that must be invested in exchange of valuable knowledge about the water. This happens in the context where most of the women's already busy workloads have been added considerably due to their male partner out migration. Importantly, this happens in the conditions of the government's and international project's policies to accord water management and water use with the notion of sustainability. The government politics of



rationing was introduced as part of sustainable and rational water use. The BMBF-UNSECO project's enhancement of WUAs was another promising social innovation which was expected to lead to improvements for all. However, as observed from the data on the ground, the trickle-down effect did not happen for the women smallholders. They continue to suffer shortages of irrigation water, risking their own subsistence, and those of their families, while the high-level talks about sustainability continue to overwhelm various international fora. At the moment, as what the women's experiences show, sustainability is achieved at the expenses of women smallholders' time, health and, ultimately, lives. These outcomes of water sustainability as a policy and practice are unfair and contradictory, thus, call for attention and subsequent actions from professionals, developers, planners, and policy makers. What appears necessary at this point is to promote policy and development action that would base their strategies on broad and in-depth research of the everyday relevancies and actualities among the prospective beneficiaries in order to be able to initiate discussions about how to integrate their interests and concerns into sustainability programming. Serious attention to how women can both benefit from and contribute to water sustainability policies and projects must become habitual in the development and professional circles.

## Conflict of interest

No conflict of interest is involved in this publication and related research.

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