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WATER PRODUCTIVITY IMPROVEMENT AT PLOT-LEVEL (WPI-PL)

Phase II

ANNUAL REPORT

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SIC ICWC

IWMI International Water Management Institute

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Abbreviations

WUA	Water Users Association
ADB	Asian Development Bank
BISA	Basin Irrigation System Authority
ER	Expected Results
YPO	Yearly Plan of Operations
WUG	Water Users Group
DH	Dekhkan Household
IAC	Irrigation and Agricultural Consulting (Tajikistan)
IWMI	International Water Management Institute
IWRM	Integrated Water Resource Management
IWRM-Ferghana	The Integrated Water Resources Management in Ferghana Valley project
IC	Information Centre
CC	Coordinating Committee
KSRII	Kyrgyz Scientific and Research Institute of Irrigation
ICWC	Interstate Commission for Water Coordination
MAWR	Ministry of Agriculture and Water Resources of Uzbekistan
MIWR RT	Ministry of Irrigation and Water Resources of the Republic of Tajikistan
MAWPI KR	Ministry of Agriculture, Water and Processing Industry of the Kyrgyz Republic
MTP	Machinery and Tractor Center
SRI	Scientific Research Institute
NM	National Manager
NPCC	National Project Coordination Committee
PSC	Project Supervisory Committee
CPM	Country Project Manager
SIC	Scientific Information Centre
WUA- SU	WUA Support Unit
SO	Social Organization
FFS	Farmer Field School
PD	Project Document
WPI-PL	Water Productivity Improvement at Plot-Level Project
WP	Water Productivity
RAS	Rural Advisory Services
SANIIRI	Central Asian Research Institute for Irrigation
CECI	Centre Canadien d'Etude et de Coopération Internationale
SDC	Swiss Agency for Development and Cooperation
CA	Central Asia
ZOKI	Advisory Training and Information Center

1. MAIN PROJECT PROVISIONS

1.1 Main Project Goals and Objectives

The main objective of improving water management at field level lies in the following:

To contribute to ensuring of guaranteed earnings, enhancing the environmental sustainability, reduction of conflicts related to water issues and, thus, to add to social harmony through improved efficiency of water management.

Goal of the 2nd phase of the project is:

To increase water productivity, crop yield and stability of crop yields at field level through improved intra-farm management and, consequently, through water management at field level, thus preventing negative environmental impacts of such factors as waterlogging and salinity.

The objective of the 2nd phase of the project is:

To strengthen the capacity (in the field of knowledge, educational material and methods) of the various players of agricultural innovation systems through strategic alliances in order to transfer to farmers the basic (adapted for understanding) educational ideas on improving water productivity at field level.

2. MAIN PROJECT ACHIEVEMENTS FOR 2009-2011

2.1 Work implementation and main results on ER1

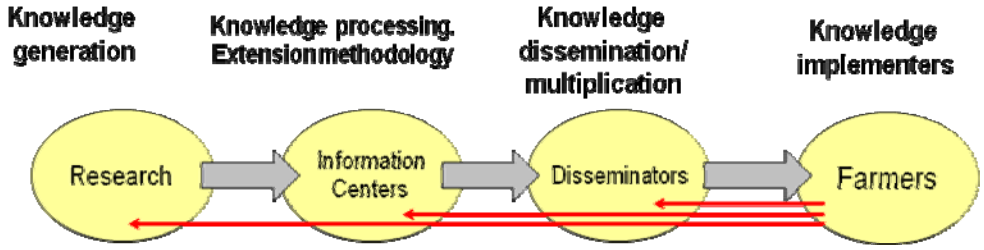
ER1: National partners are identified, structural and personal links are established, and mode of cooperation is established.

In order to meet the objective the following activities were planned:

- Identify and select partners according to certain criteria, and establish National Project Implementation Teams, select National Project Manager and project responsible persons in each partner organization
- Identify ways of cooperation and information flow, as well as to decide where to start experimental works
- Identify potential additional partners at the local level, according to the criteria
- Establish 'councils' for exchange and coordination at the local level

General progress on ER1:

In WPI-PL project for the first time in the practice of implementation of international projects, new vision and strategy proposed by SDC was adopted. All project objectives and issues were implemented by local partner organizations, the activities corresponded to the three main selection criteria of the project. Scientific organizations, information centers and advisory services (disseminators) were selected that already have experience in agricultural and water sector and dissemination experience in working with farmers, as well as sufficient technical, organizational and structural capacity to develop the process of adaptation and transfer of knowledge to farmers. Based on this strategy, national partners were identified on each country in the three republics of Fergana Valley - Kyrgyzstan, Tajikistan and Uzbekistan (**Appendix 1 and 2**). Project implementation was entrusted to the regional organizations SIC ICWC and IWMI, who entered into agreements with each national partner organizations; each organization is an independent partner in the implementation of project objectives.
Within this project, a system of interaction between the partners in each country was created and strategies of national groups were identified; in this project, for the first time, a new management and implementation system of international projects based on partnerships of various organizations aimed to achieve a common goal was implemented.



18 key partners were involved in the project: 2 main partners in the regional group - an association of SIC ICWC and IWMI, and 16 national partners - organizations selected for the implementation of the project objectives on the sites. (**Appendix 1**).

In Kyrgyz Republic advisory work with farmers and dissemination of improved technologies was carried out through 13 basic trainers-consultants: agro-technicians from OshRAS and hydro-technicians from WUA SU. Both organizations are working in the same areas. Osh-RAS, on the basis of demonstration fields, conducts advisory work among farmers in agro-technical activities, and WUA SU - works on organizing water accounting system on branches, and organizes water distribution within the branches between farmers' fields. WUA SU combines its actions on providing consultation to farmers with Osh-RAS (**Appendix 2, 2.1**).

In Tajikistan, the activities of the project are covered in six districts of Sogd province based on consulting services of "Irrigation and Agricultural Consulting" and NGO "Zarzamin" through 8 project trained trainer-consultants. (**Appendix 2, 2.3**)

In Uzbekistan, BISA employees were selected as disseminators: Syrdarya-Sokh, Naryn-Kara Darya and Naryn-Syrdarya, which covers 13 districts of Fergana, Namangan and Andijan provinces. (**Appendix 2, 2.2**)

To improve the interaction and coordination between partners in order to solve existing problems, support decision making and establish the information flow between the partners in each state Coordinating Councils (CC) were established. This enabled quick and timely response to farmers' requests without any delay.

In order to establish clear operational relationship between the partners during the period between CC meetings, it was decided to hold weekly working meetings (WM), where there was an exchange of experiences, and current issues were addressed. Working meetings were held rotationally with trips to the fields and with the participation of all stakeholders - research institutions, ICs and disseminators.

In Uzbekistan, organizational changes were made by creating 2-information centers in Andijan and Fergana. This decision was taken by the Uzbek partners to establish a more productive interaction between trainers and farmers, more rapid response to their needs and requirements, faster response of farmers needs in training and advice, and to expand the coverage of farms by the project.

Outcome on ER 1:

1) In WPI-PL project for the first time in the practice of implementation of international projects, new vision and strategy was adopted, proposed by SDC and based on the innovation cycle.
2) The project created a system of interaction between the various organizations. The activities correspond to the three main areas of the project: research organizations, information centers and consulting services (disseminators) that already have experience in agriculture and water sectors and dissemination experience in working with farmers, as well as sufficient technical, organizational and structural capacity to develop the process of adaptation and transfer of knowledge to farmers.
3) Based on this strategy, national partners were identified in each country in three republics of the Fergana Valley - Kyrgyzstan, Tajikistan and Uzbekistan (**Appendix 1**); every organization is an independent partner in the implementation of project objectives.
4) Within this project in each country action strategies for national groups were identified (**Appendix 2**)
5) For the first time in international projects a new system of implementation of international projects was tested based on partnerships of various organizations to achieve a common goal.

2.2 Work implementation and main results on ER2

ER 2: Partners in the innovation system have commonly revisited/identified the needs of farmers and analyzed them in view of matching them with known approaches and technologies to increase WP in order to select the ones innovations that can be disseminated and others requiring adaptive research.

In order to meet the objective the following activities were planned:

- analyzed evaluations of farmers' needs conducted previously, and conducted needs assessment that was focused on water management at field level and aimed at identifying gaps in knowledge.
- identified technologies (including farmers' innovations), corresponding to the needs of farmers, which could be implemented / had a high adaptation potential that would contribute to water productivity improvement.
- selected technologies that could be immediately integrated into the educational process, (ER3 & 4) and those that required adaptive research (ER5).

General progress on ER2:

Based on the evaluation of all information, the project established and summarized the existing problems at the field and farms level:weak communication, lack of sustainability and development of the WUA, low literacy of farmers in irrigation, agricultural, and legal issues that lead to a number of problems that require complex solutions, and the influence of various organs and structures to improve them, including public.

Farmers' problems and deficiencies at the field level can be basically summarized as follows: water allocation among water users is random, each water user uses irrigation water at his own convenience, without control, discipline, order or agreement (**Appendix 3**). Water delivery planning organizations are unable to control timing and amount of water use; water users are unable to obtain irrigation water in a timely manner and in required amount, especially water users located downstream not only along the main canal, but also along branches. As a result the conflicts between farmers arose that were not solved and the lowest link in the overall water structure

chain - Water Users Association - worked up to the farm borders or to the border of allocation of farm groups with small areas. Furtherdown, where the farmers, inter-farm water distribution and use of irrigation water takes place at the field level there are problems with water use; no institutional or engineering issues are considered at this level.

Based on the analysis, project **systematized the needs and problems** that directly or indirectly affect the efficiency of irrigation water use, and which can be ranked on institutional, technological, financial, economic and legal ones. In turn, out of these problems, the project identified the following: problems that can be solved within the framework of this project, and problems that cannot be solved within the framework of the project, but which affect the productivity of land and water at the field level.

Common to all countries that are solved within the framework of the project are the following needs and requirements:

Institutional: issues related to proper organization of agricultural and irrigation works in the field; issues of organization of water accounting and installation of water metering facilities; difficulties in the acquisition of resources (seeds, fuel, fertilizers, machinery and transport, late availability of these resources breaks the mode of irrigation water supply during the whole irrigation season).

Technological: issues related to the timely and normalized performance of all irrigation and farming practices in accordance with crop water requirements; lack of water accounting and water measuring devices; low level of farmers' knowledge in the technology of irrigation and farming practices.

Issues where the project actions are limited and project cannot solve the problem during this phase

Institutional: Issues of timely and adequate irrigation water delivery (the WUA level), the lack of efficient mechanism of interaction between water users and WUAs (within the project areas in Kyrgyz Republic and Uzbekistan the basis for solving these problems was formed, although it also refers more to the WUA level); limitations in the acquisition of resources.

Financial-economical problems with mutual settlement of accounts for the provided products, lack of cash and as a result the impossibility to carry out necessary field operations requiring cash settlement with the executors; the acquisition of additional resources (fertilizer, fuel, machinery); payment for the services of the WUA and other similar organizations with whom the farmer has a service contract**.**

Legal: Problems associated with the preparation of contracts with entities providing the resources, banks and agencies selling farmers' agricultural products, the lack of knowledge and information about their rights and responsibilities, rights and responsibilities of agencies with whom the farmers enter into e contract.

Unfortunately the problems that cannot be solved within the project are constraints to the introduction of new technologies to achieve the expected and the potential effectiveness and efficiency of irrigation water use, and to obtain the potential yield by farmers.

Based on identified needs and problems of farmers the technologies aimed at solutions were identified that improve water and land productivity. Regional group SIC ICWC on the basis of the results of IWRM-Fergana project has developed 19 recommendations and technologies to improve water and land productivity and transferred those to all the partners for adaption at the beginning of this project (**Appendix 4**). As a result of the survey conducted on the use of these technologies by farmers, it was found that only 17 out of the 19 technologies met farmers' needs.

In Kyrgyz Republic and Tajikistan, out of the 17 selected technologies in the first year 10 technologies in Kyrgyzstan, 11 in Tajikistan, and 17 in Uzbekistan were refined considering local conditions. The developed technologies in the form of recommendations transferred to farmers through advice and specific manuals. The remaining technologies, after analysis and adaptation to local conditions, will be used in subsequent years.

On the basis of practical needs and demands of the farmers, analysis of materials from the monitoring was carried out. As a result, 14 recommendations and key technologies were identified that can be applied for wide dissemination among farmers without further elaboration. In 2009-2011, the following technologies were the core of the proposed recommendations to farmers:

1. Guidelines on selection water-measuring device type, requirements to their, construction, and operation of water-measuring devices.
2. Instructions for the measurement of water flow on the weir for calculation of farm and irrigated field water supply.
3. Irrigation water requirements of major crops based on the development phases.
4. What is crop irrigation regime?
5. Recommendations on the selection of the technological irrigation scheme.
6. Manual on calculation and selection of norms and elements of irrigation techniques for cotton and winter wheat
7. Determination of soil moisture. Specifying times and irrigation norms based on soil humidity conditions.
8. Development of water use plans for farms.
9. The mechanism of efficient irrigation water use in farms with small plots (on example of Sokolok canal).
10. Water flow in the furrow and the calculation of the duration of irrigation.
11. Guidelines on extension work with farmers.

12. Opportunities to improve water and land productivity based on agro-meliorative certification of farms;
13. Farming practices and land preparation for irrigation season.
14. Recommendation on the conclusion of business agreements and contracts in particular for the supply of irrigation water.

During 2009-2011 partners made every effort to adapt proposed recommendations, most of which had been adopted by farmers without any additions and changes.

Gender Issues

WPI-PL project team did not divide the equality of men and women in the project area. The project equally provided training for both men and women.

Analysis of gender issues in access to and management of water resources was conducted. In agriculture and water management gender inequality takes place related to the right on land use, access to water and participation in the division of responsibilities, control over resources, opportunities for participation in agricultural water management, as well as access to market and business services.

National groups formulated the basic problems of gender equality in agriculture and water sector.

The project provides all possible assistance to female farmers, who in comparison to men expressed the greatest activity in acquiring knowledge. For the Central Asian women leadership is not typical; today, the current situation has forced women to do more, while carrying on their shoulders the household activities and trying to successfully resolve the issues that are the prerogative of men. Given this situation, the project solves the contradiction between the requirement of time and mental considerations, supporting active women, providing training, increasing women's education, their professional and legal knowledge. Thus, the training in Tajikistan was attended by 8 women out of 57 participants, in Kyrgyzstan - 66 women out of 285 participants and in Uzbekistan 17 women from 360 participants.

Outcome on ER2:

Based on analysis, the **project systematized the needs and problems** that directly or indirectly influence efficiency of irrigation water use and that can be divided into institutional, technological, financial-economical and legal. In turn, these problems were divided into the ones that can be solved within the project and those that cannot but which influence water and land productivity at plot level.

In order to solve problems identified based on indicators of their practical requirements and farmers' requests, project identified a set of technologies that meet local conditions of agricultural production.

Based on 3-year activities,14 main recommendations and technologies were identified that can be used for wide dissemination among farmers on a permanent basis.

There has been little shift in consciousness, first of all, in men's opinion of the social status of women. And it is a hindrance for the future. The actual situation is that women's activities have increased, as well as number of female farmers.

2.3 Work implementation and main results on ER3

ER3: A first set of known/researched technologies are translated into a farmer-friendly language, are available for dissemination (e.g. for ToT to national partners), and a well-selected variety of trainers is trained to carry out dissemination to farmers.

In order to meet the objective the following activities were planned:

- Identified dissemination strategies, extension approach(es) and trainers to disseminate technologies/extension messages, adapted to local conditions.

- Conducted search and analysis of existing educational materials on the technologies selected for dissemination; determined the types of products under development and developed materials to be used for training of trainers and farmers.

- Conducted Training of Trainers.

General progress on ER3:

The project conducted evaluation for each country based on which the specific conditions of farms in each state were established. Given these conditions, the project developed dissemination strategy for each country based on the mechanisms to effectively use the project proposed advanced technologies.

In Kyrgyz Republic, in the agricultural sector farms have small areas, mostly up to 1 hectare are developed. Under such conditions, water allocation and distribution of irrigation water among farmers by the WUA, with their

existing arrangements, is almost impossible and does not exist (in the region, almost all WUAs, regardless of the state allocation mechanism are designed for large farms of 1,000 - 4,000 hectares developed for the conditions of collective farms of former Soviet period). As a result, water use planning on the part of the WUA is made only to the canal border; water usersintakes are located furtherdown. In Kyrgyz Republic, the project created, proposed and used a water distribution and water allocation mechanism, that is based on water allocation for a group of farmers fed with a water intake point (branch). The specificity of this approach is that water management, under the given conditions, is based on the organization of water accounting in the head with the hydropost and the organization of water accounting by each farmer based on the number of his irrigation furrows. And most importantly, this work is done by a selected branch leader among the farmers, who records both the water intake by branch and water delivery to each farmer and pays for the volume of water used by each farmer. Water accounting is implemented per hectare of watered area, thereby equalizing all water users under one set of irrigation rate established by water suppliers. Based on this mechanism, the proposed project approaches to improve water and land productivity are transferred to farmers through branch leader. All information is supplied to branch leader through disseminating organization. Information Center provides training to trainers of disseminating organizations and in turn disseminating organizations provide training to branch leaders and farmers.

In Tajikistan, the system of dehkan farms is developed, with large areas managed by the Chairmen of DF. The basis of these DF are shareholders with small holdings of land. None of the shareholders knows where his share of land is located. WUAs are not developed and system of Rayvodhozes still exists. However, the water allocation is carried out either by the WUA, if it exists or through the Association of DF. In either case, DF faces the lack of qualified specialists, rules of water allocation and water accounting systems. In Tajikistan, disseminating organizations organize a system of water accounting on demonstration fields and for all interested farmers. Based on the installed WFM on their lands farmers are offered normalized water supply, at times determined by the WUA specialists - agronomist and hydrotechnician. For greater transparency and manageability, farmers are trained not only how to measure water, but how to calculate, and keep the records on water received from the WUA. The project provides the legitimacy and implementation of water accounting with farmers by WUA and Rayvodhoz and implementation of payment based on volume of water, adoption and legal registration of all water accounting documents and payment. The organization of the water accounting system and normalized water supply to farmers - this is the first step in the overall strategy. The second step is to develop a mechanism of interaction of water users with WUA based on engineering and technical developments provided by economic incentives and legal documentation.

In Uzbekistan, farmers have large areas of more than 50 hectares per farmer. The big issue is the lack of an objective planning and irrigation schedule between farmers, lack of water accounting at the farm level, the appointment of excessive watering rules, irregular and unstable water supply, wrong timing and duration of watering for each farmer.

In Uzbekistan, the project proposed to develop an effective mechanism to resolve issues, which is based on the effective interaction between the two levels of WUA and farmers. And in this respect, already in this phase the project took first steps on the level of pilot WUAs. Everything is based on the work of two key WUA personnel - agronomist and hydrotechnician, who should be included in the WUA. This system provides for the organizational work not only on establishment of a system for extension and dissemination of knowledge and technology in the WUAs to farmers, but also improves the structure of the WUA and its work. Both structures are one unit and a working system at WUA; one unit is closely linked with the other and therefore the success of both structures depends on the effectiveness of their mutual and coordinated work. WUA agronomist and hydrotechnician are involved and are the main executors of irrigation scheduling for each farmer. During the growing season, they hold constant monitoring of farm fields, in which they are assisted by branch hydrometers (mirabs) (quarternary canals). They keep track of crop water demand and availability of each field and the farmer to receive water. On the basis of such monitoring key experts perform consulting work and the transfer of new technologies for efficient use of water by each farmer based on the problems or errors that are identified by specialists. These specialists provide information to the WUA to which farm WUA can or should supply water and to which farm it is not necessary. On this basis, a mechanism for close interaction between WUA and farmers is created. Key specialists protect both farmers' interests and the interests of the WUAs on the basis of objective and actual needs of farmers and WUAs' opportunities.

Training of trainers and dissemination of knowledge and technologies

System to disseminate knowledge and technologies is based on the training of trainers and farmers through the preparation and distribution of extension materials in the form of newsletters, brochures, posters, manuals, etc. through trainings, individual and group counseling and through the media. Regional group had expressed its opinion and made preliminary suggestions on the organization of farm schools in the WUA.

All the recommendations proposed for dissemination recommendations were simplified to a level of farmers' understanding and most of them were translated into local languages. The information on issued and distributed educational materials used in the training of trainers and farmers, is given in **Table 1**.

Table 1. Information on issued and distributed educational materials used in the training of trainers and farmers

Country	Publications						
	Newspaper	Brochures	Leaflets	Posters	Manuals	Recommendations	Guidelines
On irrigation issues							
Uzbekistan	8	26	0	0	1	4	2
Kyrgyz Republic	2	20	5	5	0	0	0
Tajikistan	2	22	0	0	0	2	0
On farming practices							
Uzbekistan	19	11	0	0	1	1	0
Kyrgyz Republic	0	5	0	0	0	0	0
Tajikistan	4	17	0	0	0	1	0
Total by project	**35**	**101**	**5**	**5**	**2**	**8**	**2**

The dissemination of technologies in each country is based on the interaction of four key actors of the process on implementation of innovation cycle. These are: farmers, disseminating organization, information center and research institute. Disseminating organizations have been monitoring the problems, needs and gaps in the farms, analyze them, assess, and at the same time due to trainers-disseminators' qualification give their advice to farmers; all identified problems are transferred to the information center, which also holds its analysis at a more advanced level. Based on this evaluation, it develops recommendations for disseminating organizations and through training of trainers-disseminators prepares these recommendations to be transferred to farmers. The same issues that have no solutions at the level of information centers are sent to the RI for more in-depth analysis and search of solutions. Those, in turn, analyze problems, find solutions and bring these solutions to the IC. Thus the whole cycle continues and is repeated throughout the year.

In each country, approaches and methods of training were developed taking into account local circumstances and conditions of existing experience in extension services.

In Kyrgyz Republic, the training of trainers and farmers are held once per month. At the end of the training, the subject and date of the next training is determined (based on the demands and needs of trainers and farmers). During the month Osh-RAS and WUA SU consultants conduct training of farmers on their demo plots, using the obtained skills, knowledge and materials. The theoretical part of training is conducted in the office, and practical sessions on demo plots. At each training, participants receive handouts, brochures and leaflets.

Evaluation of used methods and approaches for training of trainers and farmers in Kyrgyz Republic showed that each training should be conducted on a particular topic, because training on several topics at once was ineffective. There is a need for in-depth training on hydrometry, water metering, calculation of volume and flow of irrigation water to the field, record keeping on water measuring and the other for the majority of Osh RAS consultants, as they are agronomists. For WUA SU specialists, on the contrary, it is necessary to conduct more training in agronomy, plant protection, plant pests and diseases, etc.

In Tajikistan, each trainer meets with farmers 2-3 times a month, identifies their needs and requirements, provides individual consultations on all aspects of agro-hydro technologies. In cases of common issues, the group consultation is conducted. To solve specific issues, the trainers contact Information Center (CECI) and Giprovodkhoz, and the materials received from them in the form of newsletters bring to the attention of farmers.. Training for trainers in the Information Center is held as needed, depending on the outstanding issues at the level of disseminators and, depending on the technology offered by RI.

In Uzbekistan, the information center issues newsletters 1-2 times per month based on farmers' needs and requirements. Newsletters are distributed among farmers, consultants and trainers by disseminators, given the relevance of the material to farmers. In each district in pilot WUAs one demo plot trainer and one WUA trainer is selected. Both of them are trained in the information center and both work with farmers throughout the area covered by the pilot WUA.

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Table 2: Total number of trainings conducted within WPI-PL project

Country	Number of farms, (units)	Number of trainings	Area covered by the project, ha
Tajikistan	577	85	39 411
Kyrgyz Republic	32 189	141	68 216
Uzbekistan	1 435	147	121 276
Total in project coverage area	**34 201**	**365**	**228 903**

Outcome on ER3:

In Kyrgyz Republic the project introduced a new system of allocation based on the organization of water accounting for groups of farmers with small areas. This system allowed: to eliminate conflicts between farmers, ensure fair payment for the amount of irrigation water actually used by each farmer, and use of irrigation water effectively and rationally.

In Tajikistan, the project organized system of water accounting for each DF allowed to shift from the per hectare payment to calculation of the payment based on the volume of water actually used, reduced the cost of payments for water by 40-50%, and, accordingly reduced the amount of water used for irrigation;

In Uzbekistan, the proposed system of key personnel in WUA (hydtrotechnician and agronomist) allowed to discipline the system of water management at farm level; standardize the use of irrigation water to introduce a system of water accounting in each farm, to increase knowledge of farmers through a system of ongoing monitoring and advice of key experts - agronomist and hydrotechnician in WUA.

In each country, a system of regular monitoring of farm problems, finding solutions through scientific research institutes, development of training materials and recommendations through information centers and transfer of decisions and recommendations to farmers through disseminators was implemented.

The project, on a regular basis, conducted trainings of disseminating organizations' trainers by information centers, clerks, irrigators and trainings of farmers by trainers of disseminating organizations.

In 2008, during surveys of farmers, the irrigation issues were not clearly expressed, and were hidden (only 17% of the questions were related to irrigation). In 2009, after the project specialists conducted trainings and outreach among farmers, in the whole complex of problems/questions directly connected with the irrigation water were about 60%, and after receiving the necessary advice and tangible savings of irrigation water and thus saving money due to installation of water-measuring devices and organized system of water accounting on demo plots and farms covered by the project activities, in 2010, the proportion of water issues was as high as 70%.

2.4 Work implementation and main results on ER4

ER4: Satisfaction of farmers with the provided training/advice is evaluated in two pilot areas in each of the three countries.

In order to meet the objective the following activities were planned:

- disseminated selected hydro-technologies by trained trainers in pilot areas together with corresponding agro-technical messages and evaluated satisfaction of farmers with the consultations provided in pilot plots;
- combined dissemination evaluation with continued needs assessment.

General progress on ER4:

Evaluation of satisfaction of farmers with provided trainings, and adaptation (introduction) of the technologies received on their field was carried out via trips by the regional working groups directly to the field to meet with farmers in an informal setting. This evaluation made it possible to identify positive and negative aspects of organization of dissemination, training and demonstration activities.

Farmers support the involvement of experienced and recognized agronomists into the staff of the WUA and the organization of two key individuals work – agronomist and hydrotechnician as consultants in the WUA. Farmers recommended that their staff positions are to be approved by the Councils or at WUA annual meetings and maintenance costs to be included in the budget. Such a center in the WUA must not only be a center for consultations, but also a place where everyone will share their views, experiences and jointly take appropriate solutions.

Farmers noted the importance and usefulness of monitoring forms (**Appendix 5**) based on the technological map, designed and proposed by the project as a basis for not only conducting advisory work for consultants, but also as the schedule for the farmers for proper planning and consistent implementation of all irrigation and agricultural activities for the year.

Farmers accepted the materials distributed by the project. Training and project newsletters are very helpful for them; if previously they watered their land by the 400-meter long furrows in 13 days, now, based on the recommendations they made their furrows 50 m long, and managed to complete the irrigations only in 3 days.

Farmers admit that sometimes they do not have time to read the brochures and newsletters, due to workload and other objective reasons. Therefore, farmers asked to explain the essence and benefits of the proposed bulletin in an informal setting, to hold informal training sessions closer to their farms, directly on their land, at a convenient time and place.

From the interviews with farmers, it became clear that training and advice are received by them as a positive project approach; they learn a lot and try to implement knowledge in practice. Farmers also expressed a desire to organize training for irrigators (per each 2-3 ha, farmer hires seasonal irrigators) and organize school for irrigators under WUA.

Farmers pointed out that the consultation should be more convincing to farmers; argumentativeness of beliefs about the importance of proper water supply was essential. They noted that the confidence of farmers to consultants must be earned. Farmers noted that the use of effective technologies was obvious for them; as a result of advice received farmers obtain more profit by 30-40%.

Farmers also noted that the consultation should not be one-time and be provided during training or at separate meetings. In addition to the methodical and informative work, consultations should take place also on the current issues of farmers; for that hydrotechnician and agronomists are required to visit farmers' fields, assessed the state of the fields and plants, the status of implemented activities and during the rapid assessment on the ground talk with farmers and give them qualified advice.

In all three countries, farmers noted the positive role of project technology demonstration directly on the field. Farmers noticed that this was a good approach for distribution, and good opportunity to consolidate the theoretical skills learned during the training and education, with practical, i.e., classes at demo plot, where farmers can clearly observe the growth of plants or implementation of activities related to watering and apply (repeat) this on their fields, to ask questions when problems arise during implementation on their fields.

Construction of hydroposts

To determine the need to equip WUA and farm canals covered by the WPI-PL and IWRM-Fergana projects, the cameral treatment of cartographic materials submitted by the field implementer of national teams was conducted. Based on results of decoding of cartographic materials for each base WUA schematic drawings of irrigation networks were developed, with the existing and required water measuring devices and control structures. The total demand for water measuring devices and structures for WUAs covered by WPI-PL project are shown in **Table 3**.

Table 3. Information on total demand for water measuring devices and structures for WUAs covered by WPI-PL project

#	WUA	Number of required hydroposts, (units)	Number of control structures, (units)
	Tajikistan		
1	WUA "Nuravshan"	47	62
	Kyrgyz Republic		
1	WUA "Kzyr-abad"	37	4
	Uzbekistan		
1	WUA "N. Soliev"	50	50
2	WUA "Tomchi Kul"	59	50
3	WUA "K.Umarov"	70	70
4	WUA "Kadyrjon-Azamjon"	16	16
	Total	**279**	**252**

Thus, the base WPI-PL project WUAs required 279 hydroposts and 252 units of control structures.

Similar work was carried out in the base WUAs covered by IWRM-FV project which required to equip canals with 201 units of water-measuring devices and 225 units of control structures (**Table 4**).

Table 4. Information on total demand for water measuring devices and structures for WUAs covered by IWRM-FV project

#	WUA	Number of required units	
		hydroposts	gates
	Uzbekistan		
1	Akbarabad	33	60
2	S. Kosimov	40	40
3	Aktepa Kyrgyzobod	55	55
4	Khirmon Aziz	47	40
	Total	175	195
	Kyrgyzstan		
7	Uch-kunam	14	18
	Total	14	18
	Tajikistan		
9	Gulyakandoz	12	12
	Total	12	12
	Grand total	**201**	**225**

On WUAs located in transboundary small rivers' (TSM) zone the required amount was 153 units of water measuring devices and 153 units of control structures (**Table 5**).

Table 5. Information on total demand for water measuring devices and structures for WUAs within TSR area

#	WUA	Number of required units	
		hydroposts	gates
	Uzbekistan		
1	WUA "Akhror Mirob Muminjon"	50	50
	Total	**50**	**50**
	Kyrgyzstan		
2	WUA "Jorkaron"	50	50
3	WUA "Kulundu Rozakov"	53	53
	Total	**103**	**103**
	Tajikistan		
4	WUA "Obi Ravon Ovchi Kalacha"	50	50
	Total	**50**	**50**
	Grand Total	**153**	**153**

Total required number of water measuring devices in 3 countries was 683 units of hydroposts and 689 units of gates.

Out of 683 units planned for construction in 2010 434 units were constructed and commissioned. This year as of November 1, 166 hydroposts were constructed; the remaining 83 units will be constructed by the end of 2011 (**Table 6**).

Table 6. Information on planned and actual construction of hydroposts

#	Project and WUA	Plan on the annual basis	2010	2011	
			constructed	constructed	remained
1	Uzbekistan	420	325	65	30
2	Tajikistan	109	109	0	0
3	Kyrgyzstan	154	0	101	53
	Total	**683**	**434**	**166**	**83**

Construction of drip irrigation system

Within WPI-PL project, in order to demonstrate water-saving technologies for improved irrigation management at the field level SDC initiated the construction of drip irrigation systems. Farms focused on horticultural crops and located in most water deficient area with deteriorating conditions of water supply were selected: in the Fergana region, Fergana district in WUA “Hirmoni Aziz” farm "Akbar Ali Faiz" (10 ha apricot, cherry, peach) and farm "Progress Shaukat" (5 ha cherry, peach), and in Namangan province in Kasansay district farm "Damgul Dastasi" (25 ha grape). The total area of constructed drip irrigation system was 40 hectares.

In "Akbar Ali Faiz" farm drip irrigation system was built on an area of 10 hectares for horticultural crops; drip irrigation system was 600 meters long and 167 meters wide. In "Progress Shaukat" farm drip irrigation system was built on an area of 5 hectares for horticultural crops; drip irrigation system was laid on the entire area. In "Damgul Dastasi" farm drip irrigation system was installed on an area of 30 hectares for vineyard, of which 5 hectares were equipped earlier at farmer’s own expense.

Outcome on ER4:

Analysis of results showed that due to the advisory work carried out with farmers, crop yields increased although with low visibility but high-impact for those farmers who followed the advice.

As a result of training and project work farmers have changed views on the use of water; they understood the main point– that the water has dimensions and irrigations have norms for each crop and soil conditions.

Farmers point out that the usefulness of the proposed effective technologies is obvious for farmers, and as a result of advice received the farmers profits have increased.

To improve the management of water allocation and water use at WUA and farm level, it was decided to equip all farm intakes with water measuring and control facilities at all the base WUAs covered by WPI-PI and IWRM-FV projects. Within WPI-PL project, on the basis of equipment, an irrigation water accounting system was organized at the boundary of all farms. This allowed for creating a foundation for effective water distribution at WUA level. At the same time, it enabled the introduction of volumetric water accounting. Within the WPI-PL project on WFM-2 sub-project out of planned 683 units of water measurement structures 434 units were built and commissioned in 2010. This year, as of November 1, additional 166 units of hydroposts were built; the remaining 83 units would be constructed before the end of 2011.

In order to demonstrate water-saving technologies for improved irrigation management at the field level, drip irrigation systems were installed in an area of 40 hectares in the Fergana and Namangan provinces.

2.5 Work implementation and main results on ER5

ER5: Adaptive research to evaluate the sustainability of technologies proven successful under different environment (e.g. on financial viability, labor aspects, gender viability)

In order to meet the objective, the following activities were planned:

- Assessed technologies requiring adaptive study (ER2), through cameral and / or on-farm adaptive research,
- Submitted research issues related to technologies requiring in-depth study to the relevant research institutes,
- Identified farmers’ water management innovations at farm/field level, and
- Assessed the impact of the project on water productivity and yield stability/yields at field level.

General progress on ER5:

RIs carried out work on adaptive research based on needs and requirements of farmers. Selected technologies that required adaptive research were studied by research institutes, and in 2010-2011 in the form of individual advice were used by IC for training purposes. In the technologies on irrigation regimes, some sowing times of crops did not meet the climatic conditions of Osh and Soghd. Technological map of irrigation, designed for the conditions of Andijan province had to be adapted to Osh and Soghd conditions. In Uzbekistan, out of the technologies proposed adjustment of wheat irrigation regime was implemented; at present, various kinds of seeds of this crop are used and the recommended irrigation schedules would be clarified.

A review of existing research, design and advisory materials of research institutes was conducted and materials that met farmers' needs and requirements related to efficient irrigation water use were selected.

On the basis of these materials RI developed further guidance on the following technologies for dissemination:

1. Application of advanced technique elements and technology of furrow irrigation and border-strip irrigation.
2. Application of improved farming practices to improve soil fertility and productivity of water by mulching.
3. Fertilizing irrigation through the introduction of liquid fertilizer with irrigation water (fertigation).
4. Selection of technique and technology of furrow irrigation depending on soil texture and slope.
5. Recommendations for the optimal combination of elements of furrow irrigation techniques for different conditions of Fergana Valley.
6. Recommendations on the selection of elements of furrow irrigation techniques that provide high coefficient of performance (COP).
7. Recommendations for winter wheat irrigation regime depending on the depth of groundwater and soil texture.
8. Recommendations for the leaching of saline lands.

As a result of a three-year scientific research KyryzNIIIr further developed four recommendations for dissemination; SF Tajikgiprovodhoz - 3, SANIIRI - 3, Institute of Breeding of Uzbekistan - 2 (**Appendix 8**).

Drought-resistant and low moisture capacity cotton varieties

Within the project, in addition to technologies proposed by research institutes, the search of existing scientific developments was carried out, on the topic of effective irrigation methods. In addition to this project, in cooperation with the Institute for Breeding of Uzbekistan held adaptation of new varieties of cotton that requires 3 times less water; scientific developments were presented on drought resistant and early maturing varieties of cotton and technologies of seeds treatment with high voltages in order to stimulate germination, growth and development. These technologies were tested in DPs of Tashlak and Baghdad districts in the Fergana Valley, and demonstrated fairly good results. At a later date of sowing (by two weeks on average) the number of cotton irrigations were reduced (from 5-7 to 2), with irrigation interval of 30 days; reduction of the total water supply for the growing season by more than 3 times (from 8,800 to 2,100 m^3/ha) and increasing the yield up to 47 c/ha. These varieties have been tested on the farms of the Fergana province in Uzbek part of the project.

To increase water productivity of agricultural crops, the development and use of high yielding, drought resistant varieties is very important.

Since 2010, the project had involved scientists from the Breeding Institute of Uzbekistan that offered several new varieties of cotton- the water demand of which is almost 4 times less than the conventional varieties. To adapt and test these varieties in the Ferghana Valley plots were selected which were planted with new varieties of cotton; In Tashlak district on 4 ha area in 2010, and on 13 hectares in 2011 studied cotton variety "Turon", which for the whole season received only 2600 m^3/ha of water. With such water supply the yields on the experimental field was 4300 kg/ha. In addition to drought resistance, the main characteristics of this variety were– earliness-113 days, high fiber quality, high weight of 1 boll (6,6-6,8 g), weight of 1000 seeds (127-130g) were significantly better than conventional cotton varieties.

In Baghdad district, in terms of soil salinity, drought and salt resistant (low moisture capacity) varieties "Gulistan", "L-179 and A-151" were planted. As a control, a traditional variety C-6524 was planted in this area. Seeding of C-6524 was done 2 weeks earlier than the new varieties. Water supply for the new varieties was 2100 m^3/ha in two waterings. Part of the new varieties were treated with the complex fields of high voltage current to stimulate the germination, growth and development. This gave additional positive results. Despite the late sowing, the new varieties caught up with C-6524, and in some places where the seeds were treated with the complex fields of high voltage, they were few days ahead of development. C-6524 had a rather small boll (5.2 g) while Gulistan was 6.7 g, L-179 was 6.4 g and A-151 was6.2 g, and the treatment increased their value by 0.1 - 0.2 g. The biological potential of new varieties contributed to higher yields. Thus, Gulistan yielded 41.6 c/ha, and with treatment - 47.7 c/ha. A-179 - 34.0 c/ha and treated - 41.2 c/ha, respectively, and A-151 -38.0 c/ha and treated with high voltages - 34.4 c/ha, while C-6524 gave only 25 c /ha.

Table 7. Comparative table of new varieties and lines that are resistant to water scarcity and salinity in Baghdad and Tashlak districts of Fergana province.

Districts	Average value on districts			Average values on new varieties		
	Number of irrigations	Water (m^3/ha)	Yields (c/ha)	Number of irrigations	Water (m^3\ha)	Yields (c/ha)
Tashlak	4	4348	29,55	3	2660	43,58
Bagdad	4	4659	33	2	2100	42,36

The new varieties showed high efficiency to improve water and land productivity in the farms of Fergana province. The project contributed to the promotion of new varieties in Fergana province for farms where new varieties were tested. By permission of the district and province administration, these farmers harvested the seeds of new varieties from their fields to be planted the following year and to increase their use on lands with poor water availability (**Table 7**).

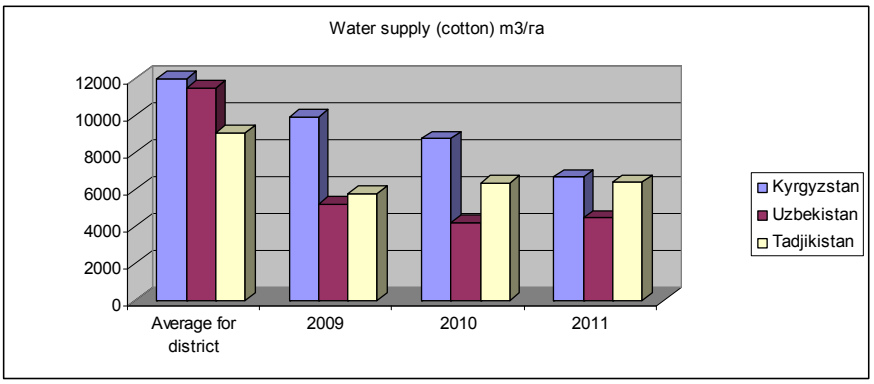
Farmers' innovations

It should be noted that there were a number of farmers' innovative solutions that were used for years and they have already proved their effectiveness. These include: irrigation technology on local areas of the field, watering with a delay to strengthen and deepen the root system, monitoring of moisture and soil temperature for starting another watering and so on. All these approaches have formed the basis of development of technologies that were later offered by the project.

Evaluation and analysis of irrigation water use and its productivity:

Evaluating the effectiveness of irrigation water use and its productivity carried out on the project area showed that the majority of farms in 2009-2011 obtained sufficiently high results. Farms, due to project recommendations achieved high efficiency of irrigation water use, taking into account soil and drainage conditions of the area and proper determination of irrigation timing and duration. These farms in the planning of irrigation were able to make decisions in difficult climatic conditions associated with high soil moisture as a result of heavy rainfall in wet years 2009-2010, and low moisture conditions in year 2011.
Despite the difficulties associated with abrupt climate variations, positive results were achieved in the pilot project sites. The reason for this was the timely monitoring and objective assessment of the situation, timely measures taken to pre-empt adverse weather and consequent conditions.
Comparative analysis of the mean values of total water use at pilot sites shows how the project managed to reduce supply of irrigation water and what potential regarding reduction in water use the region has (**Figure 1**).

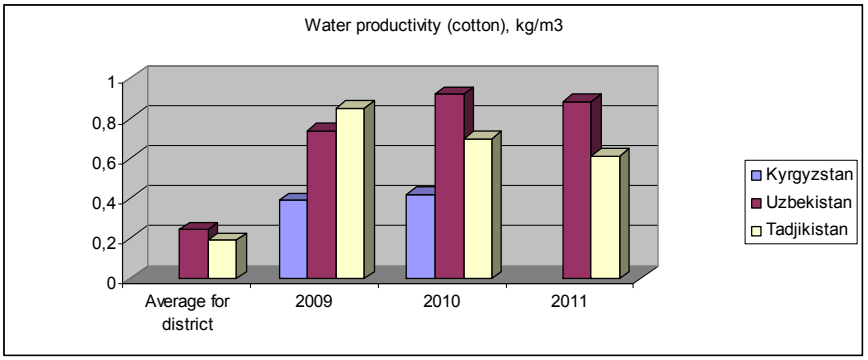
Figure 1. Comparative evaluation of values of the average water supply in the province and WPI-PL project pilot sites, m3/ha (cotton)



During Phase 2 project managed to significantly reduce the use of irrigation water in the project area compared to province values. Water supply decreased in the project area by 29.7% in Kyrgyz Republic, by 59% in Uzbekistan and 30% in Tajikistan.

Water productivity improvement in the pilot project sites achieved not only by reducing the amount of water supply, but also by increasing crop yields. This was made possible through the examination of the complex irrigation and agricultural issues that are closely interrelated and interdependent. This approach allowed the project to develop recommendations to ensure the efficient use of water and all other resources. Productivity in the project area is considerably higher than the average in the province (**Figure 2**).

Figure 2. Comparative evaluation of average water productivity in the province and project WPI-PL pilot sites, m3/ha (cotton)



As a result of project influence in Uzbekistan irrigation water productivity for growing cotton ranged from 0.74 to 0.92 kg/m3, in Tajikistan from 0.61 kg/m3 to 0.85 kg/m3 and in Kyrgyzstan from 0.39 kg/m3 to 0 52 kg/m3. High productivity values in Kyrgyzstan were obtained for grain crops and vegetables - in the range from 0.66 kg/m3 to 0.78 kg/m3 for grain and more than 2 kg/m3 for vegetable crops.

Of no small importance in improving water and land productivity is income of the farms, at which virtually all project activities are aimed. Monitoring data demonstrated that in recent years the cost of resources and the cost of work on agricultural production increased year by year. If 5-6 years ago, earnings were much higher than the costs, in recent years we have seen the opposite picture. Therefore, further developed and proposed recommendations should be aimed not only at improving water and land productivity, but also to reduce the cost of farmers' agricultural operations. Recommendations must simultaneously address issues of reducing the number of expensive operations and improve efficiency of each operation, through timely and high quality performance (for example, timely and good quality watering does not require repeated watering in short periods and ensures the effective development of the plant). In the project area the project was able to reduce the number of irrigations; the recommended water accounting system allowed in Kyrgyzstan and Tajikistan 40% reduction in costs for water; project recommended cotton planting on furrow ridge with winter irrigation reduced three agricultural operations associated with the use of expensive machinery.

Outcomes on ER5:

As a result of project influence in Uzbekistan water productivity for growing cotton ranged from 0.74 to 0.92 kg/m3 kg/m3, in Tajikistan from 0.61 kg/m3 to 0.85 kg/m3 and in Kyrgyzstan from 0.39 kg/m3 to 0 52 kg/m3. High productivity values in Kyrgyzstan were obtained for grain crops and vegetables - in the range from 0.66 kg/m3 to 0.78 kg/m3 for grain and more than 2 kg/m3 for vegetable crops.

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A number of farmers' innovative solutions formed the basis for the development of technologies that were later offered by the project.

Technology for growing drought-resistant varieties of cotton tested on demo plots in Baghdad and Tashlak district of the Fergana Valley demonstrated very good results: with a later sowing (on average two weeks) the number of irrigations of cotton were decreased (from 5-7 to 2) with irrigation an interval of 30 days; the total water supply for irrigation for the period decreased by more than 3 times (from 8800 to 2100 m3/ha) and yields increased to 47 c/ha.

2.6 Work implementation and main results on ER6

ER6: Knowledge on technologies to improve water productivity is anchored within national partners, a system that continuously assesses farmers' needs and elaborates corresponding extension messages is established; and dissemination of technologies improving water management at farm/plot level is enlarged.

In order to meet the objective the following activities were planned:

- implemented new innovation cycles on a continuous basis to ameliorate already tested innovations (followed ER) and to disseminate further technologies
- conducted regular impact assessments at the level of disseminators and farmers, performed outside pilot areas

- expanded project area with possible inclusion of additional project partners (at local level) and establishment of links with other donors to further boost dissemination beyond the reach of the project
- conducted yearly survey among project partners

General progress on ER6:

First experimental innovation cycle.

According to project innovation cycle, **first part** of planned activities during **spring-summer 2009** included the organization of works based on four main stages:

- comparative farmers' problems and needs assessment conducted by partners on the basis of regular monitoring of ER2 A2.1-A2.2;

- evaluation of technologies transferred by the project based on the adoption potential in terms of project objects and area - ER 2, A.2.3-A2.4;

- Selection of the technologies that require completion and submission to RI - ER 2, A2.4;

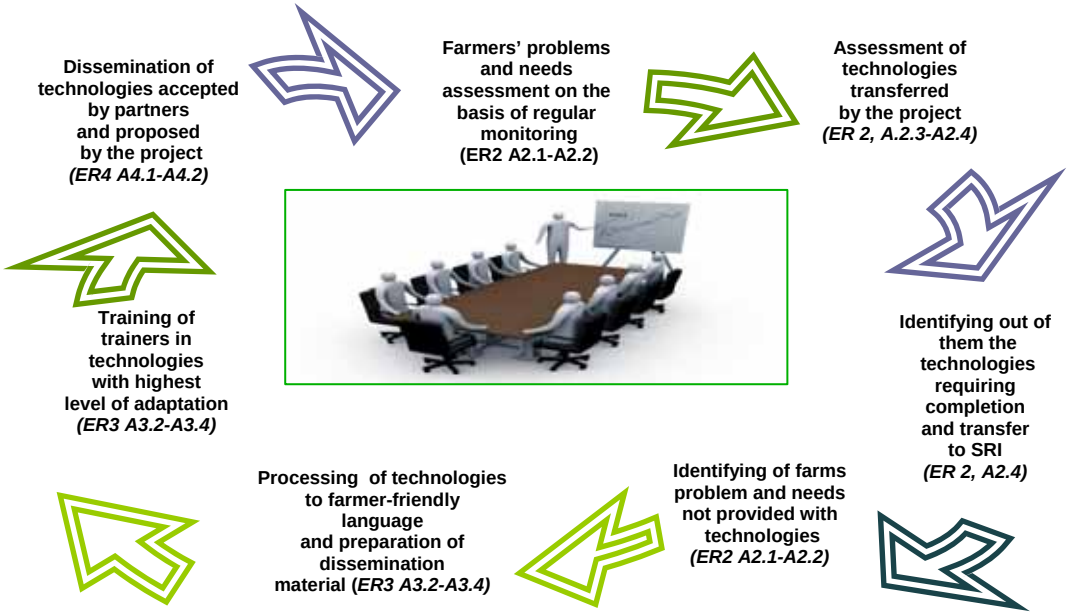
- Selection of problems and needs of farmer's not provided with the project technologies-ER2 A2.1-A2.2.

The second part of the first cycle is the continuation of the following steps at the same time it does not omit the consideration of those issues that were not completed or require constant consideration on each segment of the first part of the innovation cycle, **summer, autumn and winter 2009, winter, spring and summer 2010**:

- Translation of the technologies into farmer-friendly language and development of educational and dissemination materials on their basis ER 2, A2.4, ER3 A3.2-A3.4

- Training of the trainers in technologies with the highest potential for adoption ER3 A3.2-A3.4;

- Dissemination of the project proposed technologies accepted by partners ER4 A4.1-A4.2;



Second innovation cycle

This cycle consists of constant monitoring of farms' needs combined with dissemination and highlighting of the issues that require research or completion by RI as well as includes identifying of new technologies and proposals to solve those issues that previously did not have technological support during **spring, summer, fall 2010, and winter, spring, summer 2011**:

- Regular needs assessment combined with evaluation of dissemination- ER4, A4.3;

- Farmers' needs assessment and their provision with the existing technologies - ER 2, A.2.2,A2.4,

- Selection of needs and problems not supported by technologies and formulation of the requirements to RI on that basis to assess and identify technologies and finalize existing technologies- ER 2, A.2.2,A2.4, ER5, A5.2;

- Training of the trainers but including the additional new technologies (new cycle) and consolidation of old materials if necessary - ER3 A3.2-A3.4;

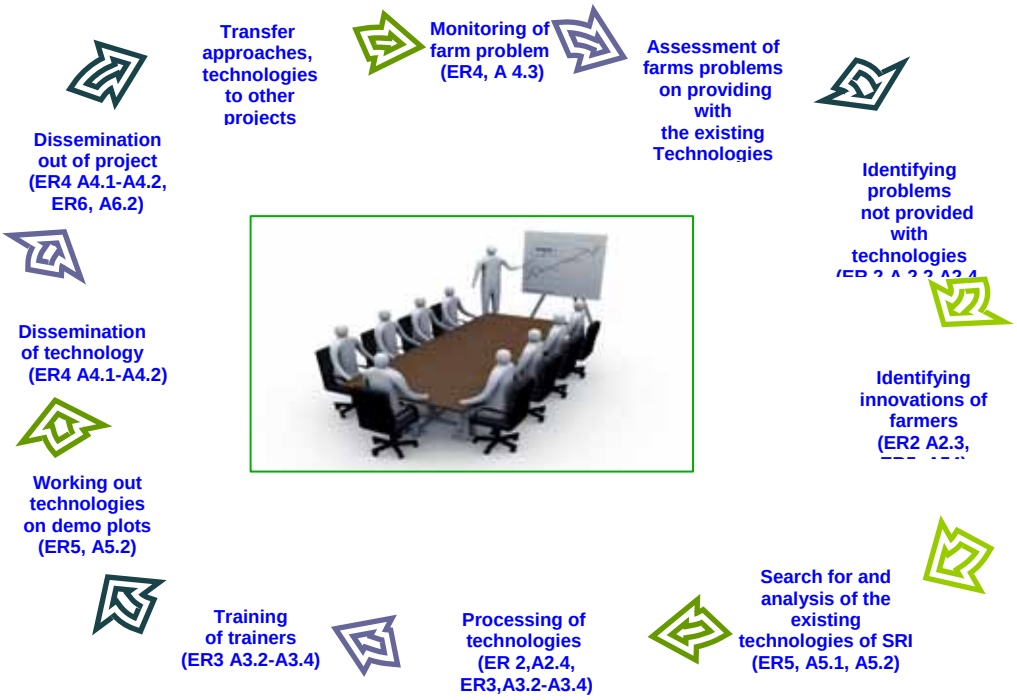
- Identification of farmers' innovations to improve productivity - ER2 A2.3, ER5, A54;

- Dissemination to other non-project areas on their request- ER4 A4.1-A4.2, ER6, A6.2;

- Search and analysis of existing advanced technologies on the basis of activities by other projects or organizations - ER5, A5.1, A5.2;

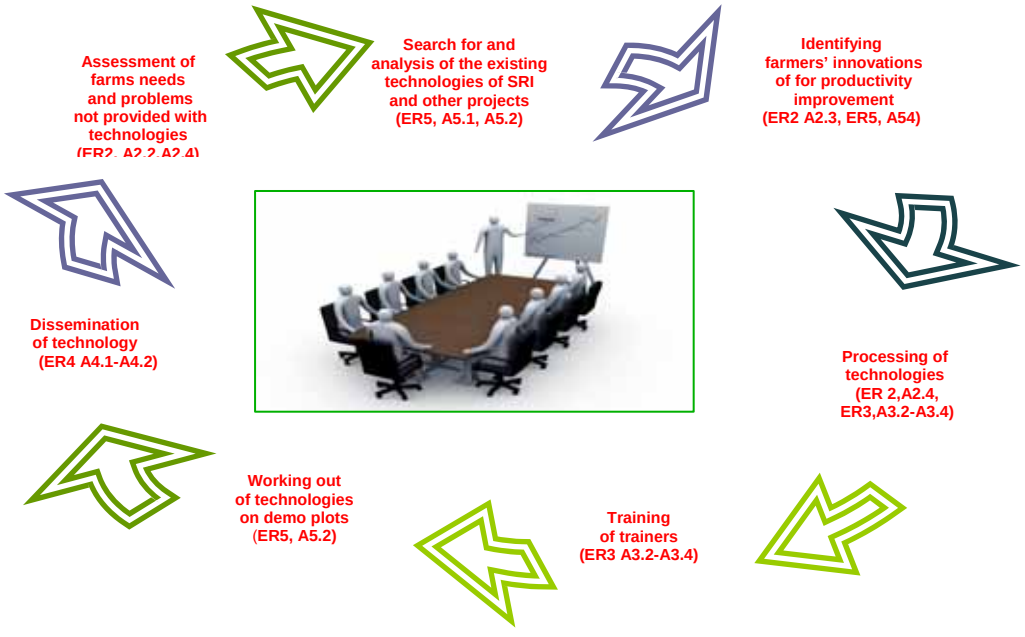
- Validation of the existing advanced technologies on project demo fields - ER5, A5.2;

- Transfer of the project approaches, technologies and ground works to other projects and interested organizations in order to expand the project scope- ER6, A6.3, A6.4.



Third innovation cycle

This innovation cycle is most important from sustainability point of view of whole innovation system proposed by project. If in two first two cycles the first step is assessment of farmers' needs and problems and then technology and only after that the research follows as supplement to main cycle activities. This cycle enhances whole system of innovation system by adoption of existing technologies, involving disseminators as task originator; their joint review with RI and close collaboration with IC on technology adoption; close contact with disseminators on training materials preparation in collaboration with RI and with its participation. This uses the relationship of RI and IC with other organizations; their involvement to solution of existing problems.



The expansion of project area and establishment of links with other donors to boost dissemination beyond the reach of the project

In all the countries of the project area, the authorities in the ministries are interested in the project approach to solving problems in water and the rural sector. Developing and bringing to logical conclusion the developed specific approaches for each country and innovation cycle operation mechanisms will provide a basis for wider and more stable use by the government of each state in the subsequent years. However, due to the fact that the whole process of the innovation cycle is transparent, the innovation cycle is reproducible / repeatable. Currently the area of project results dissemination is expanding. Today in Kyrgyzstan, Department of Water Resources at the request of administrations in Chui and Batken provinces are using the project approaches (project SEP) (**Appendix 7**). In addition, WPI-PL approaches and recommendations are used in projects of various donors - Helvetas, OSCE, UNDP / EC and World Bank. In Tajikistan, project materials and approaches are used in Hotlon and Kurgantepa provinces through various local and international organizations (AGRICULTURAL TRAINING AND ADVISORY CENTRE (ATAC), USAID WUASP), and in Isfara project in Soghd province. In Uzbekistan, the entire WPI-PL project dissemination material is currently used in the coverage area of RESP-2 project. In addition, Uzbek WPI-PL project partners are involved in capacity building of RESP-2 project specialists.

Regular impact assessments at the level of disseminators and farmers

To ensure objective and unbiased evaluation of the project, WPI project management appealed to the independent third party to conduct two Monitoring and Evaluation (M & E) studies. These M&E studies were conducted by the project team SEP Helvetas in all 3 countries. SEP project (efficient water use project) is a project on water management at farm level, aimed at complementing the efforts of the WPI-PL project in Kyrgyzstan. SEP project focuses on the level of disseminators (what WPI does only at the pilot level) and supports capacity building based on the needs for efficient water use at farm level. SEP project partners regularly use WPI-PL project materials and both projects are working closely.
The monitoring clearly demonstrated positive results of the project's impacts at the field level (see M&E Report).

Outcomes on ER6:

Innovation cycles, created within WPI are working successfully and operate independently in each country and are adjusted under existing conditions. The project managed to create a scheme of cooperation between the partners, which are equally involved at all levels. Together, these organizations addressed the issues identified at the farm level. All participating subjects of the innovation cycle have complete understanding of their roles, and they immediately respond to requests from other partners and support each other if necessary. The mechanism of the innovation cycle has proved its effectiveness and dynamism.
The monitoring and evaluation of WPI project implemented by third independent party clearly demonstrated positive results of the project's impacts at the field level.

In all the countries of the project area, the authorities in several ministries demonstrated their interest in the project approach to solve problems in water and the rural sector. Practical experience, results and dissemination material of WPI are successfully used in other projects: RESP-2 (Uzbekistan), SEP (Kyrgyzstan), Isfara (Tajikistan).

3. APPENDIXES

Appendix 1

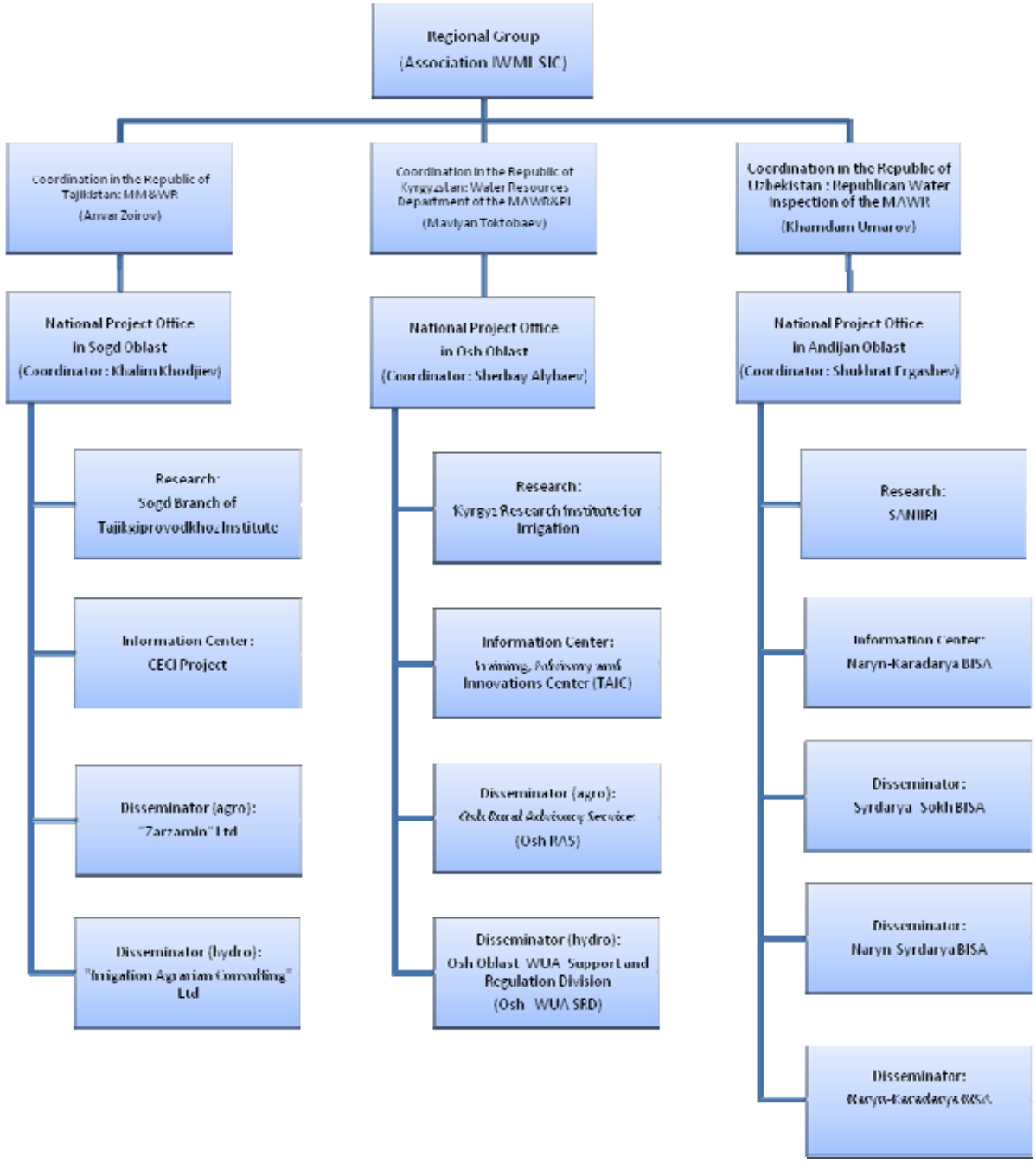


Figure 1. Structure of project organization and partners in the three countries

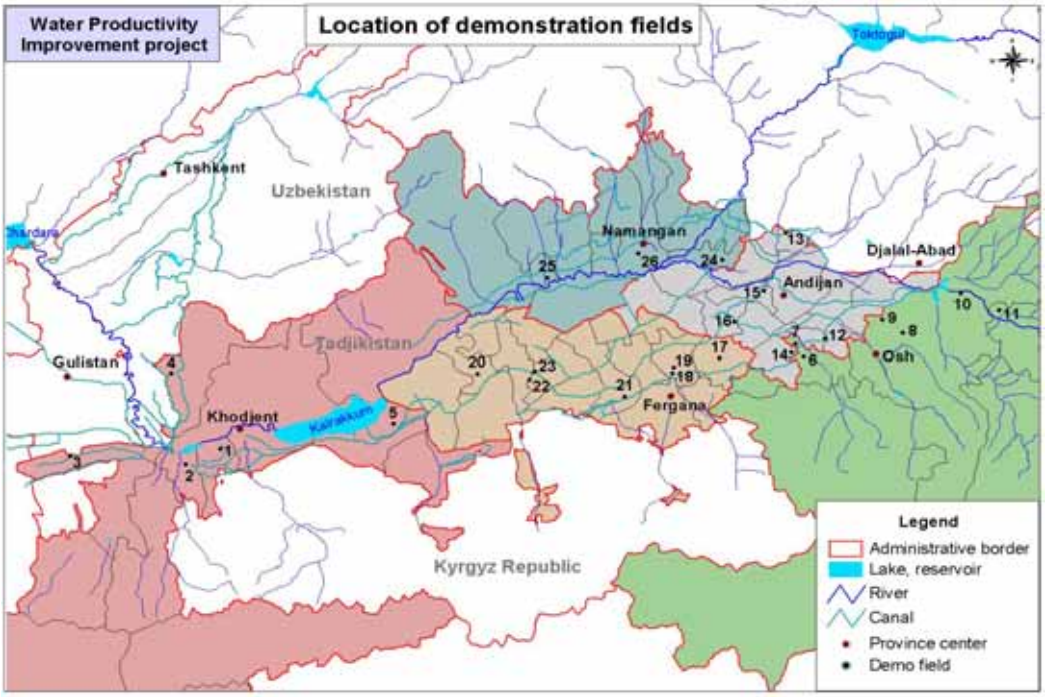
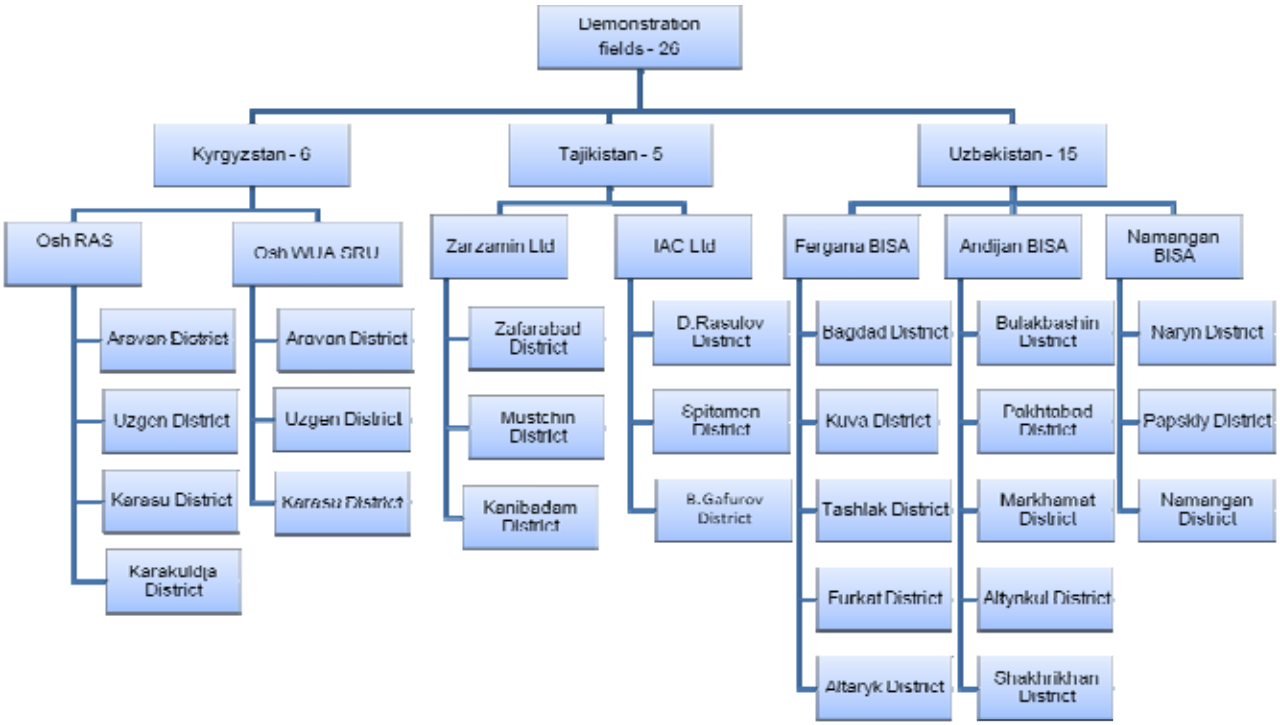


Figure 2. Map of location of demonstration fields within Ferghana Valley: **Tajikistan:** 1 – Buri Kurmas, 2 – Shark, 3 – Navbahor, 4 – Amakjon, 5 – Khimoyatbonu; **Kyrgyzstan:** 6 – Tukhtarov, 7 – Tolobekov, 8 – Absattarov, 9 – Kyrgyzbaeva, 10 – Mamafaliev, 11 – Jusubaliev; **Uzbekistan:** 12 – Akiev, 13 – Abdurahmon ota, 14 – Mirzakhmad sahovati, 15 – Baht imkon rivozh, 16 – Dilshoda, 17 – Kahramon davlat, 18 – Ergash ota, 19 – Sobir ota, 20 – Botirjon, 21 – Ortikov, 22 – Kosimov, 23 – Nilu, 24 – Durdona Gayrat, 25 – Omonov, 26 – Nabijon ota

Figure. 3: Distribution of demonstration fields by the districts of oblasts in the republics within the framework of WPI-PL project



Appendix 2

Figure 2.1 Structural linkages and interrelations among partners of the Kyrgyz national team

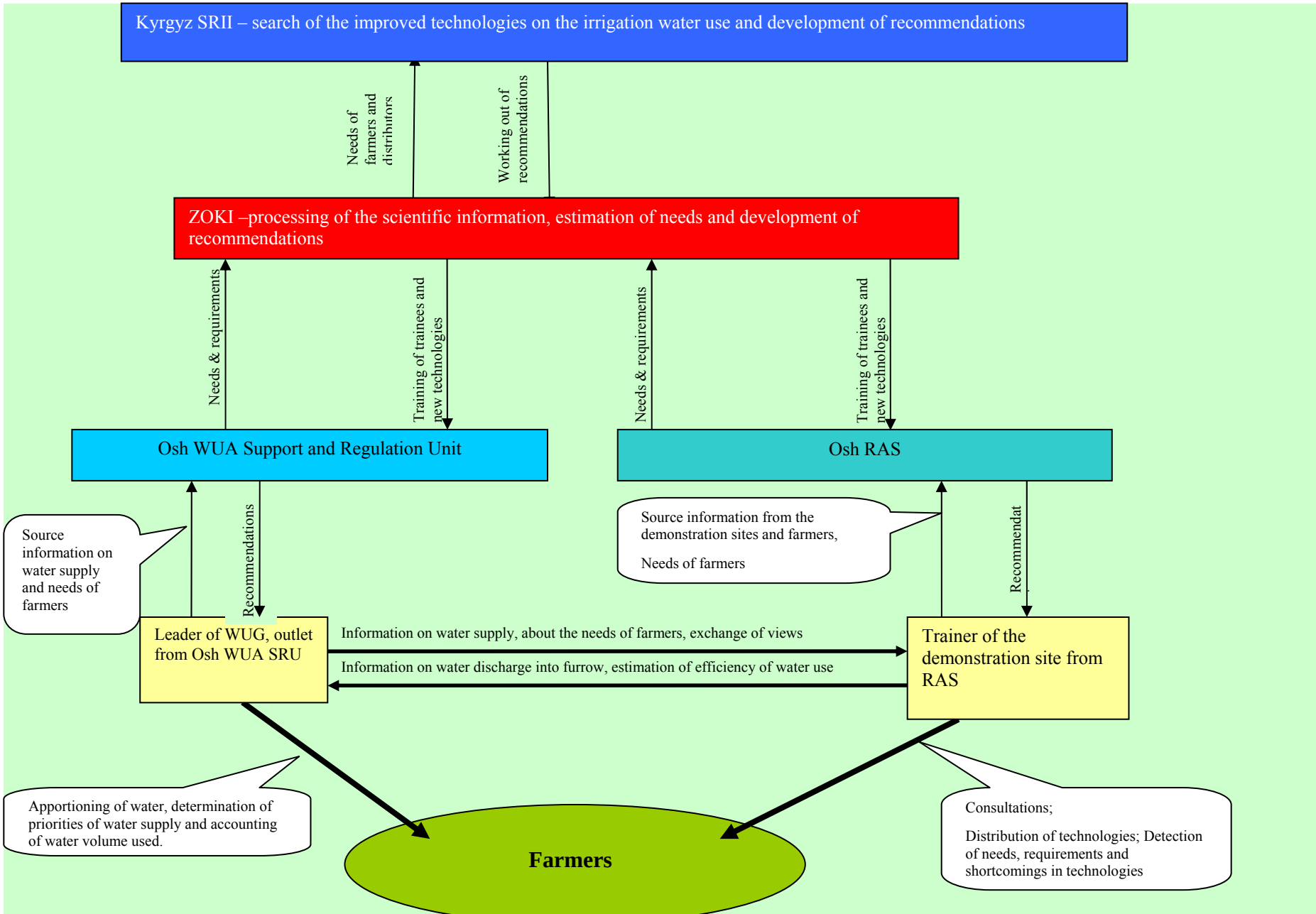


Figure 2.2. Structural linkages and interrelations among partners of the Uzbek national team

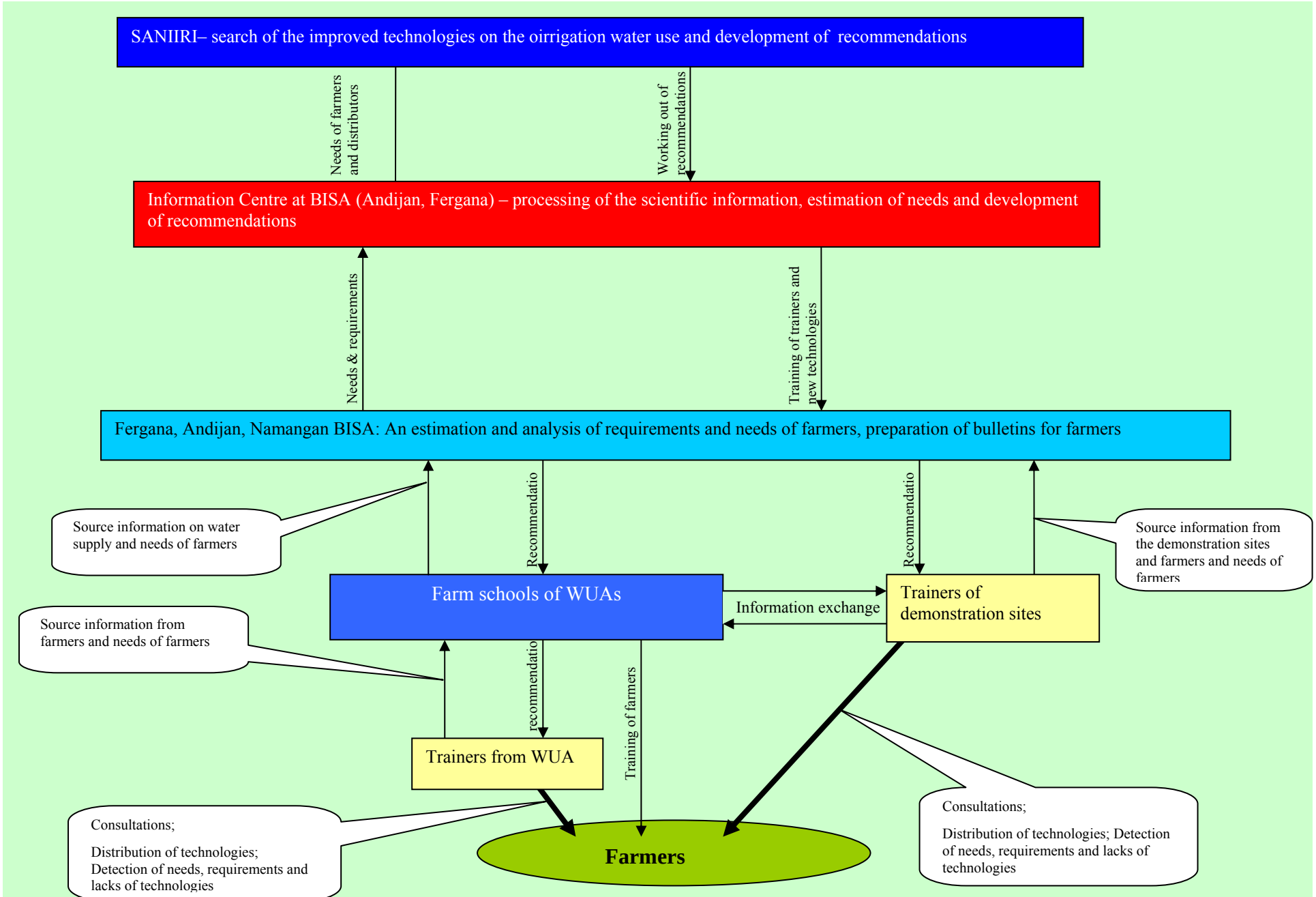
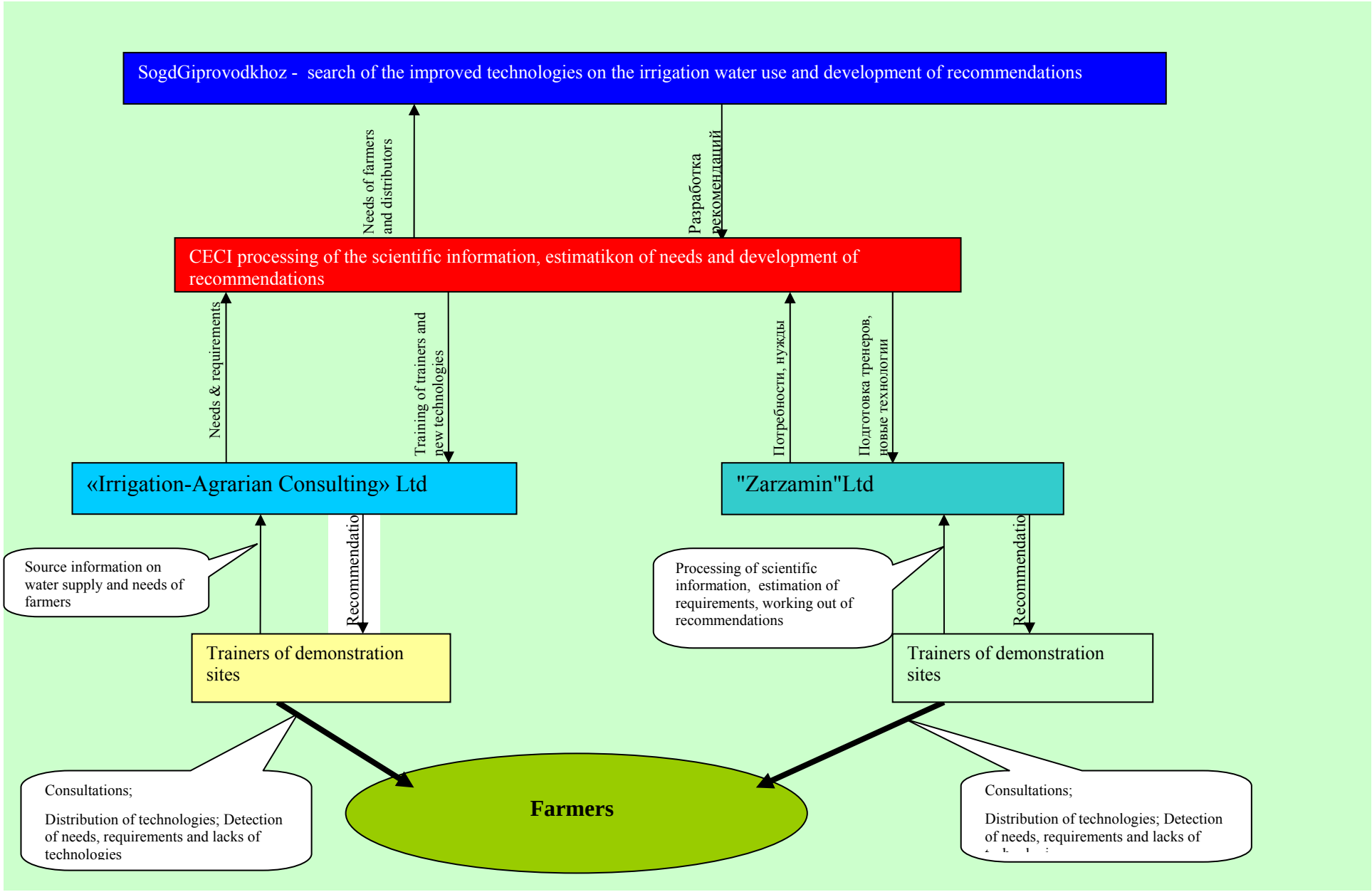


Figure 2.3 Structural linkages and interrelations among partners of the Tajik national team



Appendix 3

Problems and issues specific for the project area, identified by the WPI-PL Project

1. Unstable water supply at the farms' boundaries. How can this problem be solved if the problem is not solved by the suppliers of irrigation water? How to avoid the repeated irrigations under unstable water supply? The technology of water intake, supply of water to furrow and irrigation process flow chart should be analyzed for different soils and drainage conditions and different slopes of the terrain. Develop recommendations;
2. No water use plans for farms
3. The lack of specific recommendations for individual parameters of irrigation technique (supply in furrow, irrigation duration) for different soils and reclamation conditions,
4. No irrigation schedules for sandy soils and water-permeable soils;
5. Absence of wheat irrigation schedules (irrigation norms, timing, volume, duration, supply to furrows), irrigation technique and irrigation process flow chart for different soils and drainage conditions and terrain slope,
6. Irrigation schedule for various crops on lands with a high standing groundwater (irrigation norms, timing, duration, period between irrigations, consumption of water supplied to furows, the number of irrigations in a growing season)
7. The effect of groundwater on watering the plant root system. The percentage of this watering and how you can reduce water delivery at the water table of 0.5 m ... ... .1.5 m
8. The irrigation schedule for various crops on saline lands;
9. Standard seepage losses in furrow irrigation for different soil and drainage conditions and different cultures (scientific and research data and recommendations)
10. Standard losses when discharging water in furrow irrigation for different soil and drainage conditions and different crops (scientific and research data and recommendations)
11. Effective Irrigation practices for lands with steep slopes,
12. The mechanism of interaction of farmers with organizations planning and supplying irrigation water,
13. Broad dissemination of mechanism for the efficient allocation of water among water users with small acreage,
14. Water consumption per furrow for different soil and drainage conditions and for different crops;
15. Experimental data and recommendations for furrow irrigation. What are the benefits? In what circumstances this method is most effective? In what circumstances this method is not applicable? (Research materials and recommendations)
16. The assessment of profitable crops for lands with different water availability, and different soil and reclamation conditions, taking into account environmental requirements;
17. Requirements for crop rotation to maintain soil fertility,
18. Alternative crops that improve soil fertility.
19. The impact of cultivation on water retention in soil after irrigation. The optimal number of cultivation.
20. The efficiency of moisture supply irrigations, in which soil and reclamation and climatic conditions moisture supply irrigation can be used, with what norms and time frame.
21. Setting dates for the first irrigation for different crops. Negative and positive effects of delaying the first irrigation, taking into account the crop development phase and terrain conditions. Under what conditions the first irrigation can be delayed, and crops and conditions where it absolutely cannot be delayed. Crop development phase where irrigation cannot be delayed and in which phases productivity can be lost.
22. The low level of farmers' knowledge in carrying out irrigation and land treatment. Poor knowledge of their rights and responsibilities. It is particularly important in know how to draft contracts with various structures including WUA.
23. Farmers have no knowledge in types and timing of fertilization, cultivation and other land treatment operations directly related to irrigation activities.

Appendix 4

Technologies developed in the project IWRM-Fergana and proposed in the WPI-PL Project

1. Land treatment operations and land preparation to the irrigation period.
2. Ways to improve land productivity based on agro-ameliorative certification of farms.
3. Cotton pest and diseases control.
4. Instructions for the observation and measurement of water flow through Chipoletti and Thomson weirs.
5. Estimating soil moisture. Setting times and rates for irrigation.
6. The mechanism for the efficient use of irrigation water in farms with small acreage (based on the example of the Sokolok canal).
7. Needs and problems of farms hindering the improvement of water and land.
8. A guide for choosing a water-measuring device, the requirements for their construction and operation.
9. The need of major crops in irrigation water, by development phase.
10. The use of mineral fertilizers for cotton in the Fergana Valley.
11. Recommendations for entering into contracts between farmers and WUAs
12. Guide for advisory work with farmers.
13. Guide for the calculation and selection of standards and elements of irrigation technique for cotton and winter wheat on the results of the IWRM-Fergana Project.
14. Weeds and their control
15. Recommendations for selection of irrigation process flow chart.
16. Farms in Kyrgyz Republic, the rights and responsibilities.
17. Agricultural cooperatives in the Kyrgyz Republic
18. What is a crop irrigation schedule?
19. Guide for planning and carrying out land treatment operations in growing cotton.

Appendix 5

Table 11

Republic ---------- **Farm:** ----------

Province ---------- **Sown area** ----------

District **Texture of soil:** Pebbles with low cover thickness of pit-run fines

WUA ---------- **Crop:** Cotton

Monitoring of crops' growing and works performed in a farm

Standard indicators of agronomic activities and phases of cotton cultivation				Actual indicators of agricultural work and phases of cotton cultivation				Deviation of actual term from the normative-expected one		Reasons caused the deviation of actual term from the normative-expected one	
Approx date	Phases of growing	Approx inter phase interval	Activities in the inter phase period	Date	Inter phase activities	inter phase interval	Inter phase activities	Phase of growing	Inter phase activities	Phase of growing	Inter phase activities
25.11			Pre-arable irrigation								
03.12		5 months	Introduction of mineral fertilizers composed of 80 % of phosphorus & potassium & 5 t/ha of manure								
05.12			Under-winter ploughing								
25.03			Early-spring processing								
08.04			Presowing processing								
10.04			Introduction of nitrogen fertilizers of 30 % from the annual norm, (phosphorus & potassium of 70 %, if they are not introduced before ploughing).								
15-20.04	**Cotton sowing**										
16-17.04		5-10 days	Cutting of furrows								
17-22.04			Activate irrigation								
25-26. 04			Cultivation with hoeing								
			Sowing or re-sowing								
20-25.04	**Seedling emergence**										
30.04-01.05..		5-6 days	Cultivation								

30.04-01.05.	**Emergence of 2-3 of real leaves**										
5-10.05		25-30 days	Thin out of shoots								
12.05			Hoeing								
15.05			Weeding								
17.05			Cultivation the second with introduction of nitrogen potassium fertilizers composition								
20.05			Cutting of furrows								
20-25.05			The first irrigation								
25-30.05			Cultivation after irrigation								
30.05-01.06.	**Budding**										
30.05-01.06.		7-10 days	The second weeding								
02-05.06.			Hoeing of raw-spacing								

Appendix 6

Proposals for the partners of the WPI-PL Project on preparation for the forthcoming low-water season.

Dear colleagues, it is expected that this year will be low-water and unfortunately this forecast is confirmed.

We should be ready to respond to this and prepare farmers and various structures (WUA) to the water shortage. Therefore, we request all parties to prepare their proposals, based on the experience from previous dry years (2002, 2006, and 2008). In this regard, it is important to take into account the accumulated experience and use recommendations worked out in the Project.

Preparation of recommendations should be aimed at farmers and WUAs in all 3 countries and district-level and province-level water authorities in Tajikistan and the khokimiyats in Uzbekistan.

For dry years it is typical to have unstable water supply, therefore we need to develop the irrigation process flow chart with the shortest possible furrows (in the conditions of unstable water supply it is not possible to irrigate long furrow in one go)

Recommendations should contain the following:

- recommended water use plan;
- schedule of irrigation water supply for dry years;
- a set of agrotechnical measures, promoting water retention in the soil. The bulletins on irrigation dates should be prepared taking into account the potential shortage.

Our experts should inform farmers about irrigation rotation frequency taking into account water retention efforts, the duration of inter-irrigation period which may have to be extended.

You need to develop recommendations on using methods of the local or focal irrigation on the field.

To be effective, it is recommended that agronomists and hydraulic engineer of the WUA work together. Adjustment of the schedule of irrigation water supply can be effective if these two experts work together in the conditions of water shortage and irrigation rotation and use of local or focal irrigation.

The main focus must be on the accurate definition of timing of irrigation. It is also very important to use the spring precipitation in the preparation of land for the growing season. Namely, using the method of planting cotton on furrow ridges with preliminary moisture supply.

I ask all partners of the WPI-PL Project to develop a detailed work plan and recommendations for each province and specific soil-reclamation conditions on the basis of the above proposals.

The main areas for action at the field level in low-water season within the framework of the WPI-PL Project

1. Identifying areas with different water availability and with different soil-reclamation conditions and defining a complex of measures for dry areas.
2. Conducting water-charging irrigations and planting cotton seeds in furrow ridges;
3. Ensuring sprouts using natural moisture;
4. Extension of inter-irrigation period through agrotechnical measures (increasing the number of cultivations in inter-irrigation period);
5. Reducing the duration of irrigation, using the optimal irrigation process.
6. Control of discharge from the field and infiltration using an irrigation process flow chart;
7. Elongation of the root system through delaying the first irrigation after sowing;
8. Using the high standing of the groundwater to reduce the water supply,
9. Application of local fertilizers (humus) to increase water retention in the soil;
10. Weeding after each irrigation of moist soil;
11. Using the method of focal irrigation
12. Maximum use of internal reserves (drainage water, water from the vertical drainage wells).

The Manager of the WPI-PL Project Sh.Sh. Mukhamedjanov

Appendix 7

GOVERNMENT OF THE KYRGYZ REPUBLIC

STATE COMMITTEE OF WATER RESOURCES AND RECLAMATION OF THE KYRGYZ REPUBLIC

Ref. No. 2-2177

October 7, 2011

To: Director of SIC ICWC

Prof. Dukhovny

Dear Viktor Abramovich!

The State Committee of Water Resources and Reclamation of the Kyrgyz Republic expresses you gratitude for support in implementation of WPI-PL project. Due to this "Water Productivity Improvement at Plot Level" project, problems on the basis of 6 farms in Osh region where basic technologies for water and land use were developed and introduced were solved partially. Moreover, construction of hydrostructures and hydroposts is coming to completion.

Taking into account a request from water users, the State Committee of Water Resources and Reclamation of the Kyrgyz Republic considers it reasonable to prolong the WPI-PL project in order to complete issues on effective water and land use in Osh region as well as to introduce the results received under the project in Batken, Jala-Abad and Chuy regions of the Kyrgyz republic.

We hope that cooperation within the Project will strength our good business relations to increase in welfare of rural population.

With kind regards,

Chairman: Jamaldinov Z.I.

Appendix 8

Recommendations and technologies additionally prepared under WPI-PL project for dissemination on search for research institutions

#	Recommendations and technologies
	Kyrgyz Republic **(KyrgNIIIr, ZOKI)**
1	Guideline for self-education ”Irrigation as the main element for effective regulation of plant life factors”
2	Preparation of irrigated plot to growing season and organization of water saving on-farm irrigation system.
3	Application of improved elements of techniques and technologies of furrow irrigation and inflow along regulated patches
4	Application of improved agrotechnic actions for improving soil fertility and water productivity through mulching of row-spacing.
5	Fertilizing irrigation through application of liquid mineral fertilizers together with irrigation water (fertigation)
6	How to define the date of next irrigation and calculate norm of growing irrigation under field conditions in according with average daily water consumption and appearance of plants
7	Hydromodule zoning of Osh region
8	Water consumption of main crops under conditions of the Kyrgyz Republic
9	Selection of furrow irrigation techniques and technologies depending on slope and soil of the location
10	Water and physical soil properties, definition of soil moisture level in field conditions
11	Technology of cotton cultivation under Osh region conditions
	Tajikistan **SF Tajgiprovodkhoz**
1	General issues of tilled crops irrigation
2	Recommendations on equipping of demo fields of dekhkan farms ”Navbahor” in Zafarabad district and ”Amakjon” in Matcha district with water intake structures and water accounting facilities
4	Irrigation regime for main crops based on natural and water-related conditions in Sogd region
5	Maps with indicating ground water tables for Matcha and Spitamen districts
6	Maps with indicating ground water tables for Zafarabad and Kanibadam districts
7	Optimization of methods for mineralization of saline lands (review).
8	Maps with indicating mineralization level for Matcha and Spitamen districts
9	Recommendations on carrying out salt survey and leaching of saline lands

10	Recommendations on carrying out leaching of saline lands
11	Check-up of flow meters of variable level (Extracts from RDP 99-77).
	Uzbekistan
	SANIIRI
1	Recommendations on selection of elements of furrow irrigation techniques and technologies for cotton under various soil and natural conditions of Fergana Valley
2	Recommendations on winter wheat irrigation regime during dry years (of low water)
3	Elements of furrow irrigation technique