SHORT VERSION OF DRAFT REPORT

WHAT BUILDS INTO THE WATER USE EFFICIENCY AT THE HOUSEHOLD LEVEL- BASELINE ANALYSIS

Contributing to activities under:
CRP Dryland systems program, activity: Improving Water Use Efficiency in Central Asia
Action site: Ferghana Valley

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Short summary

Improving water use and management practices, protecting the ecosystems require considering gender disparities and achieving livelihood and food security among the most vulnerable groups of population. Rapid population growth in Ferghana Valley remains as one of the demographic trends which indicates to increases in demands and intensified use of water resources. Efficient and productive water use becomes key not only for large farming but also for expanding small home farming systems and other uses. Issues with non-maintained irrigation infrastructure and inconstant supplies of water by the water managing institutions indicate to the issues of unreliable water for both kitchen-gardening and drinking.

Current report is the first step to contribute to a CRP DS Central Asia flagship activity aimed at improving Water Use Efficiency in Central Asia with a research report specifically looking at gender disparities. Objectives of research activities were 1) to identify water use behaviors, cost and benefits, technologies and approaches applied by the household members in the rural irrigated areas. Understand reasons, disparities and triggers of efficient/non efficient water use along gender lines; and 2) to analyze women's productive roles within small holder farming or kitchen gardening. The report is still in an on-going stage and has been contributing to IDOs 2,6 and 8).

Key words: Gender, Water Use Efficiency, Households, Uzbekistan, Ferghana Valley.

Acronyms and Definitions

WUA –Water User's Associations. In Uzbekistan WUAs were renamed/reorganized as Water Consumer's Associations following decree 02.02.2010 decision of the Government ЗКУ-240 on the implementation of the Law of the Republic of Uzbekistan dated December 25, 2009 №, by the (№ 03/1-314, 02.02.2010).

Mahalla – community unit in Uzbekistan

Tamorka - Tamorka or private subsidiary plot to which all citizens were entitled with expanded rights after introduction of land reforms after the independence. The acreage allocated to households was expanded more than twice compared to 1989. The legal size of private plots was increased at first from 0.06 hectares to 0.25 hectares, and eventually 0.35 hectares of irrigated land and 0.5 hectares of non-irrigated land (Kandiyoti 2002).

Introduction

Gender and resources

Different roles, responsibilities and knowledge in managing natural resources characterize specific gender patterns, similarities or gaps (Agarwal 1994, Zwarteveen 2008). These also identify the gender division of labor, and how the agricultural outputs are distributed. So far, gender research has shown that water decision making and irrigation management are dominated by men almost everywhere in the world (Bustamante et al., 2005; Meinzen-Dick & Zwarteveen, 2001; Shyamala & Rao, 2002). At the same time, medium and small subsistence farming and irrigation as well as water used for other multiple uses are often observed to be managed by women (Alimdjanova 2009, Mukhamedova &Wegerich, 2014a).
Conventionally, positive effects of individual rights and formal access to and control of females over land and water resources is considered contributing to welfare improvements and enhancement of the bargaining power of women in the society (Kabeer 1995). However, such described constraints in ownership of land or rights do not restrict women in their involvement in agricultural works that allow them still to earn some income and increase their bargaining power among the household and in community members.

Water use efficiency and rural households

The term "water use efficiency" in the literature is often related to economic parameterization and "efficiency" terms used for indicating "the level of performance" of a system when water is transported, consumed and/or used in the process of production of a specific good. Although there are various ways of considering water use efficiency through its connection to hydraulic performance (conveyance and distribution) or agricultural parameters including different scales, the relationship between the crop growth development and the amount of water used. The term applied in farming which is more connected with water productivity: increase yield production per hectare per unit of water used, is considered to be crucial for arid and semi-arid regions such as Central Asia where limited water supply, frequently constrains farmers are to apply deficit irrigation strategies and to manage water supply in accordance with the sensitivity of crop's growing stages to water stress. Therefore, the term also includes any measure that reduces the amount of water used per unit of any given activity, consistent with the maintenance or enhancement of water quality.
Water efficiency has been less analyzed on the household level and takes into account more of the urban households rather than rural. Water user efficiency within urban and domestic buildings (Schuetze & Santiago-Fandiño 2013) is understood in connection to water conservation, in other words any socially beneficial reduction in water use or water loss (Baumann et al. 1979), water saving technologies, secondary water use. These parameters being valid for urban cannot always cover all the particular context existing within the rural areas. For example this concerns mixed water sources used different for irrigation and drinking, water delivery and transportation issues. Therefore water use efficiency requires an interdisciplinary approach (Dinar 1992)[1] that would include environmental, social (education, gender), and economic factors (public financing, industry and business development) as well as looking at more internal household parameters such as the structure of different water uses and characteristics of users.
According to Tate M.[2] (2000) there are five basic physical parameters in the water use cycle of any activity which are: gross water, intake, recirculation, discharge, consumptive use. However, not all are applicable

Gross water use refers to the total amount of water used to carry out an activity, such as producing a manufactured product, doing a load of laundry, or growing a particular crop. It is composed of two basic sources: intake, the amount of "new" water taken into the operation under consideration; and recirculation, the amount of previously used water employed in the activity. Likewise, the two remaining parameters relate to the release side of the water use cycle: discharge, the amount of water allowed to exit the activity or process, and consumptive use, the amount used up during the process as steam, incorporation into product, or other means.
In a certain way we would like to try to analyze the

[1] Dinar, A. 1993. Economic factors and opportunities as determinants of water use efficiency in agriculture. *Irrigation Science.* 14(2), p. 47-52. Springer-Verlag. http://dx.doi.org/10.1007/BF00208397

[2] Tate, M. 2000. Principles of Water Use Efficiency, Council of European Professional Informatics Societies, CEPIS web page, October 13, 2000. http://www.cepis.ops- oms.org/muwww/fulltext/repind48/principles/principles.html.

Water use can mean the amount of water used for a given task or for the production of a given quantity of some product or crop. In light of the water shortages in various parts of the world, it is important to consider water use and water efficiency. See the article "Virtual water" for more information on this topic.

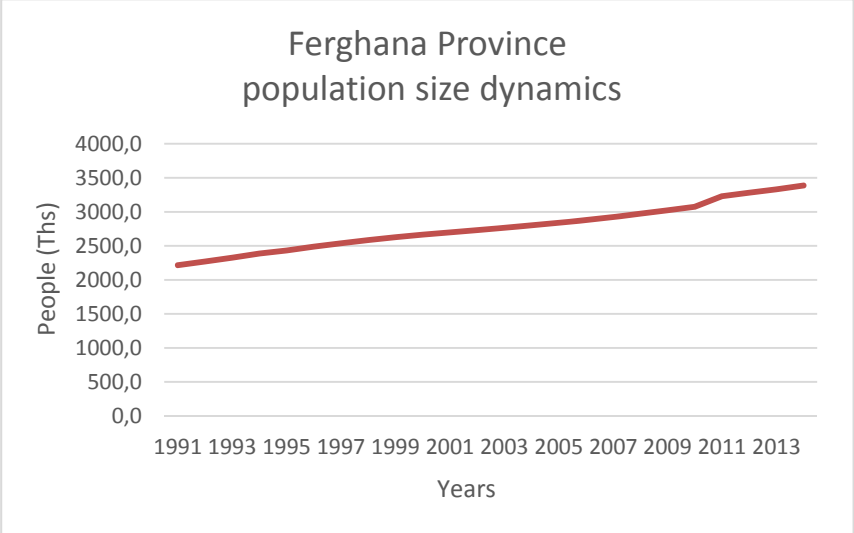
Background

After the breakup of the Soviet Union, Uzbekistan agricultural system has been restructured. New reforms have taken place also within the irrigation management. Privatization processes and appearance of Water User Associations have created new relations and new approaches to water use and distribution. In Uzbekistan, issues of irrigation and drainage are key to agricultural production, and limited water resources affect food security. The Uzbek government envisioned Water User Associations to be the most suitable unit of irrigation management for maintaining on-farm irrigation infrastructure and for improving water allocation to villagers (Zavgorodnyaya, 2006). It was expected that this policy reform would contribute to the overall national agricultural development strategy and ultimately facilitate poverty reduction and provide "social assistance to the most vulnerable groups" (ADB, 2001, p. 11).
Women are important working force in the feminized farming systems of Central Asia (Mukhamedova & Wegerich, 2014b) and represent large portion of water users for agricultural production however they make up only a small minority of WUA members and or water managing leaders.
In Uzbekistan this can be observed due to seasonal labor migration of male workers to Russia, Kazakhstan, Korea or to urban areas, where they find more attractive off-farm income generating activities. Male out-migration for waged work means that women undertake new tasks such as soil fertilization, planting, irrigating and harvesting, and learning to organize their time to accomplish their intensified work. Studies on time-use show that women spend almost three fold more time than men engaged in unpaid work. Besides the unpaid works there are also informal or non-accounted paid works such as agricultural works or works performed in kitchen gardens (tamorqas) on growing livestock or market oriented fruits and vegetables.

According to a recent ADB report (2014) "a significant portion of the population [in the rural areas] relies on hand pumps, public standpipes, and wells, and receives intermittent water supply or contaminated water". The report underlines that the "inadequacies in water supply and sanitation system affect entire populations but particularly affect women because they are primarily responsible for water collection and storage as well as other domestic tasks such as cooking, cleaning, washing, and the hygiene of children and other family members" (ADB 2014). According to UzHydromet (2014) with the expected climate change scenarios expected outcomes for Uzbekistan are hardening of the water resource deficit, worsening of the water quality; increase of dangerous risks, extreme hydrometeorologic events (droughts, floods, snow slides, etc) and decreases in the productivity of modern varieties of agricultural crops, and productivity of pastures and livestock, increased the risks of food security.

The Ferghana province had a total area of 680,000 hectares and a total irrigated area of 361,978 ha in 2010. The general increase of population and more rapid growth within densely populated areas like Ferghana Province where, population reached 3 074 600 (2014) and has been increasing by nearly 0% since independence (Figure 1) is triggering more demands for land and water resources leading to further expansion of settlement areas.

Figure 1. Population in Ferghana Province, Uzbekistan
Source: authors calculations, State Statistics Committee of Uzbekistan



Of the 11,126 farms registered in Ferghana Province in 2010, only 516 were women-headed (Scientific Information Center 2011). Since 2000, the population of the province has increased from 2.7 to 3.1 million in 2010; in the same period, the number of settlements (community centers) has increased from 312 to 395 (Scientific Information Center 2011). Until recently, settlements expanded into irrigated areas (Table 1). Given the reduced employment opportunities in rural areas due to privatization and optimization, there is a high rate of seasonal migration. Seasonal migration is gendered and the majority of season migrants are men (Reeves 2010).

Table 1: Changes in land allocations to kitchen gardens in Ferghana Province

Years	Total irrigated area, ha	Irrigated crops and kitchen garden lands (ha)						
		Cotton	Wheat	Alfa-Alfa	Orchards	Other Crops	Kitchen garden	Kitchen garden/Total irrigated area %
1980	323049	188822	0	39925	22487	53190	18625	5.77%
1990	354151	140698	0	52821	37744	68911	53977	15.24%
2000	357736	126384	90793	9977	33435	147953	39987	11.18%
2010	361978	103600	111700	3718	47628	144718	62314	17.21%

Problem statement

Improving water use and management practices, protecting the ecosystems require considering gender disparities and achieving livelihood and food security among the most vulnerable groups of population. Rapid population growth in Ferghana Valley remains as one of the demographic trends which indicates to increases in demands and intensified use of water resources. Efficient and productive water use becomes key not only for large farming but also for expanding small home farming systems and other uses. Issues with non-maintained irrigation infrastructure and inconstant supplies of water by the water managing institutions indicate to the issues of unreliable water for both kitchen-gardening and drinking.

Expected outcomes

Improved water use efficiency and productive uses by small land holders (kitchen gardens) through gender disaggregated analysis of water use efficiency components, dependencies and

Objectives of research activities

1. To identify water use behaviors, cost and benefits, technologies and approaches applied by the household members in the rural irrigated areas. Understand reasons, disparities and triggers of efficient/non efficient water use along gender lines.
2. To analyze women's productive roles within small farming or kitchen gardening
3. Through interactive workshops to Increase awareness and knowledge of men and women small land holders in understanding water and energy efficiency and related trade-offs and provide recommendations on new practices and approaches on improved water and energy use efficiency.

Related Gender Responsive Objective of the project (based on the gender strategy of CRP 1.1)

Based on the gender responsive objectives of the Gender strategy of the CRP Drylands systems program, the research aimed to (1) "contribute to developing and implementing more effective interdisciplinary ex-ante diagnostic methods that integrate gender analysis and ensure gender equity in targeting and prioritizing the CRP's research programs" by developing semi-structured questionnaire that could be applied also in other projects within the same region. (2) "Improve knowledge/understanding of the key cultural, ideological, normative and institutional factors and emerging changes and trends in these, that lead to gender inequalities and identify effective gender-responsive and transformative ways of addressing these to increase production, incomes and food security and women's share of these benefits".

Research questions by specific topics

(1) *Resources and uses:* Which types of resources, irrigation infrastructure used and what is their conveyance? Who are the main users and uses (drinking, irrigation, other domestic productive and non-productive uses, waste water uses) of these resources

(2) *Practices and technologies*: How do men and women irrigate (including energy and water amounts spent)? What are the determinants, gaps and constraints in water and energy resource utilization as well as, responsibilities, technologies and practices (including conservation) applied by male household members. What are their needs, potential and possibilities to improve efficiency of water use in sustainable manner.

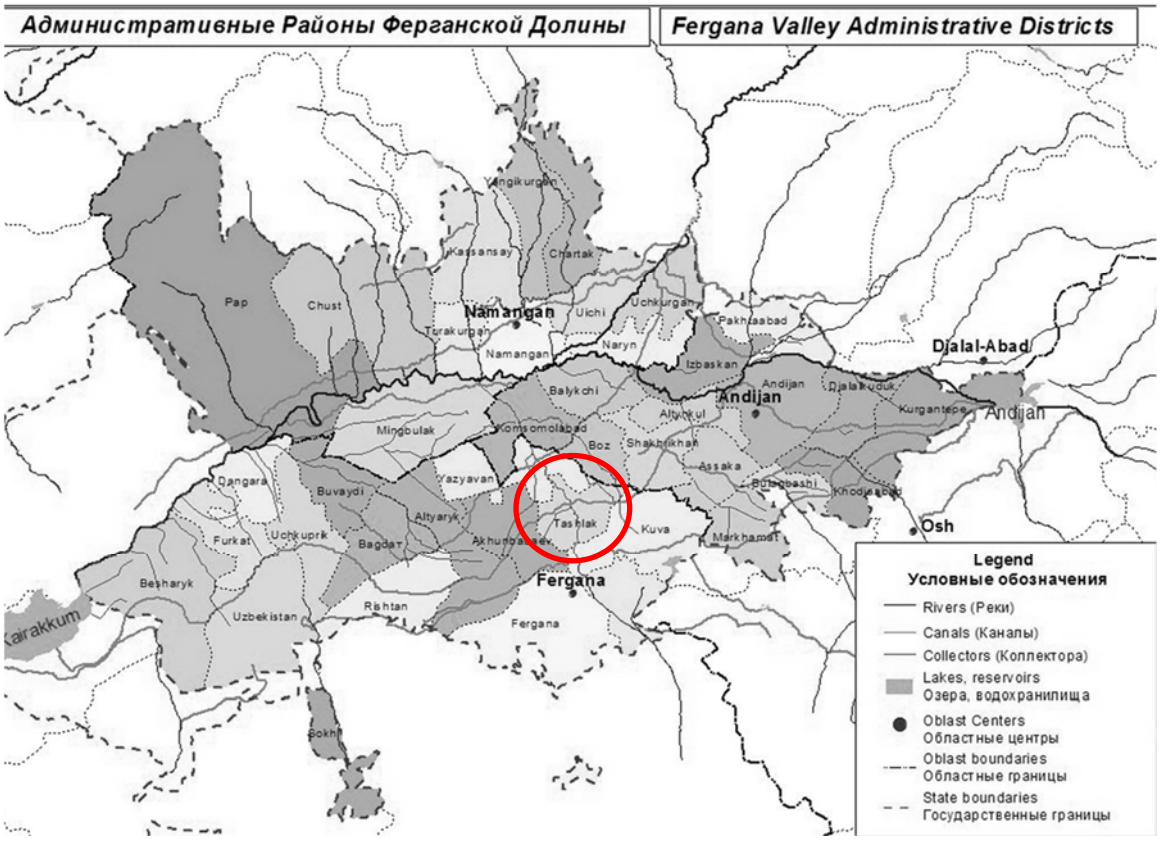
(3) *Decisions and participation:* Who makes the decisions on when, how and with which source to irrigate and which technology/ approach to use for irrigation? What is the role and participation degree of each member? Who contributes and who benefits more from agricultural production?

(4) *Willingness to adapt and improve water use efficiency:* Are households ready to improve their current conventional uses of water resources? What are alternative approaches which they know or they are willing to adapt.

General information in the study area:

Toshloq district is situated in the North-Eastern part of the Ferghana Province (Figure 1). It is a densely populated area, which has in itself 6 smaller villages, each of which consists of few other villages. In total Komiljon Umarov Water Consumers Association has 5 canals which take water from South Ferghana from which mainly 3 canals are used for feed this area: Akhshak, Besarang and Varzak. The water from the South Ferghana canal is not the only source of irrigation, drainage and artesian water are also Water users include large and medium farms as well as households and other non-agricultural users.

Figure 2. Freghana Valley administrative districts with a red circle on the Tashlak district

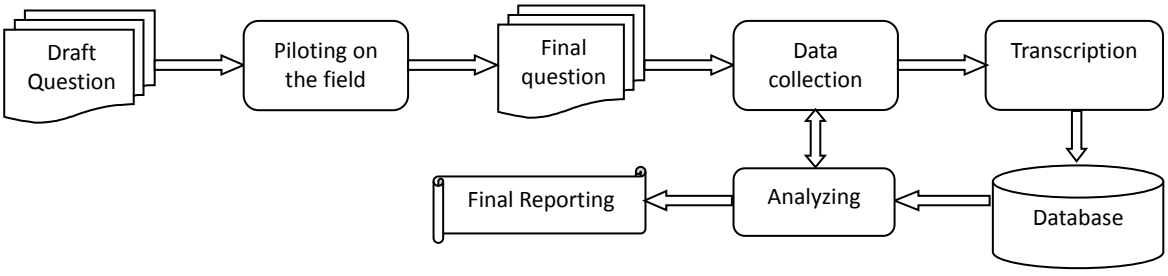


Project l Location	Uzbekistan, Fergana Province, Toshloq District, Komiljon Umarov WUA
Villages	3-villages, 6-large communities consisting of 18 small mahallas
Water sources	1 level: South Ferghana Canal 2 level: Yangisoi, Varzak, Besarang, Akhshak Over 50 wells serving the both farmers and households
Population	Households- 11 343 People: 58 667 : females - 51%, males-49%
Total area occupied by kitchen gardens	26% from total WUA's irrigated land (4 063 ha) Average kitchen garden area: 0,15 ha
WUA members	47 farmers, 16 mahallas

Methodology

In order to target water use efficiency on the household level we decided to cover all three villages situated within the Komiljon Umarov WUA. Research employed mixed methods of analysis including semi-structured interviews and case studies on assessment of water use efficiency of households within one WUA in the Ferghana province, Uzbekistan and filing the data into one database using Google drive application (Figure 3).

Figure 3. Main data processing sequence consisted of the following structure.

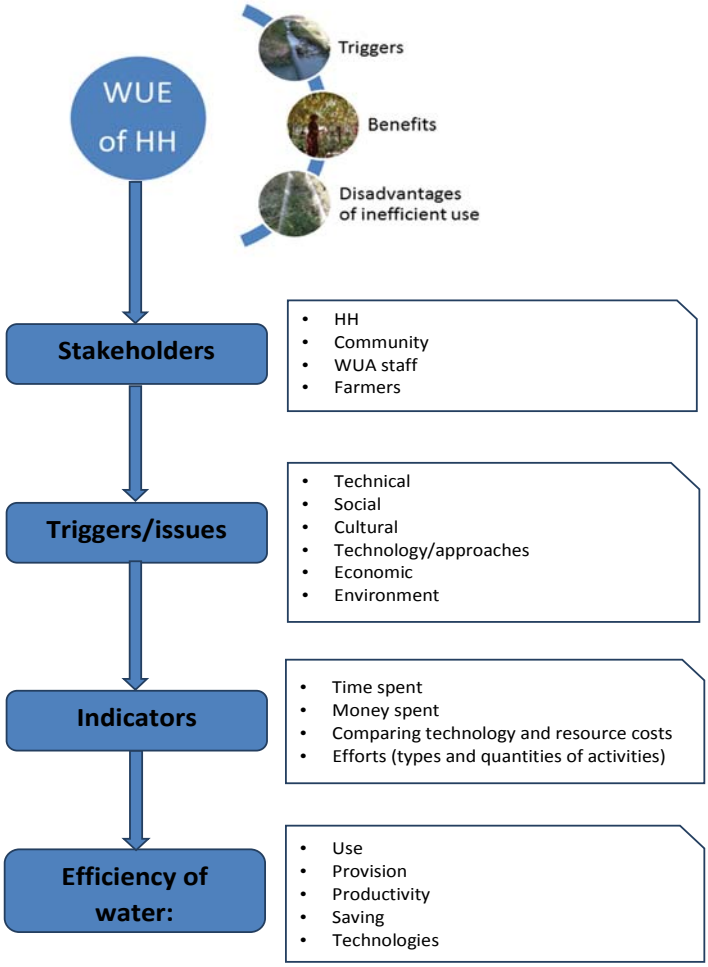


The main sequence of topics and indicators under which semi-structured and open ended questions were designed and were analyzed following the structure below (Figure 4):

Figure 4. Questionnaire design structure.

The figure signifies a structure of methodology that starts from learning the triggers of efficient or inefficient uses of water (triggers), at the same time research seeks to reveal the benefits of efficient use and how its reached from the point of view of household members (Benefits) and study the cases of inefficient water use or management (Disadvantages of inefficient use).

The structure also identifies internal and external connection points of various actors, indicators and other factors influencing the WUE.



The key informants composed of female and male household members as well as some of the community members and WUA representatives. Responses of each interview were filled in into answer sheets which were later coded into Google Drive application. At the same time all interview data was audio recorded and later transcribed verbatim. Field observations and ground truth data have been noted within each area interviewed to verify the opinions of interviewees and assumptions. Verification of the interviews analyzed is projected to happen with the trainings which will be organized in the beginning of the year 2015.
Water use efficiency will be estimated with series of questions designed to: assess water use by casual approximations by the household members, measurements based on the water providing entities and actual participant observations; to identify conventional water use technologies; to gain knowledge on understanding of water use efficiency and productivity (history, culture, family/community values and formal and informal norms. Counting of hour women and men are involved in various households and agriculture activities could be applied for assessment of productive contributions.

Selection: Selection of households which were interviewed was based on first identifying existing water sources (gravity, lift irrigation, mixed); location in relevance to the water source (head, middle, tail) and in some cases irrigation infrastructure in use (artesian wells, drainage pumps). Both female and male household members above 18 years old were chosen to participate in the interviews and were chosen by random sampling.

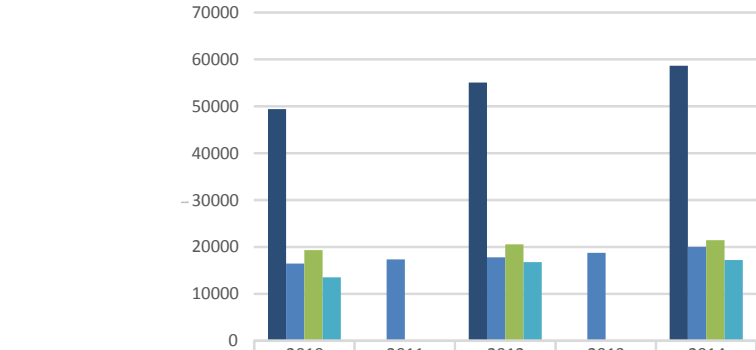
Survey Design: Design of a questionnaire has been developed in close consultations with IWMI senior staff and piloted together with local partners from the communities of the Toshloq district and with couple of households and revising them to fit into the context. Following the correction the questions were translated

into Uzbek language (Attachment 1). Meetings with main beneficiaries and stakeholders of the project were conducted in the inception visit to the site. As a result of these discussions we were able to establish partnerships with community leaders for receiving official support in conducting the interviews and organizing a joint training by the end of the research.

Data and analysis

Data used: Participant and community observations, GPS locations points for mapping household-respondents, photos, interview results (interview schedule Figure 2), statistical data from the district authorities. In total 97 interviews were conducted with household members from 3 big community village gathering (*mahalla fuqorolar yig'ini*), namely: Ahshak, Arabmozor and Sadda, in which there were over 12 small communities (Figure 5).

Figure 5. Demographic data for Toshloq district



	2010	2011	2012	2013	2014
Total Villages in the Toshloq WUA	49375		55096		58670
Akhshak Village	16487	17327	17783	18750	19990
Sadda	19360		20542		21448
Arabmozor	13528		16771		17232

Initially it was planned to interview in the break-up quantity of 50% male and 50% female population within the WCA villages. However, during the random sampling of the households mostly women were found within the households, since most of the men were absent due to migrant works. Therefore, the actual interviewed respondents consisted of mainly female (over 75%) and male (around 25%). General characteristics of respondents based on gender, age, education, occupation and location were brought in the Attachment 2 .

The spread of age of respondents showed a difference between males and females interviewed with male falling between 40-50 (39.13%) 50-60 (43.48%) year ranges and female with the biggest shares falling under 30-40 (22.97%), 40-50 (21.62%) and 50-60 (27.03%) year ranges. This can be explained by several factors: 1) usually the eldest in the household is given the word to speak with somebody unknown; 2) young women with children or mothers in law/grandmothers looking after children; 3) migration of men for seasonal works reflects often the data of more elder men between 50-60 present in the house, since this age range is usually the final for the those who are doing seasonal works in Russia (according to the IOM (2013) age ranges of the male migrants from Uzbekistan to Russia were: 666 000, 17-25 years old and 568 000, 26 - 35 years

old[3]. The education of respondents was found not to be different based on their gender division with secondary education reaching 73.91% men and 93.24% women consequently.

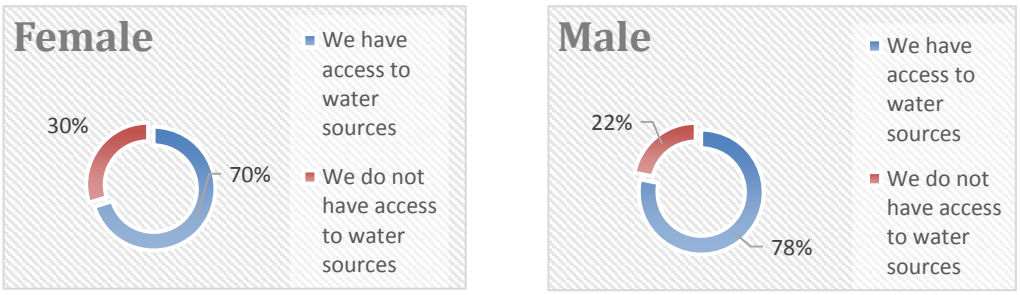
For all three villages, major occupations/employment status (based on formal employment) can be classified to the 5 main categories and percentages within each can be calculated from the total population: services (25.77%), house (30.93%), agriculture (14.43%), pension (12.37%) and local governance (9.28%). However, gender disaggregated data shows that for female, house work remains as the most popular answer (39.19%) and only after services (20.27%) and pension (13.51%). For male respondents the pattern changes the order with services (43.48%) prevailing, then agriculture (21.74%) and construction (13.04%). Service category also has many subcategories that can be divided to more male and to more female occupations such as taxi driving (male) or trading in the market (female).
Prevailing presence of women in house works repeats the general trend persistent to the age group of women interviewed and shows that women's economic opportunities are still greater in the informal sector, where main activities are: home farming, handicrafts. Presence of more men with agricultural occupation as their formal work indicates more to the ownership status of male in farming. This fact also is proved by the fact of absence of women as farmers and members of studied WCA and more performing the agricultural works informally.

Results and discussion

Resources and uses

Majority of respondents from all three villages stated that they have access to water resources. Out of six identified water sources which were identified available by the households for various needs River/canal water and hand pumped sources are used interchangeable and in parallel. Some households have access to artesian and drainage wells as well as to standpipe. The first question that was asked from the households was whether they had access to water sources? The answer for female and male respondents' answered very similar (Figure 6.) with majority of household representative giving the answer that they have access.

Figure 6. Answer to the question: "Do you have access to water sources?"



Women and men both equally were aware of all the available water sources. In general, from all the sources coming to the households the most used are nearby river/canal, hand pumps, and finally artesian/drainage wells (Figure 7a). Not all households had access to all of the sources at the same time, for some only one or two sources were available and for others, the availability of used sources was more diversified.
Figure 7b shows the structure of used water sources for drinking purposes here the answers were that majority of households rely on hand pumps installed within the their plots and artesian and drainage wells.

[3] IOM. 2013. Migrants of Uzbekistan occupy the first place in Russia overrunning Azerbaijan and Kyrgyzstan. Article in Russian language: "Мигранты из Узбекистана заняли первое место в России, обогнав Азербайджан и Киргизию", 02 января 2013 г. . www.iom.tj

Figure 7a. Do you know **the source of water** coming to your house?

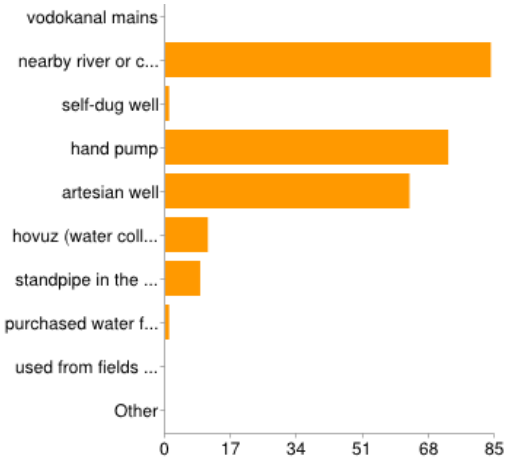
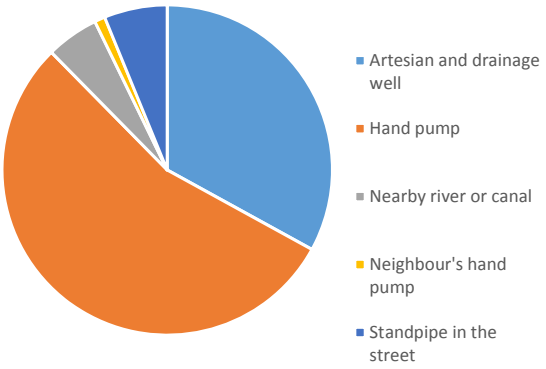


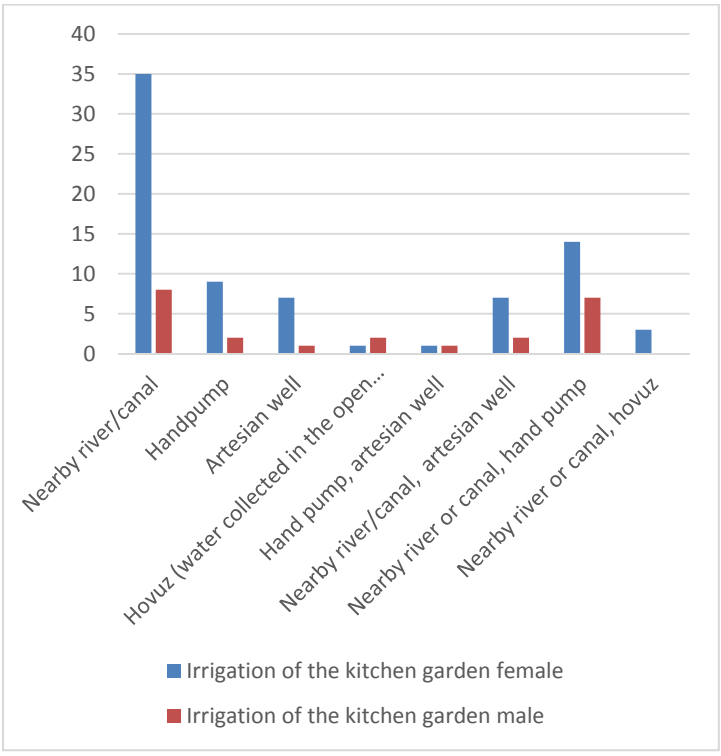
Figure 7b. Can you tell which is the most used water source for **drinking** if there are several?



Majority of hand pumps within the households are installed in 10-15 (54.92%) meters and less with a depth of 5-10 (29.57%) and 15-20 (15.49%). This might naturally be connected with different levels from which the shallow ground water can be found. Basically most of the population uses hand pumps sometimes to diesel/electric pump. However canal water (main source: South Ferghana Canal) and artesian, drainage wells still remain as an important source for kitchen gardens.

Households utilize mixed source for irrigating their kitchen gardens. Responses indicated a slight difference in answers provided by male and female respondents in regards to the identified sources for irrigation, however the most used were canal/river and pumps within the households (Figure 8).

Figure 8. Water use for kitchen garden irrigation by sources and disaggregated by gender.



It has been stated that in general there is sufficient water within the district, however, the difference in the soil quality, availability of various alternative additional sources or consistency in availability of water sources seems to be correlated with how much and how often the water is used. There are some conflicts on the matters of water use and maintenance of irrigation infrastructure existing between households and farmers which use common sources.

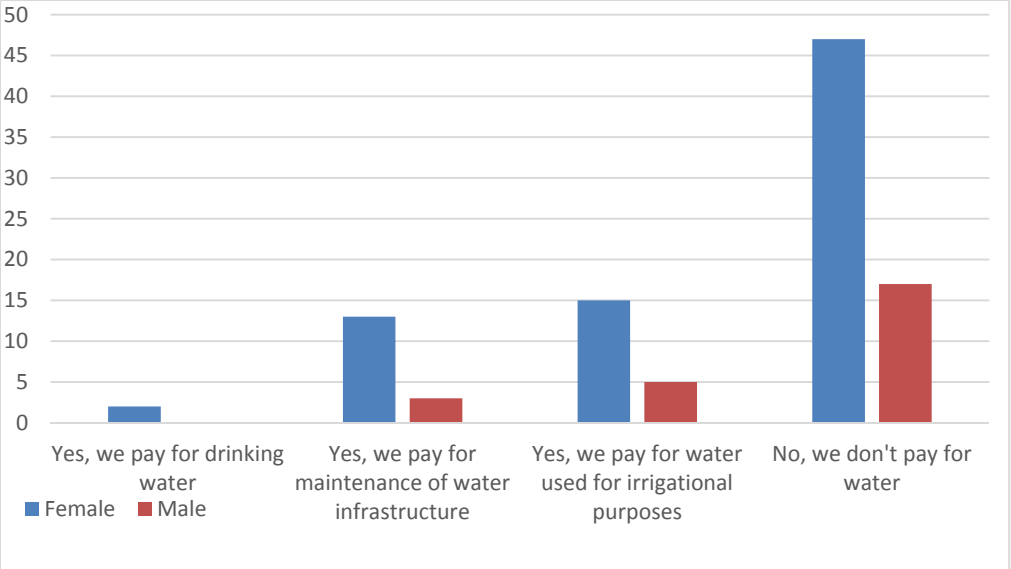
Water use behavior characteristics suggest that currently households do not participate as members of WUA and almost 58%, especially women, and are not aware of its existence.

Households using surface irrigation waters from the Akhshak, Besarang, Varzak canals do not pay for any water provision services. As the water has no cost but the provision of water delivery and system maintenance have costs, Water Consumers' Associations according to the set legislation and their charters should their members which are farmers, population and other entities or businesses which might be using the water sources under their management.

Based on the structured question "Do you pay for water?" (Figure 9.) was given to reveal whether the efficiency of water use and conveyance could be characterized by the payment patterns. As shallow wells with hand pumps used for irrigation and drinking needs were installed by the households, 65% of male respondents and 61% of female respondents identified that they did not pay for water. Only few respondents announced payments for irrigation water (20% of men and 19% of women).

12% of male and 19% of female respondents mentioned fees for the maintenance of artesian and drainage infrastructure. Interestingly, the percentage of respondents who claimed that they pay for water they drink was too little. (3% for women and 0% for men).

Figure 9. Gender disaggregated drinking water payment patterns.



All of these payments were relevant to multiple drainage wells which are currently in the property of local water authorities but are put under the responsibility and control of large farm holders. The drainage water can be used both by the farmers and households and expenditures for maintenance and major repair costs are shared by the users. The maintenance and repair fees are gathered by the responsible farmers[4] attached to multiple drainage wells. Households which share the costs for maintenance and repair services informed that the monthly payments range from 3000 to 5000 sums. Artesian wells are set under the responsibility of mahalla, and only maintenance fees are collected by the representative of the local community governance (Interview scripts Attachment 2).

In cases when households did not have home pumped water source, the alternative choices were listed as: artesian wells (65%), bringing the water from the neighbors (21%) and standpipe situated in neighborhood, for which they make payments (8%)

Women identified that they have to spend from 5 to 30 minutes (55% respondents' answers) 1-3 times per day to bring water from the distance ranging from 40-200 meters for their household uses.

The water usually is carried using buckets (72%), less with metal containers (45%) and plastic jars (8%). Efficiency of water conveyance in terms of its transportation is low since majority of women (62%) have to spend in average from 30 minutes to 1 hour every day to bring the water to their households.

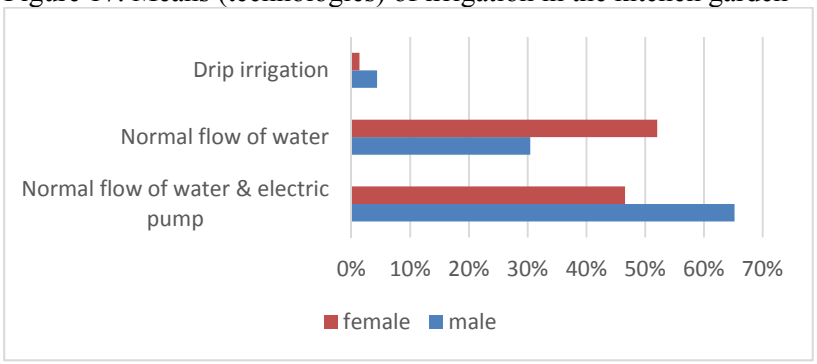
[4] After the farm restructuring and institutional changes most of the infrastructure including the artesian and drainages wells have been put into the account of Irrigation Departments within the districts, however, the management and maintenance was left with the new farmers (Interview with the WUA Director).

Out of total respondents 66 % of women and 82 % of men identified that the water for household needs is always available. Signifying that women have higher sensitivity to the absence of water. The efficiency of water provision is identified not only by its availability but also by its pressure which allows entrance into the household ditches. Around 70% of the respondents identified that they have middle pressure of water coming to their ditches (river/canal or drainage water sources mentioned). Less mentioned is the low (8%) and very low pressure (3%). When the data was disaggregated by gender, men seemed to be more optimistic in their answers about the pressure of water (Figure 10.).

There are not so many technologies which are applied by the households. The ones identified included drip irrigation system for planting cucumbers, using a 200 liter container which is hanged upside down with water and mixed with liquid fertilizers. The users (only 3 respondents) of such system underlined that for irrigating the kitchen garden crops during the whole day spending 8-200 liters.
There are major differences between the 3 villages in most cases hand pumps which are available in the local market (Chinese) are available -Image below). Hand pump which also have the possibility to be connected to diesel or electric power are used first of all for drinking, bathing, livestock and often for irrigation (with the electric pump) when other water sources coming from ditches are not available or inconsistent.

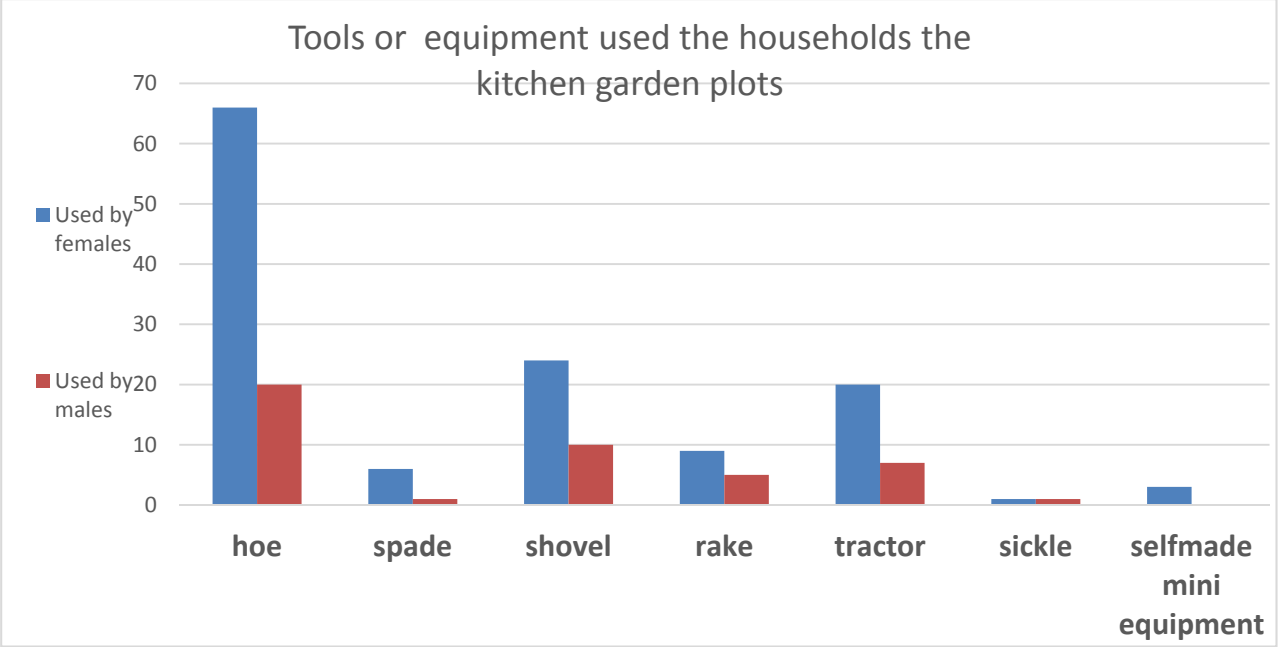
Over 49% of the household use electric pumps from bringing water from the ditches or from the hand pumps (Figure 17). This tendency seems to grow since electric pumps are widely available in the local markets and imported from China. Only respondents mentioned that they use drip irrigation in their households.

Figure 17. Means (technologies) of irrigation in the kitchen garden



Depending on the plot size the electric pump is used from 0,5 to 3 hours per one irrigation.
Considering variety of standard crops planted in the kitchen gardens, the irrigation from the ditch source is performed once a week by 46% of respondents

From all the respondents 45% did not use electrical pumps to irrigate their kitchen gardens; Frequency of irrigation seems to be the same if water from the pump is used. Kitchen gardens do not use manual pumps nor irrigate their garden plots with buckets. Only 2% of the households use drip irrigation in their households.
Tools and equipment used within the plots contribute to the outcome of the efficient water use (Figure 18).
Figure 18. Tools or equipment used the households the kitchen garden plots.

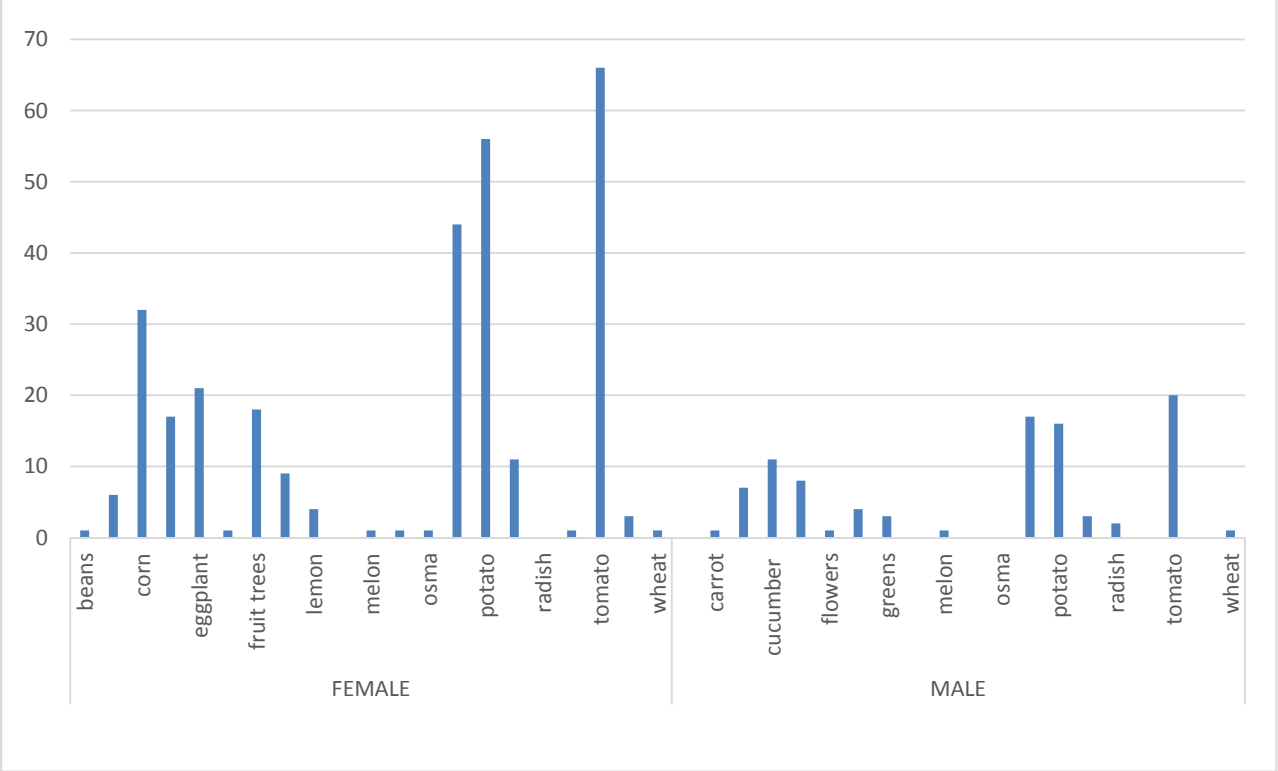


During the cotton season the households are aware that the water will be scarce and their irrigation is adapted to be done once a month or given at times when the farmers' irrigation is stopped.

Responses have divided almost into 50/50% in regards to existence of irrigation schedules. Answers related to having a schedule were tied with farmers' irrigation schedules and regulated by farmers water masters. This may signify that households hold certain responsibility for water spent and the limits for kitchen garden irrigation. Households diversify their crops to secure their primary food items and also to be able to have excess of marketable fruits and vegetables which are either sold in the local market or can be sold to exporting companies.

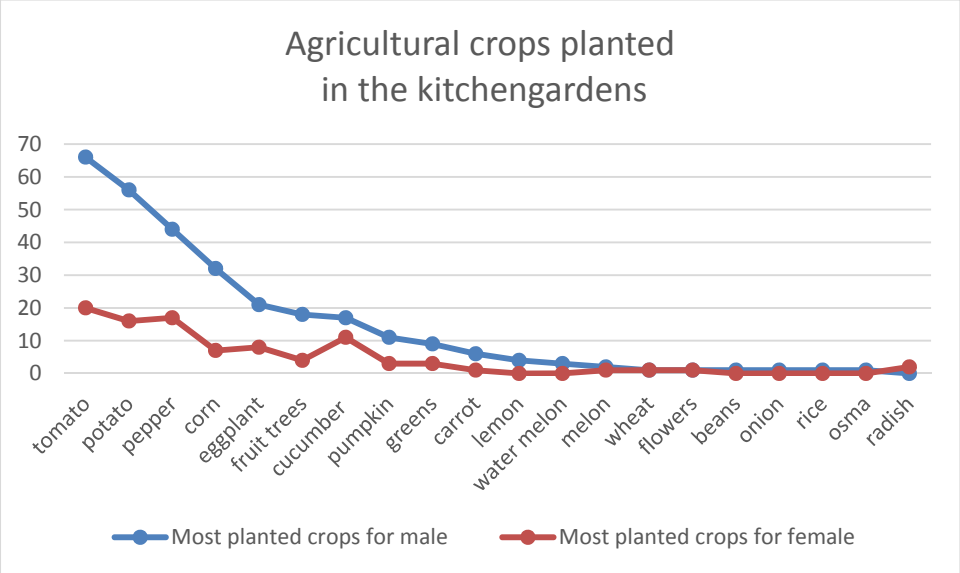
Disaggregated by gender the kitchen garden items categorized crop types also can indicate to the nutritious value of what is consumed by the households. At same time the graph reveals that women are planting more vegetable items which are of the most of use for food and fodder.

Figure 19.



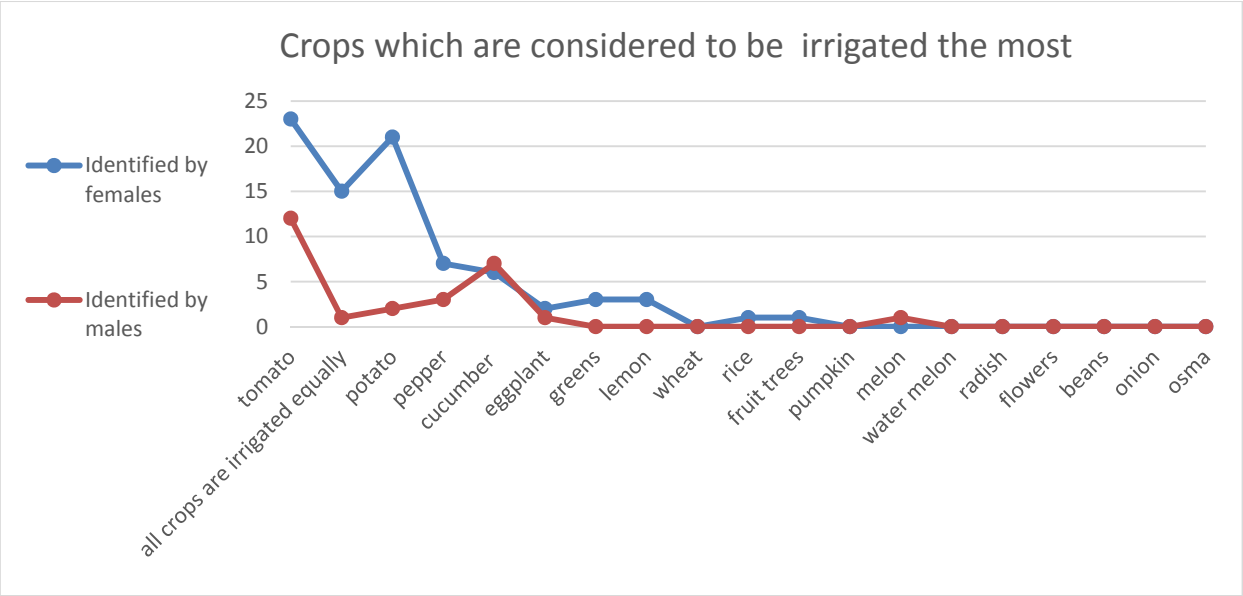
Looked from the prioritization angle, top ten list of the most planted in the kitchen garden plot includes: tomatoes, potato, pepper, corn, eggplant fruit trees (including grapes), cucumbers pumpkins, greens and carrots (Figure 20).

Figure 20. Agricultural crops planted in the kitchen gardens



In terms of crops which are considered by households to me the most water consuming, some of the answers coincided with the most planted, at the same time this question revealed lack of knowledge of some women in regards to crop irrigation norms as some answered that all crops are irrigated in an equal way (Figure 21).

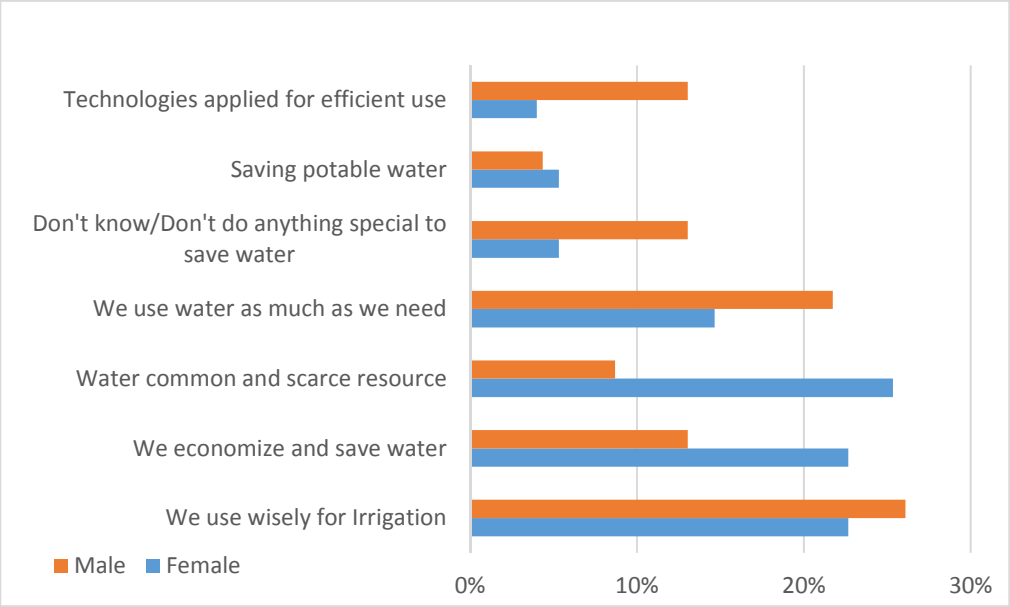
Figure 21. Crops which are considered to be irrigated the most



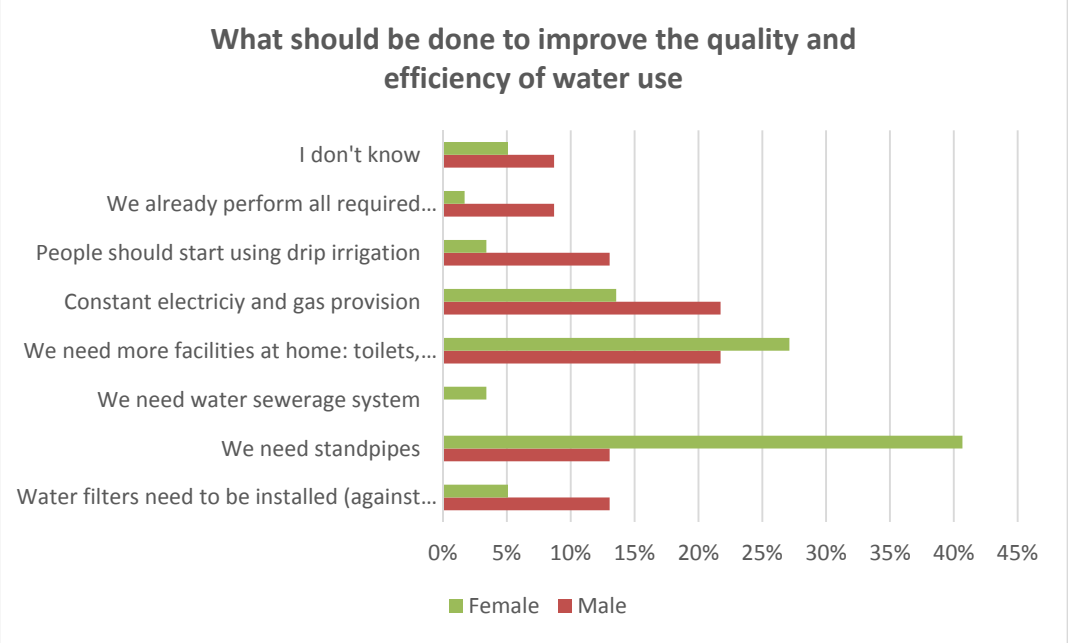
Individual perceptions about efficient use of water resources reflect attitudes and potential possibility of adapting water saving or other smart technologies, thus respondents were asked about what do they do for efficient use of water resources. Household members understood efficient use to be related more to canal/river water or potable water sources. There are several responses which mention technologies which technologies applied or which could serve to be saving water source: “We switch off the hand pump, don’t use water purposelessly, and take only what we need. As electricity is also expensive, we don’t use the pump too often.” (Interview: #45, female, Ahshak, Pahtakor mahalla). Women recognized efficient use related to understanding that it’s a common and scarce source and that it should be economized and saved: “We

economize water. We don't spend water unless it is urgent. We use artesian water for only drinking" (Interview: #55, female, Ahshak, Pahtakor mahalla). For other purposes we try to use hand pump. Male respondents related the efficient use with water wisely used for irrigation and also that currently the water is used as much as needed and not more since it is not always available: "We use water when we really need it. When you have less water you will automatically save it" (Interview:# 40, male 59, Akhshak, Khotinqumi mahalla, Navoi street).

Figure 22. What do you do for efficient use of water resources?



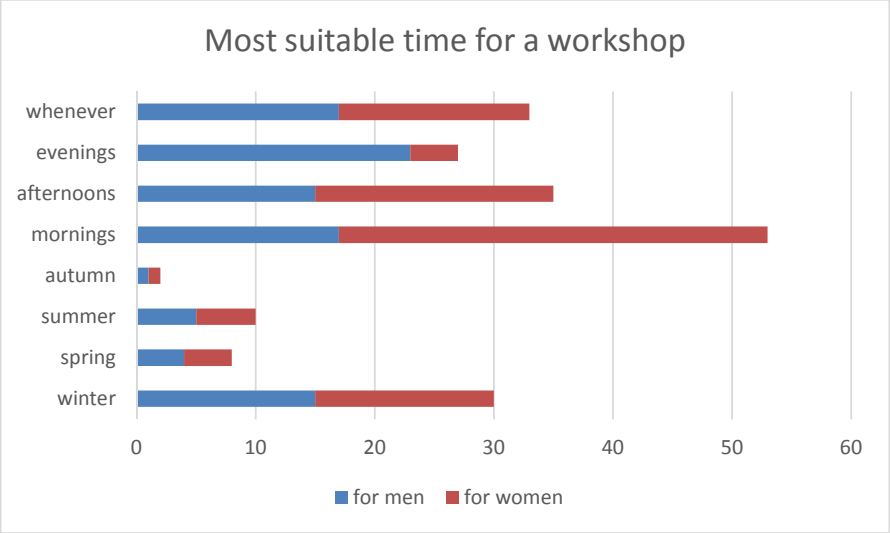
Looking at the perspective or future of efficient water use, the households were asked the question: "What do you think what should be done to improve the quality and efficiency of water use?" was a way to understand what household think they might need and think would be improved. Female representatives being the ones in charge of presence of water for their daily use answered that it would be good to have standpipes in each household, also they indicated that for efficient use of water facilities as kitchen, bathrooms and toilets inside the house should be built.



Next steps/ Capacity building/ Uptake

Interactive workshops are proposed to be planned for the next year with the objective of increase awareness and knowledge of household female and male members on the topics of water and energy efficiency and provide recommendations on new practices and approaches on improved water and energy use efficiency. Interactive workshops can also include presentation of results will help to validate gathered data from the interviews and can serve to design up-take activities for the beneficiaries of the project and also for initiating similar surveys in other Dryland Systems Program activity sites. With this in mind the household members were asked to indicate suitable and available time for participating in such workshop. Both men and women preferred winter time, however the timing during the day differed with women preferring the workshops to be in the mornings and men in the evenings.

Figure 23. Workshop participation timing preferences



The workshop will include community and local authority representatives, Water Consumers Association as well as specialists (related to: gender, water saving technologies, ground water, crops and trees).

The database of responses needs further deeper analysis and also should be compared with similar data gathered from other WUAs to understand more the water use efficiency indicators impacted by the performance/ conveyance of water by the WUAs or weather the efficiency lies more in how water is used and which technologies are applied within the households.

Note: Attachments are available upon official requiest from the International Water Management Institute and CRP Dry Land Systems Central Asia representatives.