State-facilitated bottom up in agricultural water governance and sustainability of solutions to recurring water stress: a case study from smallholders’ perspective in Uzbekistan

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Abstract
Agricultural water stress is a critical problem undermining socioeconomic development and environmental sustainability of water and land resources in many agriculture-based economies. Uzbekistan is an example of such case, where for coping with the problem, water reforms such as creation of Water User Associations (WUAs) attempted to decentralize the decision-making to some extent encouraging bottom-up approach to water governance. However, the results have been disappointing so far, particularly visible in persistence of priority in water allocation for farmers with state-ordered crops and neglect of smallholders as legitimate water users. The study presented here describes some of the discrepancies between paper and practice in the example of water governance in one studied community. Using household survey, interviews, and focus group discussion, the authors show that true transformation into bottom up cannot be achieved through pure state-facilitation, especially if it remains on paper and largely limited to technical measures. Such state-facilitated bottom up is bound to fail with the arrival of new levels of water stress. Preferential treatment also undermines incentives of farmers to improve productivity in using water and land resources. The authors highlight that a balanced attention is needed in relation to reforms that encourage not only supply-side solutions, even though they are very necessary. Reforms are also necessary directed at enabling smallholders to participate in decision-making in dealing with water stress, and take more active role in communicating their needs, negotiating fair allocation, and coordinating implementation of agreed water plans.

Keywords: water scarcity, irrigation, smallholders, social solutions

Paper type: Research paper

1. Introduction

In the last two decades, reforms in the agricultural water sector in Uzbekistan attempted to follow, with somewhat alternating emphasis, the world trends of decentralization and consolidation in irrigation management, and tried to find some balance in transfer of
management responsibilities from water authorities to water users (Soliev et al. 2015; Moss & Hamidov 2016). The results of the reforms have been so far disappointing, and farmers with state-ordered crops still receive greater priority in most decisions at least informally, while ensuring access to irrigation water by rural smallholders, a large share of rural population in the country, remains problematic (Swinkels et al. 2016). This ongoing practice manifests itself in a number of ways.

Farmers, who grow crops under state quota, such as cotton and wheat, have a priority to irrigate their fields before others. This practice is formally established to meet the market goals of the state (Kim & Hornidge 2016), while the government continued to control all aspects of the water management in the country (Abdullaev et al. 2008). This is despite the emergence of water users’ associations (WUAs) as a form of self-organized groups of water users to collectively run their intra-irrigation network and ensure fair access to and allocation of water resources (Abdullaev & Rakhmatullaev, 2015). Further, smallholders, a group of water users with much smaller land plots compared to that of farmers, are de-facto excluded from forming local WUAs, as they do not have a legal status, a requirement provisioned by the current legislation to establish a WUA, and WUAs are generally perceived as an organization for farmers (Mukhamedova & Wegerich 2014).

This paper presents insights from a recent empirical research on water governance reforms in the example of one community, located in a rural area of Khorezm Province. Farmers and smallholders of the mahalla, a term used to refer to a small community or neighborhood in Uzbekistan, irrigate their fields and small land plots, also called tomorqa, from the on-farm irrigation canal. Water users of this rural site report that they have been suffering from the chronic shortage of the irrigation water. To address the water stress, both government and donor organizations attempted to intervene with the goal to transform the top-down into bottom-up water governance, so that water users can take active role in coordinating their water use (Soliev et al. 2015; Djumaboev et al. 2017). The results are, however, far from the intentions, and the water stress is reported to persist, as smallholders continue to be considered as somewhat unimportant group of actors.

In this paper, the authors argue that addressing water stress requires both technical or supply-side and social or demand-side measures. Further, the authors stress that collective action that can improve water access and allocation should be facilitated not only on paper, but also in practice. In the example of studied community, using the results from household survey, interviews with key informants and focus group discussions with key actors, the present study aims to demonstrate that (1) formal changes are not sufficient for effective implementation of reforms towards empowering water users if informal state-centralized practices persist, and (2) technical supply-side measures alone are therefore not sufficient to improve water governance in a rural community.
2. Theoretical framework: state-facilitated bottom up in water resources management?

Cornerstone issues in water governance lie in the domain of institutions (Wegerich 2003; Horinkova & Abdullaev 2003). Discrepancy between formal (laws, decrees, etc.) and informal (beliefs, customs, traditions, etc.) rules clearly manifests itself in transition countries (Theesfeld 2004). Policies initiated without taking into full account the prevailing informal institutions, broadly defined here as rules in use, run the high risk of being ineffective. In such cases, new formal rules clash with long-enduring informal ones, which then results in failure of reforms. Top-down establishment of water user associations (WUAs) in Uzbekistan can serve as an example, where mismatch between formal and informal practices resulted in overwhelming majority of WUAs not becoming a self-sufficient and self-governing organizations based on collective action (Abdullaev et al. 2010; Swinkels et al. 2016).

Persistence of informal institutional arrangements can explain why it takes considerable time to reach a point where formal and informal rules might converge (Theesfeld & Jelinek 2017). Determinants of the informal rules lie within deeply-rooted social perceptions, and the concept of path dependency explains why policy-makers might pursue incremental changes, tweaking the existing “system” only in small steps (Sehring 2009; Theesfeld & MacKinnon 2014; Soliev et al. 2017). While technical solutions to the water stress can be seen as incremental change with, although unsustainable, quick improvements, revising current formal rules imposed by the government effectively might take decades (Williamson, 2000). However, when the water resources reach their limits, technical supply-side measures become less relevant and employment of social resources or demand-side measures come to the fore to effectively deal with the increasing pressure of water scarcity (Ohlsson & Turton 2000).

The idea of WUA, a decentralized and participatory form of water governance, was promoted as a panacea against unsustainable water use in Uzbekistan by international organisations and donors in the end of 20th century (Veldwisch et al. 2012). This idea is rooted on a neo-liberal vision of governance that advocates for the transfer of decisions on resource management from public organizations to local-level individuals and organizations (Sangameswaran, 2009). The global concept of integrated water resources management (IWRM) also considered WUA as the flagman in promoting its core principles of “decentralising decision-making powers and strengthening the role of local water users” (Moss & Hamidov 2016). Interestingly, first pilot WUAs were established in Khorezm province in 2000-2002, but the literature suggests that the advocates of irrigation management transfer might have underestimated the resilience, flexibility and inventiveness of the state actors, who adjusted the subsequent process of establishment and operation of the WUAs to fit their agenda (e.g., Veldwisch et al. 2012).

The state policy on WUAs in Uzbekistan was formally aimed at creating local water management organizations governed by local water users (Veldwisch & Mollinga 2013). The
ideal role of state would be that of keeping newly established WUAs accountable to water users, at least, in the initial period (Wegerich, 2008). However, in practice one can observe quite the opposite: the policy implementation contributed to the reinforcement of paternalistic views towards local water users, where state is deemed as the first and ultimate authority (Aminova & Abdullaev 2009). Proposed policy diverged from its initially stated goals and WUAs have been organically integrated into the state system of agricultural governance (Veldwisch & Mollinga 2013; Zinzani 2016). This top-down approach to introducing collective action into local water governance has resulted in the weak capacity of the most WUAs to generate funds for efficient maintenance of local irrigation systems (Abdullaev et al. 2010). To break this path dependence, a state policy in water governance should be targeted that could enable favorable regulatory environment for truly autonomous and inclusive decision-making and governance by local water users (Gunchinmaa & Yakubov 2010; Amirova et al. 2019).

The case study presented in this paper explores some of the processes behind and the consequences of how smallholders have been de-facto excluded from the formal WUAs despite being a significant and, as it will be shown, more efficient group of water users.

3. Materials and methods

3.1. Study area
The studied community, mahalla, is located in Khorezm Province of Uzbekistan. The area of the mahalla is about 1850 hectares. The climate is sharply continental, the average annual temperature fluctuates around 13°C. Most of the precipitation occurs during the non-vegetation season, mainly from November to March. The soil in the area is exposed to wind and water erosion. The soil in Khorezm Province typically has low fertility (Akramkhanov & Vlek 2012). Topsoil layers are exposed to salinization, and it is necessary to perform leaching up to three times in winter and early spring to remove it.

In the region, and in the studied community, agricultural production is possible only with irrigation through canals due to climatic conditions. Agriculture accounts for about 50% of regional domestic product, and about 60% of the workforce. Farmers grow cotton, wheat and rice in irrigated areas. In the studied community, the number of smallholders that have and use a small land plot – tomorka – was 446, with the area of 186 hectares. Smallholders cultivate mainly wheat, corn, sorghum, fruits and vegetables.

3.2. Water/irrigation system in the community
Farmers and smallholders of the studied community receive water to irrigate their land from the local intra-farm irrigation canal. The length of the local irrigation canal is 6.8 kilometers with the capacity of about two cubic meters per second serving the irrigation area of 910 hectares. The canal is generally considered to be in a poor condition, as it is an earth canal with significant siltation and lack of equipped water outlets and hydro-posts.
Issues related to the water supply and cleaning of tertiary canals are resolved through the local community administration, Mahalla Committee. For example, in 2016, the Mahalla Committee was contacted 10-15 times on water issues, and hashars (term used to refer to joint community works) were organized to clean the intra-irrigation network. According to the Chairperson of the WUA, one of the main functions of the WUA is to regulate the provision to and use of irrigation water among smallholders and farmers in the community. The chairperson of the WUA and a representative of the Mahalla Committee act as mediators between smallholders and farmers.

3.3. Methodology
The study the inductive approach to research (Bryman 2012). Collected data and findings were connected to extant theory on water governance. The study was conducted primarily using a qualitative research strategy and was supported by collection of relevant statistical data. The research methods included a household survey, informal interviews with key informants, as well as a focus group discussion with the active smallholders.

The household survey was designed to assess the socio-economic characteristics of households related to agricultural activities, water use and the distribution of water resources. Secondary statistical data were collected during the study. The study followed a step-by-step approach, which included sampling, testing the questionnaire and directly conducting the survey itself. The object of the study or the sampling unit was a household with a land plot located along the irrigation canal (smallholder). The sample size was slightly less than 10% of the total number of households of the studied mahalla. Thus, 33 smallholders with land less than one hectare were surveyed. The selection of households for interview was based on random sampling at the up-, mid- and downstream of the canal respectively. The survey was conducted through individual interviewing of household members. After the survey, the collected data were refined, entered into a spreadsheet database, and analyzed by applying descriptive statistics.

Separate informal interviews with the chairperson of the local WUA and a representative of the Mahalla Committee were also conducted. Due to exploratory nature of the study, the researchers applied the semi-structured interview method, which covered specific issues pertaining to the role and functions of WUA and Mahalla Committee, as well as relationship between and differential treatment of smallholders and farmers by WUA.

In addition, a focus group discussion was held with seven most active smallholders to explore issues related to water management in the community. Matters discussed were related to the formal and informal procedures of the access to and allocation of the irrigation water for smallholders, the role of the Mahalla Committee and WUA in resolving potential conflicts between water users, and perceived solutions to the scarcity of irrigation water.
4. Results and discussion

Presenting the results, the authors focus on the local water governance issues, such as access to and allocation of the irrigation water. The accent is on how smallholders perceive the irrigation water stress and its solutions.

4.1. State-facilitated bottom-up Water User Associations

Existing legislation formally depicts water user associations as a bottom-up structure founded by legal entities on a voluntary basis. Article 2 of the 1993 Law on Water and Water Use (The Law on Water and Water Use 1993) states that “Water User Association is a non-governmental, non-profit organization created by water users – legal entities, on a voluntary basis to coordinate their activities in the field of water relations, as well as to represent and protect their common interests”. However, in practice WUAs exclusively consist of farmers and most of them grow state-ordered crops (Swinkels et al. 2016). For example, the local WUA in the studied community encompasses 74 farmers, but none of the smallholders.

When it comes to smallholders, they are not considered as legitimate water users (Swinkels et al. 2016), and as was explained by the WUA chairperson, they do not join the local WUA since they do not want to pay fees. Nevertheless, in practice, smallholders are dependent on water from the irrigation canal since they use 186 hectares of irrigated land as a main source of meeting their needs in wheat, vegetables and fruits. Smallholders have to spend cash on these food items in the local market if they suffer crop losses due to insufficient availability of irrigation water.

4.2. Farmers, smallholders, WUA and Mahalla Committee

The smallholders reported that the farmers received priority in water allocation. The WUA chairperson has confirmed that farmers, as members of WUA, have a water allocation plan and receive prioritized access to irrigation water. At the same time, there is no schedule on water delivery, and no system of monitoring of the irrigation water use by smallholders in the community. Among the results of the survey, it is illustrative how one smallholder stated that they “[…] requested an access to irrigation water from one farmer, but he didn’t allow us to use his water.”

Farmers, likewise, receive priority in conflict resolution. Participants of the focus-group discussion unanimously confirmed that when it came to resolving a disagreement between smallholder(s) and farmer(s), the final decision was predominantly made in favor of farmer(s). Mahalla Committee tries to help resolve issues in favor of smallholders, but it is on an ad hoc basis and only when smallholders come with complaints. One smallholder, participant of the focus group discussion, described this process as follows, while others confirmed it. When smallholder needs to irrigate their plots, they ask the representative of the Mahalla Committee to call the WUA chairperson. Then WUA chairperson arrives (if available at the time) at the
place of issue/conflict and tries to help, though, only in cases when it does not compromise farmers’ needs in irrigation water.

Overall, the authors found that smallholders were de facto excluded from formal collective decision-making process regarding water use. However, smallholders can voice their concerns via Mahalla Committee. Indeed, smallholders can only complain on the shortage or allocation of irrigation water that is perceived unfair to the Mahalla Committee, but since they are not members of the WUA and do not pay any fees, WUA chairperson and Mahalla Committee can only help to mitigate/resolve the potential conflicts between smallholders over irrigation water on an unreliable ad hoc basis. There is neither a functioning formal regulation nor an informal regular practice that could guarantee safeguarding the interests of the smallholders. The WUA chairperson and the Mahalla Committee do not help with ensuring the water provision on a systematic institutional level.

The following table summarizes results of focus group discussion related to local smallholders’ views on issues with irrigation water (Table I).

Table I. Issues identified from the focus group discussions in relation to access to and allocation of irrigation water.

<table>
<thead>
<tr>
<th>Issues</th>
<th>Unsatisfactory</th>
<th>Satisfactory</th>
<th>Reported reasons/remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Timely supply of water.</td>
<td>+</td>
<td></td>
<td>Water supply was fully sufficient only in 2017 within the period between 2010 and 2017.</td>
</tr>
<tr>
<td>2. Conflict resolution among smallholders over water delivery.</td>
<td>+</td>
<td></td>
<td>Serious conflicts arise only in rare cases. Most conflicts are resolved peacefully, including with the aid of Mahalla Committee.</td>
</tr>
<tr>
<td>3. Conflict resolution between smallholders and farmers over water delivery.</td>
<td>+</td>
<td></td>
<td>The conflict is always resolved in favor of a farmer. Smallholder cannot access water unless farmer receives water first.</td>
</tr>
<tr>
<td>4. Maintenance of the community ditches.</td>
<td>+</td>
<td></td>
<td>Complaints exist as to who participates in the hashar – voluntary community works.</td>
</tr>
<tr>
<td>5. Fair allocation of irrigation water.</td>
<td>+</td>
<td></td>
<td>There is no water delivery schedule. It is impossible to achieve fair water distribution. There are not enough people to monitor the water delivery schedule. Each water user withdraws as much water as one wants.</td>
</tr>
</tbody>
</table>
4.3. Smallholders’ perception of water stress and solutions

Results of the focus group discussion (Table I) show, and of the survey (Table II) confirm, that smallholders, in case of water stress, do not necessarily complain. Most of them appear not to question (though, they acknowledge the issue as a fact) that farmers, particularly those who grow state-ordered crops, have a priority.

**Table II.** Survey results on perception of smallholders on issues with irrigation water.

<table>
<thead>
<tr>
<th>Issues with irrigation</th>
<th>Share of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallholders do not receive water during the irrigation of farm fields</td>
<td>45%</td>
</tr>
<tr>
<td>Smallholders, located at the head of the canal, do not save water</td>
<td>30%</td>
</tr>
<tr>
<td>Absence of water guards is responsible for irrigation issues in the Mahalla</td>
<td>24%</td>
</tr>
</tbody>
</table>

Some smallholders at the middle and tail of the canal blame smallholders at the head of the canal for overusing the water for irrigation. Yet, they do not see coordination and self-organization as a potential solution but expect renovation of the canal and external appointment of a water guard for monitoring water use specifically for smallholders to solve the water stress (Table III).

**Table III.** Perceived solutions to irrigation water stress.

<table>
<thead>
<tr>
<th></th>
<th>Canal reconstruction</th>
<th>Negotiate with farmers</th>
<th>I do not know</th>
<th>It is not an issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>21</td>
<td>1</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Share of households</td>
<td>64%</td>
<td>3%</td>
<td>27%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Participants of the focus group discussion (Table I) also pointed out that all smallholders should participate in community hashar to clean the irrigation canal and ditches.

4.4. Discussion of broader implications: towards balanced technical and social perception of solutions to water stress

Agricultural policy in Uzbekistan is geared towards meeting state goals first. Agricultural land users in the country can be roughly divided into two classes: farmers, those who fulfill state needs, and other farmers and smallholders who usually grow crops for own consumption and sales at the retail markets. Farmers, who cultivate state-ordered crops (for example, cotton and wheat) have access to resources at favorable terms. This has an impact on the access to irrigation water resources by other users. In the studied community, it was reported that
smallholders could not irrigate their lands until farmers finished irrigating theirs – leaving the smallholders’ plots without water in the meantime. These findings are in line with the existing literature that report largely similar patterns of the processes behind and the consequences of establishing and implementing WUA reforms (Veldwisch 2008; Mukhamedova & Wegerich 2014).

Prioritizing certain type(s) of agricultural producers over other(s) can be to large extent attributed to the state-centric policy, a legacy of the Soviet history in Uzbekistan. This centralized mode of governance de-facto entitles local bureaucrats with power to implement agricultural state policy on their terms (Zinzani 2016). As the state essentially controls water governance, its local representatives (i.e., khokimiyats) can exercise their power to influence and interfere with local water management, overriding both state water management organizations and WUAs (Veldwisch et al. 2012). This informal division of power is not a secret for water users, and influential ones eventually resort to their arsenal of personal bonds. For instance, in periods of irrigation water deficit and conflicts in Khorezm province, farmers seek help from the representatives of local authorities, with whom they have close relationships (ibid). Under the same circumstances, smallholders “are excluded from governance processes, from water management and information on water availability” (Oberkircher et al. 2010, p. 11). However, this follows that it can be assumed that some smallholders might turn to certain powerful farmers, requesting them to share water too. Again, this might be the case under the condition that both parties have some close personal connections.

Looking at our empirical findings it can be stated that power relations in rural Khorezm have not gone through core changes since the times they were first rigorously researched in the first decade of the present century (see, for example, Veldwisch 2008; Trevisani 2010). The WUA Chairperson, who has an extensive experience working for more than 25 years in the local water management sector, reported that hardly anything had changed essentially in terms of the water system governance in the country since he joined the field. Recent largely symbolic revisions of regulations on paper poorly hide the reality in practice whereby the state still controls the agricultural sector and local authorities have not transferred power to local land users. One evidence for that is the wave of the land optimization initiatives the government has undertaken since 2008, with the recent one occurring in 2019 (Petrick & Djanibekov 2019). Djanibekov et al. report that implementation of these land reforms was in the hands of local authorities, and ‘successful’ land users had to sometimes maneuver between corridors of power in order to get or save their land holdings (Djanibekov et al. 2012).

While one can assume that de facto exclusion of smallholders and preferential treatment of farmers with state-ordered crops could make these farmers more productive, in fact the latest official statistical data on the country level show that smallholders are clearly more productive than farmers (Table IV).
Table IV. Share of farmers and smallholders in the agriculture of Uzbekistan (2016).

<table>
<thead>
<tr>
<th>Crop</th>
<th>Farmers</th>
<th></th>
<th>Smallholders</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (%)</td>
<td>Production (%)</td>
<td>Area (%)</td>
<td>Production (%)</td>
</tr>
<tr>
<td>Grains</td>
<td>85.4</td>
<td>80.4</td>
<td>12.5</td>
<td>18.3</td>
</tr>
<tr>
<td>Cotton</td>
<td>99.2</td>
<td>99.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vegetables</td>
<td>36.5</td>
<td>34.8</td>
<td>61.9</td>
<td>64.3</td>
</tr>
<tr>
<td>Fruits</td>
<td>61.5</td>
<td>45.8</td>
<td>30.1</td>
<td>52.1</td>
</tr>
<tr>
<td>Potatoes</td>
<td>21.4</td>
<td>23.1</td>
<td>77.7</td>
<td>76.1</td>
</tr>
<tr>
<td>Melons</td>
<td>53.9</td>
<td>49.5</td>
<td>44.1</td>
<td>48.9</td>
</tr>
<tr>
<td>Grapes</td>
<td>65.1</td>
<td>53.1</td>
<td>31.2</td>
<td>45.4</td>
</tr>
</tbody>
</table>

Source: State Committee on Statistics of Uzbekistan (2016)

The table IV shows that despite the priority given to farmers by the authorities, smallholders manage to use land more efficiently in terms of crop production per unit of available land. Smallholders outperform farmers in the production of nearly all crops. For example, in 2016, farmers grew fruits on 61.5% of total allocated land, but produced only 45.8% of all fruits. Whereas, in the same year, smallholders succeeded to produce more than half (52.1%) of all fruits, using much less share of all available land – only 30.1%.

This phenomenon can be observed in a regional context as well. For example, in Khorezm Province smallholders produce two-thirds of gross agricultural regional product (except cotton and wheat), despite the fact that farmers possess 87% of all arable land (Djanibekov et al. 2012). Smallholders try to fully utilize their small plots, using intensive cropping and higher diversified crop mixes, even under unreliable irrigation water supply (Yakubov & Ul-Hassan 2007).

From above-mentioned, it can be inferred with a high degree of confidence that smallholders use water more productively than farmers. Hence, it seems that the preferential treatment of farmers over long periods might have created the expectation that they do not have to use water or land resources efficiently and decreased their incentives to improve productivity.

Interests of the farmers, as legal entities, are also protected by the WUA formally too, as smallholders are de-facto not eligible to be members of these WUAs. This urges smallholders to opt for measures of investing in costly water-extracting equipment (wells, pumps) and/or to
negotiate with farmers to agree on the schedule of the water delivery where farmers have overwhelming advantage on the terms. There are reports in the literature that negotiating with farmers proved to be viable in some instances in Khorezm Province where smallholders convinced farmers that smallholders’ plots should be irrigated first (Abdullaev & Mollinga 2010). However, what is notable about that case is that the success was attributed to employing a rather social and demand-side, and not technical and supply-side solution, when at social gatherings, such as wedding celebrations and funerals, local leaders of the community communicated to farmers the concern that resonated with the majority of the community members. However, in our study area, respondents did not mention this opportunity of influencing farmers through local leadership, employing social gatherings, communication or otherwise. This might be due to various reasons, and one of them could be that smallholders accept the de-facto preferential status of farmers and see only other smallholders as competitors for scarce water resources (as some were assigning blame on smallholders at the head of the canal), while most of the reported solutions were purely technical supply-side measures in nature.

Thus, absence of formal water regulations for smallholders opens space for opportunistic behavior and potential conflicts among water users as a result of poor social capital, that is lack of trust between water users and general perception that solutions should be external and technical (Hamidov et al. 2015; Theesfeld 2004). This could be also seen by the fact that respondents suggested appointment of a water guard for smallholders as a solution to water stress in their plots, yet they indicated that this should be done by authorities. Given the results of the official statistical survey that clearly show higher productivity levels of smallholders compared to that of farmers, there is need to reconsider state reforms in the agricultural water sector. New reforms should aim at encouraging more productive uses, which would require enabling smallholders to become a fully legitimate group of water users. While a formal change to integrate smallholders to formal institutional arrangements such as WUA might be relatively easy, empowering them to become active participants of decision-making processes might be more challenging requiring some fundamental changes in attitudes and perceptions of all actors (state authorities, farmers, and smallholders themselves) as to how water resources should be shared and managed.

Overall, technical supply-side measures are perceived as primary ones to mitigate issues with an access to and use of irrigation water by smallholders. This is in line with the recent studies that highlight the lack of necessary socioeconomic, political and financial attention to supply side of water security (Wegerich et al. 2015). However, supply-side solutions to water stress become ineffective if unaccompanied by appropriate social learning necessary to manage the demand side at the same time (Ohlsson & Turton 2000). On the one hand, a contributing factor could be the salience or visibility of technical solutions for water users. The visible and quick solutions are generally known to be more attractive (Thaler 1999). On the other hand, it is also in line with the path dependence theory and challenges associated with change in
mental models as externally facilitated measures that do not require constant communication might appear more feasible than changing irrigation habits of water users (Jones et al. 2011). Reconstruction of the main irrigation canal and installation of the two pumps would indeed improve physical availability of the water for community smallholders compared to existing situation. However, smallholders would still be able to irrigate their plots only after farmers. This renders technical solution as potentially not sustainable in the long run, although effective at short-term.

5. Conclusion

Formally, decentralization of water governance practices, where management is transferred to water users, for example through organization of Water User Associations, is increasingly recognized as an important step both for socioeconomic and environmental sustainability reasons. Implementation of such decentralization reforms, however, remain disappointing. Solutions to water-related issues in irrigation-based agriculture usually revolve around technical supply-side measures, such as reconstruction and maintenance of the canal and other irrigating infrastructure. For instance, reconstruction of the malfunctioning local irrigation canal in a studied community is perceived as a primary measure to improve irrigation for local smallholders.

Although technical and supply side solutions to the water stress are important, they can be sustainable only when accompanied by demand side solutions as well. Intangible social aspects of the water governance influence fairness of access and use of water resources by different water users. The state policy on water management in Uzbekistan is primarily built around interests of farmers. Farmers enjoy preferential access to water resources, since by far they have largely served state needs as main producers of state-quota crops. Even establishment of water user associations throughout the country left smallholders de-facto out of this formal opportunity to participate in collective decision-making and action on water management alongside with farmers. Interestingly, the official statistics shows that smallholders are more productive than farmers despite this low priority given to them in access to irrigation water.

Decision-makers, which are generally still associated with higher authorities and not with the members of the water user associations or local community, tend to favor small, but visually appealing changes. Renovation of the canal would have a certain positive effect on the access to water resources by the smallholders in the studied community, and therefore can be seen as a justified and necessary measure to resolve water stress. However, this measure would prove to be only a temporal solution unless smallholders are integrated as legitimate users of water resources in the future. Meanwhile, reforms should also be directed at empowering smallholders to recognize the value of self-organization in dealing with water stress and take more active role in communicating their needs, negotiating fair allocation, and coordinating implementation of agreed water plans.
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7. References


