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'Follow the Innovation': The second year of a joint experimentation and learning approach to transdisciplinary research in Uzbekistan

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Working Paper Series

63

Center for Development
Research

Department of
Political and
Cultural Change



Sustainable Management
of Land and Water
Resources in Uzbekistan –
Khorezm Project



Zentrum für Entwicklungsforschung
Center for Development Research

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Mehmood UI Hassan and Anna-Katharina Hornidge

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Abstract

In 2008, the BMBF-funded, interdisciplinary research project 'Economic and Ecological Restructuring of Land- and Water Use in the Region Khorezm (Uzbekistan)' initiated a participatory approach to innovation development and diffusion with local stakeholders. Since mid 2008, four selected agricultural project innovations are jointly tested by teams of researchers, local farmers and water managers under real-life settings. While the activities during the first year focussed on induced learning by scientists, the second year's emphasis was on the identification of and integration with the appropriate stakeholders and the conducting of jointly designed and implemented experiments to test, validate, and if needed, adapt the selected innovation packages. This paper documents these and focuses on the sub-processes within each team, how the team members understood and approached stakeholder collaboration, how they operationalised their scientific thinking into practical steps, and what impacts these processes had in terms of improving or validating the innovations.

Keywords:

Follow-the-Innovation, Follow-the-Technology, Transdisciplinary innovation research, participatory innovation development, Stakeholder involvement, Innovation Diffusion, Uzbekistan, Central Asia

1 Introduction

The ZEF-UNESCO project 'Economic and Ecological Restructuring of Land and Water Use in the Region Khorezm (Uzbekistan)' introduced a work package into its third phase that fosters a participatory approach of, jointly with stakeholders, testing, adapting and finalizing institutional and technical innovations which were so far developed by the project in scientific isolation. The term 'Follow-the-Innovation' (FTI) was coined for taking the so far developed 'plausible promises' to interested stakeholders and from there onwards 'following' the consecutive paths taken by these innovations, their further refinement and adjustment to the local context.

The first year of the attempted action research therefore concentrated on the forming of the respective transdisciplinary teams and capacity development for inter- and transdisciplinary research as a process of mutual learning, as documented by Hornidge et al. (2009; forthcoming). As such four innovation packages were selected and a transdisciplinary team of researchers with different disciplinary backgrounds and local stakeholders for each innovation was formed. The selected innovation packages included the strengthening of water users associations through a capacity building approach (WUA), conservation agriculture in irrigated areas (CA), afforestation on marginal and degraded lands (AF), and advanced tools for rapid salinity assessment (SA) and flexible irrigation scheduling (FIS). Continuing the activities started in 2008, 2009, the second year concentrated on the identification of and integration with the appropriate stakeholders and the conducting of jointly designed and implemented experiments to test, validate, and if needed, adapt the selected innovation packages. This paper documents these and focuses on the sub-processes within each team, how the team members understood and approached stakeholder collaboration, how they operationalised their scientific thinking into practical steps, and what impacts these processes had in terms of improving or validating the innovations.

Consequently this paper seeks to document the experiences collected during 2009, the second of altogether three years of nurturing this transdisciplinary process of innovation development. As such this paper poses a continuation and complementation of Hornidge et al. (2009) and hopes to serve as empirical repository for future analyses. The material for this manuscript is drawn from 128 documents¹ and author's own field notes based on direct observations, discussions with FTI participants, and insights as facilitators and coordinators of the processes.

The paper is divided into five main parts. Section 2 outlines the steps taken and experiences collected in defining the innovations, identifying the stakeholders, experimental designs and moving from plans to actions in the field. Section 3 briefly describes the additional capacity-building efforts taken for improved inter- and transdisciplinary cooperation. Section 4 discusses the key challenges faced by the FTI teams during this second year of the overall process and the paper ends with a concluding discussion.

2 From Planning to Practical Action and Interaction

2.1 Defining the Aims of the Innovation Packages

The WUA FTI team defined the purpose of its innovation as to transform an existing, weak water users association (WUA) with the help of a social mobilization and institutional development approach (SMID) into a successfully working WUA. The SMID-approach was perceived as a process that hinged upon social mobilization by local residents and the resultant institutional development with capacity-building and technical support by the project. The expected outcome of this process was the generation of ownership, social, monetary and labor support from the water users to the WUA. The process was expected to lead to the inclusion of the large share of water users and their concerns into the decision making process of the WUA (Abdullaev et al., 2008).

¹ See Annex 1 for a list of process related, project internal documents.

The WUA as an institution was identified as a suitable platform for launching agricultural innovations and the SMID approach was hoped to foster openly expressed demand on the side of water users and WUA management for improved water management (i.e. water planning, distribution and scheduling) and agricultural practices (i.e. disease control, insects, land leveling). As such it was hoped to create a fertile ground for the outscaling of other project innovations such as irrigation scheduling, salinity control, land leveling, conservation agriculture and afforestation.

Based on the earlier research (Egamberdiev, 2007; 2008), the team on conservation agriculture believed that the principles of minimum tillage, retention of crop residue and appropriate crop rotations, which are considered the three basic tenets of Conservation Agriculture (CA) could potentially enable farmers to grow more food, feed and fiber crops in an environmentally sustainable way using less labor and finances. The soil fertility and the water-holding capacity of the soil would increase over time and conservation agriculture could thus substantially improve the livelihoods of the local population by fostering sustainable, irrigated agriculture in Uzbekistan and Central Asia.

The initial aim of the Afforestation team was to demonstrate to farmers and policy makers the potential of afforestation on marginal lands as an alternative and profitable land use. Earlier research (Khamzina, 2006) had shown that the three tree species *Elaeagnus Angustifolia*, *Ulmus Pumila* and *Populus Euphratica* could be grown profitably on marginal and agriculturally abandoned lands. A four year old plantation could yield up to 14 tons of oil equivalent per ha, meaning that the identified species would start to pay off after four to five years. If planted on all abandoned lands in Uzbekistan, forest cover would exceed the forest cover of Germany. Timber production and export, as well as forest plantations for carbon credits, therefore could pose an alternative to the export-oriented cotton monoculture (Lamers et al., 2008).

The primary aim of the Salinity Assessment team was to create awareness for the electromagnetic device EM38 as express salinity mapping tool amongst the potential stakeholders as well as to jointly validate the results for future adoption and use (Akramkhanov et al., 2008). The aim of the flexible irrigation scheduling was to demonstrate the benefits of improved irrigation management based on actual field characteristics instead of norm-based irrigation. The idea was to calculate the amount and timing of irrigation for each plot based on the actual data related to the crop planted, soil type and moisture content in the soil, atmospheric variables and groundwater depth to work out the irrigation demand in terms of volume of water required at the specific time when water was available in the parent channel. This approach was assumed to enhance water use efficiency as well as crop productivity.

2.2 Stakeholder Identification and Engagement

Identifying Stakeholders, Selecting Sites

The four interdisciplinary FTI-teams, consisting of researchers and research assistants from relevant socio-political, biophysical and economic disciplines from a diverse set of countries selected the innovation sites and identified stakeholders and engagement strategies according to each innovation's specificities.

As such, the WUA-team used its Venn-diagram, prepared during the second FTI training to map potential stakeholders to engage with. The potential stakeholders included commercial and household water users, village councils and elders, WUA staff members, staff of higher level water management organizations, the district administration, and staff of the Ministry of Agriculture and Water Resources of Uzbekistan. The team discerned between the direct and indirect stakeholders in relation to the WUA and concluded that the WUA staff and water users were the direct stakeholders, while all others were indirect ones. The team considered two potential WUAs that were the research sites for a work package for which the team leader was responsible for. Out of the two WUAs, Ashirmat was finally chosen as the collaborator since

the WUA chairman actively sought support from the project for improving the WUA's performance.² It was thus ensured that interest in the partnership was mutual.

Due to the team's focus on bottom-up WUA empowerment, the team decided to primarily engage with the direct and indirect stakeholders in the cooperating WUA and here namely with the WUA staff, the local rural administration as well as the actual water users. Taking this up, the WUA established a working group which would be in charge of the whole process of mobilization and cooperation with the project. It comprised the chairman of the village council (Raees Shuro), an informed and influential farmer and former head of the kolkhoz during Soviet times, and the six staff members of the WUA itself, each being responsible for certain parts of the irrigation system.

The Conservation Agriculture team organized a one-day study tour for farmers from Ashirmat WUA and Amir Temur MTP (Machine Tractor Park) to Ferghana Valley on August 26, 2008. One of the aims was to identify interested farmers who wanted to experiment with the project for testing principles of CA. The senior project members had worked in Amir Temur MTP on their research trials since 2003. Yet, in contrast to the past engagements, the team envisaged a more structured engagement process on the content of CA elements and a greater role of the stakeholders in designing the experiment. By choosing Amir Temur as a site for intensified cooperation, the team hoped that the earlier trials which had demonstrated the potential of several elements of conservation agriculture, such as laser leveling, planting on beds and direct seeding of rice would have raised the interest in those. The team hoped that as they would gain more experience and free up some resources during the later years, they could also continue with some of the farmers at Ashirmat WUA. The selection of farmers for collaboration in Amir Temur MTP was based on the farmers farming experience, willingness to share resources, flexibility and ability to adapt, and the interest expressed in participating in the joint experimentation. Criteria such as farm size, soil quality, access to water etc. played a secondary role. The interest to collaborate was further tested by the farmers' willingness to provide initial inputs at an early stage of implementation and openly discussing the risk of a production loss if the experiment failed. Finally, the team selected three farmers from MTP Amir Temur for cooperation only.

For the Afforestation team, aiming to demonstrate the productive, profitable and environment-friendly use of marginal land, key consideration for site selection was to identify farms where marginal land patches were available. An identification and interest mapping survey was thus launched in districts with marginal land, namely Shvot, Koshkopir, Khiva, and Khanko.

The Afforestation team devised a multi-stage farmer selection process based on a list of criteria to screen the potential stakeholders, discuss the idea with identified stakeholders and then, based on farmer's interest, define further activities. Four rounds of discussions and screening were held with farmers having marginal lands. Farmer's interests in afforestation were explored and their interests in becoming equal partners in conducting joint experiments were explored. Based on the following criteria, three farmers in Amir Temur were finally selected for collaboration and partnership:

1. Extent of marginal land in the farm;
2. Matching of farmer's preferences for tree species and plantations with FTI team;
3. Availability of water resources and willingness to share those;
4. Whether or not the farmer envisaged to seek a permission from authorities to put parts of the marginal land under afforestation; and
5. Farmers' ability to comprehend the scientific agenda of joint experimentation.

Two out of these three farmers were in agreement to initiate contiguous forest plantations on small marginal patches of their respective farms, while the third wanted to plant shelter belts (Kan et al., 2008).

² WUA Ashirmat was formed in 2005 along the tail-end parts of Zey Yop canal irrigating parts of Koshkopir district. It manages the irrigation and drainage system which spans over an area of 2000 ha. At the beginning of mutual cooperation it supplied water to about 90 commercial farms and approximately 600 peasant farms and household gardens

The Salinity Assessment team, based on the nature of its innovation - a cost-intensive equipment for the measuring of salinity for accelerated map production – agreed to focus on institutional stakeholders only. Based on their specific mandates the following were identified for interaction: Khorezm Oblast Gydrometeorologiski (In English Hydrometeorological) Expedition (OGME), Soil Research Institute (SRI), Central Asian Irrigation Research Institute (Russian Abbreviation -SANIIRI), Land Reclamation Fund of the Ministry of Finance, and Tashkent Irrigation and Melioration Institute (TIMI). Site selection was considered unnecessary as the device was considered as site non-specific by the team. Hence, the team identified all agencies responsible for salinity assessment and mapping. In doing so, the team expanded the earlier Venn diagram into a matrix comprising salinity mapping organizations, their locations, mandates, and the perceived benefits for them from the use of EM38, prepared a stakeholder, their mandate and perceived benefits matrix and circulated it amongst other team members for comments and suggestions. This matrix was then used to rank the stakeholders and identify the above five for establishing first contacts.

The Flexible Irrigation Scheduling team initially defined WUA staff as their primary stakeholders, while at the same time debating the maturity of the innovation. Was it mature enough to be jointly verified and validated with stakeholders although its scientific promise was yet to be tested under scientifically controlled conditions? The team therefore decided to test the idea first at the cotton research institute, where the project was testing elements of land and water innovations, before later on engaging with WUA Ashirmat for further refinement.

Choosing Experimental Strategies

Each of the four FTI teams designed their own form of step-wise joint experimentation, depending on the nature of each innovation and the respective stakeholders engaged.

The WUA team decided to start the stakeholder engagement process with a form of joint experimentation that focused on the formation and training of a Core Contact and Partnership Group (CCPG) made up of the WUA staff, influential farmers and the rural administration. The key responsibility of this team, apart from liaison with the FTI research team was envisaged as formation a grass root Water Users Groups (WUGs) in each tertiary level canal or in other alternative levels/areas. The CCPG members were to be trained by the FTI research team, through SMID training series, on the legal obligations of WUAs, water management related issues as well as the facilitation of discussions between WUA-staff and farmers. The costs related to this (for training materials, equipping the WUA with bicycles and office refurbishment, financing study tours, salary of the head of the staff required for social mobilization and monitoring) were to be born by the project. This initial phase, was then to be followed by a second phase, characterized by a "laissez-faire" approach through which the CCPG would undertake further social mobilization for WUG formation within the WUA and the FTI team would only provide information, facilitation support for back stopping as well as monitor and evaluate the process.

This step-wise plan of cooperation was discussed and specified together with the WUA staff. Additionally, the team developed a cooperation strategy with other FTI teams from the project, based on the idea that the WUA, as an institution, could act as a platform for the further developing and testing of all project innovations. As such the non-governmental organization, Khorezm Rural Advisory Support Service (KRASS), in 2009, launched a laser leveling program in collaboration with the WUA. However, there were tendencies amongst other staff members to visit the WUA without informing the FTI group, which at times caused tensions and misunderstandings.

The Conservation Agriculture and Afforestation teams decided to undertake experiments within the selected farms after discussions with the farmers, whereby the roles and responsibilities of the researchers and farmers during implementation would be mutually agreed based on partner competence and practicality. With regard to Conservation Agriculture, this meant that the farmers were to provide land, labor, and routine inputs, whereas the research project would provide equipment and critical inputs, such as herbicides, not required under conventional agriculture. The choice of crops, levels of inputs and agricultural practices were to be mutually agreed. In case of afforestation, the farmers were to provide land, labor and inputs while the scientists provided tree saplings and expertise on tree management. The monitoring of tree growth was the researcher's responsibility.

The Salinity Assessment team, due to merely two EM38 sets being under use by donor projects in Uzbekistan, decided to divide its activities into two main parts: first raising the awareness of relevant stakeholders about the possibilities of rapid soil salinity mapping; and second, based on their demonstrated interest, jointly mapping and validating the results. Direct involvement of the selected five organizations in the project's on-going measurements was found to be complicated because most institutions were located far from Khorezm. The possibility to bring them to the project site in Urgench was considered to be less useful than letting them use EM38 in practice during their own field work. Therefore, based on the initial understanding of the different institutional mandates the following stakeholder-specific engagement strategies were outlined:

- (i) Invite Khorezm OGME during the salinity survey in autumn to the Cotton Research Station or visit their survey site;
- (ii) Visit on-going SRI soil survey site to show and use the equipment;
- (iii) Conduct training course on the use and calibration of EM38 to selected educational institutions;
- (iv) Discuss with SANIIRI the possible calibration and validation of EM38 for soils in Syrdarya, Tashkent, and Fergana regions.

Additionally, it was decided to initiate, if needed, the writing of a joint funding proposal by the local institutions responsible for salinity assessment, in order to procure several EM38 devices for the organizations involved. With regard to the international donor community, the team decided to establish contacts with Uzbekistan's Land Reclamation Fund, the Asian Development Bank and Japan International Cooperation Agency to discuss possibilities of using EM38 in their funded initiatives on salinity management.

The Flexible Irrigation Scheduling team envisaged that the basic data would be collected by the stakeholders themselves and based on that the scientists would merely assist them to determine the timing and amounts of irrigation events using a set of models considering soil, water, atmosphere and plant relationships. As the data requirements would be rather high to feed the models, it was hoped that the farmers and WUA would collect the necessary benchmark data and the project scientists would run the models and provide results to the WUA and selected farmers, who in turn would follow the schedules in terms of volume and timing of irrigation. The responsibility for monitoring was perceived to be that of the scientists. The strategy was, to first test the approach at the project-managed fields at the cotton research institute and then to transfer it to WUA Ashirmat. However, as explained later, the discussions did not yield actions.

2.3 From Plans to Implementation with Stakeholders

Interdisciplinary Plans and Road Maps

During the third FTI training in November 2008 (Hornidge et al., 2009) the teams decided to turn their work plans into road maps, reflecting on a) the specific characteristics of the innovation at hand; b) the most relevant stakeholders and sites as well as the strategies of selection; c) the engagement strategies; d) the experimental designs; e) the division of roles, responsibilities and tasks; and f) the required resources. This was based on the intention to first trigger thinking amongst the project's FTI teams on the designing of innovation specific processes of stakeholder interaction. The stakeholders' inputs into the planning process were envisaged at a later stage. Yet, while the intent for the road maps was to plan the activities of each team in a focused manner around the specificities of each innovation, it turned out that instead the teams wrote elaborate work plans comprising a) detailed justifications with references to scientific literature of the said innovations' relevance to the Uzbek context; b) detailed, and often scientific, descriptions of the innovations themselves and the 'plausible scientific promises' of these; c) detailed lists of activities with rationale, timing, and anticipated outcomes; d) resources, equipment and staff requirements, and e) the scientific indicators for assessing the qualities of the respective innovations.

The roadmaps were initiated by the team leaders, discussed in meetings with those members locally available and through email exchanges with those located elsewhere. Often, the suggestions and comments received through emails were interpreted as criticism questioning the capability of those who

“worked” by those who “criticized”. Explanations and replies were often time consuming and demoralizing. The produced outcomes, the proposed road maps, looked like scientific research proposals rather than road maps for collaboration with stakeholders. Consequently several rounds of team meetings and email discussions within the project’s FTI teams were necessary for preparing the roadmaps in a form that could be shared with stakeholders.

Looking Back: The First Internal Review Workshop

The third FTI workshop in November 2008 was followed by the first project internal review workshop from May 15 to May 16 2009 in Urgench, hence at the beginning of the vegetation season 2009 and after finalizing the roadmaps. The workshop was facilitated by the FTI facilitator and the coordinator of the social science work packages in the project. It brought together 22 participants, the core of which were senior researchers based in Urgench, several research assistants as well as 3 representatives of WUA Ashirmat.

The specific objectives of this workshop were to enable participants to critically review the progress of various teams and identify factors that fostered or inhibited the progress as opposed to plans made earlier and identify constraining issues.

The two-day program comprised of the following blocks:

- Team presentations critically reviewing the performance of various FTI teams since November 2008. The teams were particularly requested to focus on two positive examples of good performance and two not so positive examples.
- Brief presentation on the main ideas and conceptual embedding of FTI as repetition,
- Identification of roles and responsibilities of a facilitator (including limits to facilitation – Group Exercise).
- Stakeholders estimations on teams’ progress.
- An introduction to value based monitoring, which was then followed by an exercise on identifying team values by different teams.
- Refining the teams’ roadmaps for 2009 as part of a team exercise and discussing the roadmaps in plenary.
- Summarizing and discussing issues for improvement and strategies to resolve those.

While the workshop was a success in terms of participation, topics covered and the level of engagement and self criticism, it also became very obvious that the progress of most FTI teams until May 2009 had been less than expected. Only the WUA team had integrated the stakeholders into the process through a series of joint discussions, frequent meetings, joint workshop on problem analysis, co-organizing WUA’s first ever general assembly meeting, training workshops for WUA staff on WUA regulations, rights and responsibilities and a study tour to successful WUAs in the Fergana Valley. The CA team, while having written a roadmap and finalized their stakeholder selection, faced issues on time allocation for FTI activities as each of the members primarily prioritized other research activities. Furthermore, the monitoring indicators chosen by the CA team were criticized as too scientific and therefore seriously questioned. Yet, the effects of these on the actual process design and implementation could little be assessed, since the team only minimally documented their process.

The Afforestation team had finalized its roadmap and stakeholder selection by the end of March 2009, and had taken first steps earlier by creating a nursery of saplings and distributing the first saplings to the cooperating farmers who planted them on their fields in end of March 2009.

The Salinity Assessment team had also finalized their roadmap and stakeholder identification. First meetings with potential stakeholders had taken place but had yielded little interest on the side of the stakeholders. Furthermore, the purpose and ways of documenting the process was not clear to the team and so far had not been done systematically.

The team on Flexible Irrigation Scheduling had prepared a roadmap in consultation with the FTI facilitator and had started to collect some scientific benchmark data necessary to make the models run. Yet, the FTI process clearly did not form a priority over other tasks of the key staff members and therefore hardly progressed.

The discussions in the plenary repeatedly focused on the (in parts lacking) commitment of staff members to the FTI process and the need for regular coordination with the FTI facilitator and other teams (UI-Hassan, 2009). Team members suggested that those innovations, of which the teams (due to staff commitment elsewhere) made little progress, should either be dropped, be merged or provided with appropriate human resources. Taking this further, the group decided for each FTI team (and its specific innovation) to write a brief motivation statement outlining their intentions and the feasibility of continuing the FTI process. With regard to Flexible Irrigation Scheduling it was discussed to separate it from the Salinity Assessment team and instead to attach it to the WUA team, where it could contribute to a higher transparency in water distribution.

The last day of the workshop was committed to revise the teams' roadmaps and resolve the identified issues. Here in particular issues of team composition, team meetings, financial and human resources allocated, the relevance of selected innovations as well as FTI communication and facilitation were discussed. The key decisions taken included: (a) to merge it with the WUA team; (b) to hold regular fortnightly meetings of the FTI teams (at least the FTI team leaders) and the FTI facilitator for planning and discussing the next steps; (c) to employ a FTI assistant, who would assist in documenting the processes; and (d) to include the FTI facilitator as team member in the Salinity Assessment and the Flexible Irrigation Scheduling teams (UI Hassan, 2009).

Capacity Development and Awareness raising as Entry Points to Transdisciplinary Collaboration

Three teams, namely WUA, CA, and SA, decided to start the processes of stakeholder interaction with activities for awareness raising and capacity development.

The WUA team organized several joint learning activities between the project FTI team and WUA Ashirmat as illustrated in the table 1 below³.

Table 1: Capacity-Development Activities carried out by WUA Team

<i>Date</i>	<i>Activity</i>
June 14, 2008	Workshop for joint situation and problem analysis, bringing together project FTI team, WUA staff & farmers. Workshop Blocks: <ul style="list-style-type: none"> • water distribution game • resource mapping exercise • team discussions between farmers and staff of higher-level water management organization on water management problems • discussions in plenary on how to enable WUA to serve water users. The workshop documentation was later translated and shared with WUA.
July 25, 2008	Presentation by project FTI team to WUA staff and selected farmers on WUA's legal structure and functions; Comparison with the situation in Ashirmat, followed by a discussion on the existing gaps between WUA's legal mandate and actual functioning
July – Sept.	Several individual visits to WUA by FTI team members to identify, refine and agree on a series of capacity development activities with WUA.

³ Some of these activities were carried out in late 2008 and the details were not available during the compilation of the first year process documentation in Hornidge et.al., 2009. Therefore, these are included here.

Oct. 22, 2008	Ceremony for supplying WUA Ashirmat with 5 bicycles
November 25 – December 02, 2008	<p>Study tour of CCPG members to well functioning WUAs in Fergana Valley under a Swiss funded project.</p> <p>Components:</p> <ul style="list-style-type: none"> ▪ Meeting with Basin Authorities: familiarization with <ul style="list-style-type: none"> (i) water resource availability, (ii) IWRM FV project (iii) role of water management organizations in daily water distribution. ▪ Visit to South Ferghana canal water management organization & Union of Canal Water Users ▪ Visit of three WUAs (internal organization, administration) & sites of WUA irrigation system (actual operation) <p>Before the trip, specific roles were assigned to each member. During the trip the experiences were reflected and discussed on a daily basis and lessons learnt formulated. The learning was translated into a strategy of the WUA working team, which was then to be presented and approved by the General Assembly of WUA.</p>
December 15-18, 2008	<p>Training on “Social involvement and water resources management” for WUA CCGP and WMO:</p> <ul style="list-style-type: none"> ▪ Participants identified hurdles for efficient water management, including: lack of ownership of and awareness about WUA roles and functions amongst farmers and village residents alike, poor coordination with WUA of water users, unreliability of water supply; and excessive water use by some farmers. ▪ Ways for overcoming the hurdles were discussed, including: strategies to mobilize water users, water management planning and distribution, inventory and asset management, interactions with higher level water management organizations. <p>The use of participatory tools for training organization helped to create a high level of ownership amongst the participants during the discussions.</p>

Source: Authors compilation based on Djanebekov et. al., 2010

The CA team designed a discussion workshop in November 2008 for farmers to the project's office. The 15 invited farmers included 6 from WUA Ashirmat and 9 from Amir Temur MTP, who comprised both large- and small-scale farmers, possessing 13 ha up to 120 ha land at their disposal, and with a range of farming experience from 7 to 30 years. Presentations by experts, team discussions, and visualization techniques were used for identifying farming problems and introducing the principals of CA to participants as potential improvement. The laser leveling equipment, planters and seeders used in CA experiments were demonstrated and attracted keen interest from farmers. As outlined above, the team additionally conducted a small survey capturing the interest in joint experimentation on the side of the farmers during this study tour. Based on this, the three farmers for further collaboration were identified. To the project's FTI team itself the one day study tour offered an insight into the farmers' perceptions of their acute problems as well as what kind of potential solutions were considered appropriate by farmers

Another field demonstration day was organized at the cotton research institute, where project's research on elements of CA was demonstrated in situ to the invited farmers in June 2009. The invited farmers were taken from the participants' list for the earlier stakeholders' meeting held in November 2008 and thus included the farmers with whom the FTI was already cooperating as well as other interested farmers. Only 50% of the invited participated attended the demonstration day. Others had valid reasons of absence which they communicated in advance.

The AF team undertook the following activities before discussing collaboration with farmers: a) designing together with the director of the FRI a questionnaire for farmer selection and pre-testing of the questionnaire with farmers in January 2009; b) approaching authorities for assessing their support for joint experiments with farmers in January-February 2009; c) conducting the survey in February 2009; d) internal meetings for selection of interested and suitable farmers in February and March 2009; d) discussion on FTI collaboration within the team; e) visit to tree nursery; and f) digging out and preparing the nursery saplings for plantation.

The SA FTI team started with discussing the benefits of express salinity assessment compared to conventional methods and demonstrating the use of EM38 and its outputs to the prioritized organizations to raise their awareness and interest in the innovation itself. However, the prohibitive cost of the equipment was initially found to be the chief concern for the stakeholders. While almost all of the

5 approached stakeholders (namely SRI, OGME, SANIIRI, Land Reclamation Fund, Tashkent Irrigation and Melioration Institute (TIMI)) showed interest in using EM38 for salinity mapping, only SANIIRI expressed real interest in a joint validation of the innovation and agreed on a roadmap with the FTI team. Other stakeholders did not follow up agreed next steps for cooperation despite numerous follow-up calls and visits by the members of the FTI team.

From Inter- to Transdisciplinarity

The WUA FTI team undertook a structured dialogue with its stakeholders by sharing the draft work plan and details of social mobilization strategy with the WUA chair in the local language, who in turn discussed the draft in a meeting between WUA chair, WUA staff, and rural administration. While the stakeholders in general agreed on the broader plan, they made suggestions, to include local administration and previous Kolkhoz head as the key social mobilizers. Furthermore, the WUA also disagreed to the implementation strategy of only focusing on social mobilization. While the researchers proposed “soft” interventions, such as capacity development activities, trainings and discussions, the WUA suggested that a blend of both “hard” and “soft” interventions was necessary to strengthen WUA Ashirmat. The proposed “hard” interventions comprised minor renovation works and equipment for the WUA office to give it a “face and recognition” amongst water users, the provision of bicycles to facilitate mobility and interaction of WUA personnel with water users, a computer and printer to facilitate WUA’s record keeping as well as water and finance related calculations.

The researcher’s logic of focusing only on “soft” interventions nevertheless was driven by their perception of the WUA staff members’ understanding of the role and mandate of the WUA as a client-driven and users-owned service provider, and the motivation of WUA staff to perform as a service team. Within the given context of Khorezm however, WUAs are rather initiated and maintained as an essential sub-unit of higher level water management organizations. Thus, the WUA stakeholders came up with a 12 step WUA improvement plan (Abdullaev et al., 2009) that included a blend of “hard” and “soft” interventions with proposed actions, timing, inputs, finances, and responsibilities. The WUA FTI researchers kept their minds open to the ideas emerging from the WUA and tried their best to accommodate the concerns of the WUA into their planning. Besides, the cost estimates for the suggested hardware interventions were found to be reasonable and modest, and thus were accepted (and financed by the project) as part of the WUA improvement plan.

Within the CA team, the team leader, being a CA expert held several rounds of informal discussions to expose selected farmers to the idea of CA joint experimentation, and to detail out the roles and responsibilities of the two partnering sides. Follow up engagement activities included field visits and follow-up telephone calls to the selected farmers and further clarifying discussions on the nature, content and the proposed roadmap of the joint experiment. The technical aspects of the proposed future collaboration were paid a greater attention both from team members and farmers’ side. The field activities on the joint experiment were anticipated to start by April 2009. By this time, the research team prepared a draft agreement for cooperation. In the discussions amongst researchers, the objectives of the collaboration were identified as to: (1) create awareness of basic principles of CA practices; (2) conduct joint experimentation; (3) monitor and evaluate CA adoption; (4) develop CA further according to the local context and as such contribute to the dissemination of CA within Uzbekistan and Central Asia. The research team (in isolation from the stakeholders) designed a roadmap for implementation as draft for later discussions and revisions together with the farmers.

The Afforestation team from the onset solicited the participation of a local forestry expert, who became the team leader and partner to the implementation of the FTI process. He regularly took part in team work. Yet owing to his main involvement and public duties in Tashkent, his engaging into the teamwork in Urgench was transient. Advantageous was however that he became part of the learning process through field visits whereas he contributed with his technical knowledge and experience in the discussion with farmers. Altogether, his leadership, advice and role in the team helped identifying the areas of difference between scientific and farmers’ expertise and perceptions.

A general concern on the side of the farmers was the obtaining of state permissions for growing trees on land that demonstrated low productivity for state crops, but was registered as productive land. While

initially the farmers agreed to approach the authorities themselves, it was later decided to be more effective if the project wrote to the authorities soliciting the permission to release these lands from state crop production for afforestation. For two of the selected farmers, permission from local authorities (MTP chair) was easily obtained verbally. For another farmer from Khiva, first the farmer himself approached the district mayor to seek permission by showing the project research material (research briefs) on afforesting marginal land. Yet, he was refused permission. The farmer and the researcher discussed and agreed that if project would write a support letter, it might facilitate the permission. Initial preparations were made by the project administration to write to the provincial authorities through involvement of the rector of the Urgench State University, an intimate project collaborator. Meanwhile, however, the project researchers and the farmer learned that while that piece of land was declared marginal and unproductive, but at the same time was allocated for construction of houses by the district authorities. Additionally two farmers in Shovot district wanted to participate in the joint experimentation with the project, with one of them, as the head of the MTP, granting himself the permission but refusing to contribute own resources and the other being refused the permission from the local administration. Hence, collaboration with neither of the two was taken up.

Seeking Concurrence with Stakeholders and Formalizing Cooperation

By November 2008, and after a series of discussions between the project's WUA team and WUA Ashirmat, a 12 step work plan including an explicit division of roles and responsibilities (Annex 1) was finalized and an agreement of cooperation was signed in January, 2009.

In order to share this plan with the water users within this WUA, the WUA team together with the project's FTI team organized a general assembly on 15th January 2009, which was well attended by local farmers, the WUA council and staff, as well as the local administration. During the assembly the WUA chair was replaced due to non-performance, WUA staff was assigned to collaborate with certain groups of farms, and a water inspector was appointed to assist in reducing water wastage by assisting farmers to reduce or abolish illegal water extraction and measuring water use. Farmers were requested to build hydroposts for improved water regulation and measurements.

Further points discussed and agreed were the salaries of various posts within the WUA, the WUA budget and business plan as well as the collaboration with the project. Due to the inability of the WUA to pay staff, farmers agreed to provide additional people to support the WUA and the members of the WUA council and audit commission were re-elected.

The CA team presented the roadmap formulated in isolation from the stakeholders to the selected farmers of WUA Amir Temur in mid March 2009, and the farmers were invited to comment and give feedback. The team then finalized the roadmap based on the farmer's comments and shared the finalized version with the farmers for approval. Between 25th and 30th March 2009, the farmers had agreed to this refined version of the roadmap and agreements of cooperation (Annex 2) were signed.

The Afforestation team conducted a perception study on the farmers' tree specie preferences and, based on this, decided in two collaborations to additionally experiment with poplar trees besides the project suggested species. In another collaboration, the team decided to give up the idea of contiguous plantation and opt for border planting of species that were not recommended for afforestation. The idea here was to test out an agro forestry concept rather than afforestation of marginal lands. The respective agreement between the project and the three farmers in Amir Temur were signed on 30th March 2009 (Annex 3).

The SA team approached SANIIRI as potentially interested stakeholder with a mandate in both, research and implementation aspects with regard to salinity assessment. Here, the team initially held discussions with a technical specialist of SANIIRI on SANIIRI's interests in highly accurate data on the interlinkages of soil moisture and soil salinity. EM38, with an, in her eyes low accuracy ranging from 60% to 80%, therefore seemed interesting to her, given that she could verify the calibration of EM38 on SANIIRI's research station in Khorezm. Consequently it was agreed that the project would support her work during this calibration period in Urgench with transport, field assistants and other necessary inputs. In case SANIIRI found EM38 useful, SANIIRI would issue a formal document with the results of calibration and

would include a two hour introduction to EM38 into a training course regularly delivered to OGME This two step approach was formalized in the mutual agreement signed on 10th August 2009 (Annex 4).

2.4 Implementation of the Experiments

WUA Team

With the approval of the draft agreement and 12 step work plan by the General Assembly on January 15, 2009, the CCPG and project FTI team of WUA Ashirmat started implementing the plan (Table 2).

Table 2: A chronological list of activities undertaken by the WUA team in 2009

#	Activity	Time	Participants ZEF	Participants Stakeholders
1	WUA General Assembly 2009 – approved 12 step work plan	15.01.09	2 Research assistants	15 farmers, 8 WUA staff, 2 MTP staff, 1 rural council chair, 6 village council leaders, 9 village citizens
2	Meeting in WUA – on 12 step work plan CCGP head starts undertaking Social Mobilization in public events	17.04.09 April through December 2009	4 Research assistants	6 WUA CCPG members
3	Internal Meeting (IM) of project members– Roles within FTI group, merger of WUA and Irrigation scheduling FTI groups, activities /plans for immediate future, resources, rules on contacting with WUA	18.05.09	3 Senior researchers 3 PhD students 3 Research assistants	
4	IM - FTI link with social science research (who will do what), planning round table of WUAs	01.06.09	1 PhD student 3 Research assistants	
5	IM – Planning of round table with WUAs chairmen, ideas and role of Hayot and Bernhard	08.06.09	3 Senior researchers 1 PhD student 4 Research assistants	
6	Ashirmat CCPG members invited to Demo day on CA	10.06.09	CA group	Head of WUA CCPG, 1 hydrotechnician of WUA
7	Round table of Zey-Yop canal WUA chairmen	19.06.09	4 Senior researchers 5 Research assistants	3 WUA chairmen
8	Visit to WUA - To cross-check how WUA Ashirmat works with water users and is it shown in the monthly progress report for June 2009	29.06.09	1 Research Assistant	Met 3 farmers
9	IM - 1) Discussion of meetings. 2) Performance indicators. 3) Progress report of WUA Ashirmat. 4) Discussion on future work plans.	01.07.09	1 Senior researcher 1 PhD student 4 Research Assistants	
10	WUA Meeting – 1) How WUA Ashirmat is performing? Opinions from farmers. 2) Is FTI WUA group taking right approach in developing WUA Ashirmat?	24.07.09	4 Senior researchers 2 PhD students 5 Research assistants	7 WUA staff, 3 commercial farmers 3 household farmers

11	The WUA FTI group leader and a senior researcher on groundwater leave the project	31.08.09	2 Senior researchers 3 Research assistants	
12	WUA perception survey	September 2009		9 commercial farmers, 11 household farmers
13	WUA approached the FTI research team to assist in preparing a proposal for acquiring canal cleaning equipment (1 excavator, 1 bulldozer) through a JICA grant	September 2009	1 Senior researcher 2 Research assistants	Head of WUA CCGP, 1 WUA hydrotechnician
14	Visit to WUA - To agree on meeting day with WUA staff and all farmers of WUA Ashirmat to discuss results of perception survey and WUA performance in general	07.10.09	2 Senior researchers 2 Research Assistants	1 WUA Chair 1 Head of CCGP 3 WUA hydrotechnicians

Source: Authors compilation from Djanebekov, et. al., 2010

The social mobilization was primarily led by the head of CCPG, a farmer of WUA Ashirmat and former head of the kolkhoz. As a knowledgeable person in the community, he was generally supported by the chair of the local administration and the hydrotechnicians of the WUA whenever necessary. Despite the received training on the core ideas of processes of social mobilization and how it could be utilized for improving the understanding and ownership by water users of the WUA, he decided against activities mobilizing the water users of WUA Ashirmat. Instead he gave numerous speeches on social events, such as weddings, funerals and other community celebrations, on the importance of water and water management. Therefore, the effectiveness of this strategy was compromised due to four points: a) at community ceremonies, the participants are generally less receptive to serious topics as they expect nice words only about the family or the person whose ceremony is it; b) not all the participants of such events have equal interest in water use; c) not all the participants belong to the irrigation system or WUA in question; and d) there is no opportunity to ask clarifying questions, if someone is interested to know more.

In May 2009, the participants of the internal FTI review workshop decided to merge flexible irrigation scheduling with the WUA team, as mentioned above, aiming for increased transparency and equitability with regard to water distribution. With the aim to introduce flexible irrigation scheduling to the WUA, a water distribution workshop was planned, but significantly hampered due to disciplinary and personal differences between the FIS and WUA team leaders. In August 2009, the team leader of the WUA team, as well as in December 2009 the team leader of FIS, decided to leave the project and the workshop did not eventuate. Furthermore one of the most active team members of the WUA FTI team on the side of the project for health reasons had to leave Uzbekistan. The WUA team, from the side of the project, therefore was significantly reduced. In order to compensate the staff loss, the overall FTI facilitator significantly increased his involvement in the WUA FTI team, driving the process forward from mid 2009 onwards.

On the side of the WUA, the head of CCPG received a modest compensation from the project for his services and prepared a brief monthly progress report, sharing it with the FTI researchers. His reports indicated that the WUA performed well on most points of the action plan related to hardware interventions and by July 2009, the WUA office was refurbished, most farmers had installed hydro posts, the inventory of infrastructure was completed, the pumps were transferred to farmers, and the shared canals and drains were cleaned. The lake was filled with water whenever water was in excess and the WUA managed to convince the higher level WMO to clean the most clogged parts of the main canals and clear the collector of debris and blocks so that the excess water could again flow smoothly to the drainage system. It also managed to fill the lakes present within the WUA boundaries so that the groundwater would not fall to a level at which the drinking water wells would dry out.

Yet, due to the lack of interest from further upstream WUAs, the WUA could not successfully establish a hydrological water user federation along the Zey Yop canal as had been agreed. WUA Ashirmat in collaboration with the project distributed written invitations to other WUAs along the Zey Yop canal

providing a platform to discuss the need and potential of such a federation and holding a meeting on 19 June 2009. However, the chairmen of only two other WUAs along Zey Yop Canal, Hanobod Zey Yop and Ayrankul, came to the meeting. Consequently, the WUA chair and the CCPG felt discouraged and did not take another effort in that direction.

Additionally, the WUA started discussing with the FTI research team possibilities for increasing transparency in water distribution by testing rotational water distribution along the smaller canals where more than two farmers were taking water. Unfortunately, this was not further followed up by the project after the key water specialist and team leader left. Furthermore, the WUA approached the FTI research team to assist in preparing a proposal for acquiring canal cleaning equipment through a Japanese International Cooperation Agency (JICA) grant. The proposal was submitted to the donors in September 2009. In April 2010, the WUA was informed that the grant in the shape of an excavator had been approved by the donors and an excavator would be soon delivered to the WUA. The intentions within the WUA leadership were to use this equipment not only for cleaning the main canals, but also renting it to farmers within WUA Ashirmat who were not in debt to the WUA, for the cleaning of on-farm canals. By doing so, the WUAs chair intended to provide an incentive for farmers to pay WUA fees on time. The WUA also intended to rent the equipment to non-members on a premium charge in order to increase its financial resource base.

For similar reasons, the WUA management decided to start charging kitchen garden water users a small flat cash rate of 2000 soms⁴ per irrigation event to ensure a regular cash flow for paying the salaries of its staff. Though almost all households paid their water charges, the small amounts were not enough to pay the staff salaries. Most commercial farmers, on the other hand, did not pay their water charges to the WUA due to a lack of cash on their bank accounts, as a result of the state order system⁵.

CA Team

After signing the agreements in March 2009, the partnering farmers selected the fields for experimentation (Table 3). These were then subdivided into an experimental and a conventional plot. While the farmer would grow crops on the conventional plot using his or her usual agronomic practices, the experimental plot was cultivated according to the advice of the expert. Some elements of the experiments were however changed based on farmer's suggestions. For example, the seed rate for winter wheat was increased in one case. In another case, herbicides were applied during the second crop growth to suppress the weed population. The fertilizer doses and residue amounts were also adjusted in some cases based on mutual agreements.

Table 3: A chronological list of activities undertaken by the CA team in 2009

#	Activity	Time	Participants ZEF	Participants Stakeholders
1	Action work plan CA	26.02.09	1 Project coordinator 3 Senior researchers 2 PhD students	
2	Discussion of work plan with farmers	March 2009	Senior researcher/ team leader on CA	3 farmers (Ruzumbay, Maksud, Atamurod)
3	Changes in the work plan according to farmers' suggestions	March 2009	CA Group	

⁴ 2000 soms equals 0,92 Euro (1 som = 0,00046 Euro) on September 15, 2009, Source: Oanda Currency Services

⁵ Agricultural land belongs to the Uzbek government, which leases these lands to farmers on a long term lease provided they agree to grow state determined cotton and wheat crops on specified area, an average yield target, and handover the agreed amount of produce to state. The input use and timing of agricultural operations are also specified. The state transfers 40% of the cost of production in advance to farmers' bank accounts, and the input suppliers and tax authorities can deduct their charges direct from farmer's accounts. The accounts are settled at the end of each cropping season. Under these strict conditions, most farmers usually remain unable to meet their obligations and are thus fined. Even if farmers exceed targets, they can not withdraw cash. The amounts in bank account can only be transferred to other legal entities and firms and not to persons.

4	Signing the agreement on cooperation	March 2009	Senior researcher/ team leader on CA	3 farmers
	Selecting fields for experimentation	March 2009	Senior researcher/ team leader on CA	3 farmers
5	Field work (soil sampling, field preparation)	March 2009	Senior researcher/ team leader on CA, his assistants	3 farmers
6	Field work (planting, fertilizing, irrigation)	April 2009	Senior researcher/ team leader on CA, his assistants	3 farmers
7	Field work (weeding, yield calculation, crop-residue management)	?? after harvest	Senior researcher/ team leader on CA, his assistants	3 farmers
8	Field work (soil sampling, field preparation)	June 2009	Senior researcher/ team leader on CA, his assistants	Farmer Ruzumbay
9	Field work (soil sampling, field preparation)	October 2009	Senior researcher/ team leader on CA, his assistants	Farmer Maksud
10	Planning of CA Demo-Day	04.06.09	Team leader, 3 Senior researchers 1 PhD student 1 Research Assistant	
11	CA Demo-Day	10.06.09	Project coordinator 5 Senior researchers 2 PhD students 1 Research Assistant	6 people (1 MTP head Amir Temur (AT), 3 farmers AT (2 of which FTI), 2 WUA Ashirmat workers
12	Reflections from CA Demo-Day	10.06.09	1 CA team leader, 1 Senior researcher 1 PhD student 1 Research assistant	
13	Interactions with farmers and field inspection	June-October 2009	CA team leader	Farmers
13	Internal Meeting (IM) – Update on CA activities and plans	08.10.09	CA team leader 1 PhD student 1 Research Assistant	
14	IM - Invitation of FTI CA/AF collaborators for FTI training.	26.10.09	CA team leader 1 senior researcher 1 PhD student 1 research assistant	
15	IM – Discuss the group planning	06.11.09	CA group Project coordinator, 1 research assistant	
16	IM - Discussed pre FTI and FTI activities that were done with farmers, how they started FTI, what did and what they have now	09.11.09	3 Senior researchers 1 PhD student 1 Research assistant	
17	IM - To finalize planning, concrete points how to do Impact Assessment	09.12.09	1 CA team leader 1 Project coordinator 1 Senior researcher 1 Research assistant	
18	Preliminary Impact Assessment	10.12.09	1 Senior researcher 2 Research assistants	Farmer Atamurod
19	Preliminary Impact Assessment	11.12.09	1 Senior researcher 2 Research assistants	Farmer Ruzimbay
20	Preliminary Impact Assessment	18.12.09	2 Research assistants	Farmer Maksud

Source: Authors compilation from Rudenko, et. al., 2010

These interactions were however neither structurally recorded nor in detail reported back to the entire team. Yet, according to the verbal accounts of the team leader, there were frequent interactions and discussions with farmers within each cropping season on agronomic aspects of conservation agriculture, and experimental designs were adopted based on a mutual consensus between the CA expert and the respective farmer.

AF Team

The signing of the agreements for collaboration was only possible by March 2009, which resulted in a late start of the field activities (Table 4). This was further exacerbated by the exceptionally early arrival of spring. Ideally, the saplings should have been planted at the onset of spring. This late planting increased the risk of a low survival rate of trees; it was nevertheless mutually decided by the farmers and the project staff to start planting, despite the progressed season. On March 20, 21 and 26, 2009 the saplings were planted at all three sites. The planting events positively contributed to the researchers understanding of the farmers' cultural considerations in specie and site selection as well as inner-family labor and task divisions for planting the trees.

Table 4: A chronological list of activities undertaken by the AF team in 2009

	Activity	Time	Participants ZEF	Participants Stakeholders
1	Design and pre-testing of survey questionnaire; approaching authorities for permission; involving local tree experts into survey	19.01. – 23.01.09	PhD student Head of FRI Local tree expert	
2	Survey	January-February 2009	Project coordinator Head of FRI PhD student 3 Research assistants	14 Farmers
3	Selection of farmers in few rounds : - Preliminary selection FTI group internal - Field visits to farmers (Interest to innovation; site conditions and farmer's terms to implementing) - Phone communication on status with formal permission - Preparation of request letter (with support of UrDU Rector) - Final decision	February-March 2009 25.02. – 10.03.09	PhD student Head of FRI 2 Senior researchers 1 Research assistant	14 Farmers, Authorities;
4	Discussion on FTI collaboration; Site selection with finalists and technical consulting; Visits to tree nursery; Training on planting	14.03. – 18.03.09	Head of FRI Local tree expert	3 farmers and their workers
5	Digging of saplings in Khiva nursery / Preparation of tree cuttings Training of students	18.03. – 27.03.09	Head of FRI PhD student 3 Research assistants	
6	Salinity measurements at I and M	18.03.09	PhD student 3 Research assistants	
7	Tree planting	20.03. 09, 21.03.09, 26.03.09	PhD student 1 Research assistant	3 selected farmers and their workers

8	Post-planting monitoring visits: Status with irrigation Signing formal agreements	24.03. – 30.03.09 30.03.09	PhD student 1 Research assistant	3 selected farmers
9	Monitoring visits: Survival rates and establishment	Every two weeks	PhD student 1 Research assistant	
10	Monitoring visit with tree expert to 2 sites of A.T	14.05.09	PhD student Head of FRI	
11	Visit to Karakalpakstan (awareness creation, farm research)	15.05.09	Project coordinator Senior researcher of Forestry UNESCO representative	2 farmers in Karakalpakstan
12	FTI Internal Monitoring workshop	15.05. - 16.05.09	PhD student Head of FRI 1 Research assistant	
13	Group meeting - Scheduling of FTI activities	16.05.09	Project coordinator PhD student Research assistant	
14	Monitoring visit with tree expert to 2 sites of A.T	16.05.09	PhD student	
15	Monitoring visit with tree expert to 2 sites of A.T. Discussion with farmers (A.T and Khiva)	28.05.09	PhD student	3 selected farmers
16	Visit to KK (Discussion on FTI collaboration)	25.06.09	PhD student Research assistant	KK Farmer Hamdam
17	FTI - IV workshop	02.11.09	Project coordinator PhD student Head of FRI	1 selected farmer
18	Field visits with forestry expert	05.11.09	PhD student Head of FRI	
19	Group meeting - Scheduling of FTI activities	06.11.09	PhD student Project coordinator Head of FRI	
20	Visit to project research site in Yangibazar (awareness creation)	05.11.09	PhD student Head of FRI	1 selected farmer
21	Field visit to potential farmer for FTI 2010: Awareness gauging Interest to innovation	09.11.09	PhD student Research assistant	1 selected farmer
22	Preliminary Impact Assessment	15.12.09	1 Senior researcher 2 Research assistants	1 selected farmer
23	Preliminary Impact Assessment	17.12.09	2 Research assistants	1 selected farmer
24	Preliminary Impact Assessment	30.12.09	2 Research assistants	1 selected farmer
25	Monitoring field visits	Every three weeks	PhD student	Farm managers of 2 farmers

Source: Authors compilation from Kan, et. al., 2010

The late planting especially on both marginal sites increased the risk regarding water availability for irrigation, which was required immediately after planting. According to the water turn assigned to these two farmers, it became very likely that the irrigation could be exceedingly delayed and thus would add to the stressful conditions at the time of germination, which could reduce the chances of survival. Whereas it was in the farmer's responsibility to provide timely irrigation water, Farmer Muborok expressed need for support from the research team to assist her in approaching the authorities to ensure water supply. Consequently, the timing for irrigation was scheduled by farmers as contingent on the other parts of the field, which was still used for cotton growing. As such, farmer Ibrahim was able to receive irrigation water on time to his site through his own connections with WUA, farmer Muborak could not solve her water problem and waited for her regular irrigation turn for cotton and was only able to irrigate the trees when there was water flow for cotton.

The planting events were followed up in the months after (Table 4) with fortnightly visits to the sites by project staff and more frequent visits by the farmers and their staff for taking care of the trees. During these visits, whenever the farmers themselves were available, the project staff also met the farmers for further discussions on the tree growth and survival rates.

SA Team

The SA Team carried out a number of activities (Table 5) to proceed with joint validation of EM38. One month after signing the agreement with the project in August 2009, SANIIRI sent its PhD student to work with the project's FTI team. As agreed, the EM38 equipment was used at SANIIRI's research station in Khonka district, for which salinity assessment data based on SANIIRI's conventional soil sampling techniques existed. In the field, the FTI team leader explained the technical details of the device, measuring principle, depth of signal penetration, and the method of calibration. The project's field assistant demonstrated the device calibration before taking measurements and was responsible for assisting with EM38 and GPS measurements. The SANIIRI researcher was assisted by 2 more assistants in soil sampling to compare the results.

Table 5: A chronological list of activities undertaken by the AF team in 2009

#	Activity	Time	Participants ZEF	Participants Stakeholders
1	Roadmap - flexible irrigation	15.01.09	3 Senior researchers	
2	Internal discussion (e-mail) - update and seek advice on further steps regarding salinity device FTI	04.05.09	Project coordinator 7 Senior researchers	
3	Internal Meeting (IM) – discussion about future plans of the innovation	18.05.09	2 Senior researchers	
4	IM – merger of flexible irrigation with WUA	18.05.09	Project coordinator 3 Senior researchers	
5	Discussion with Soil Research Institute (SRI) regarding survey in Djizzak	19.05.- 20.05.09	SA team leader	Head of SRI One professor and a senior researcher at TIMI
6	SRI letter for joint soil salinity survey using conventional and Em38 methods	22.05.09		Head of SRI
7	Joint EM38 survey with SRI's soil survey in Djizzak	28.05.- 30.05.09	Team leader SA Research assistant	SRI field staff
8	Seminar organised by Japan International Research Center on Agriculture (JIRCAS) in Tashkent to exchange ideas and results in salinity studies	?? March 2009	Team leader SA	JIRCAS staff, TIMI : One professor and a senior researcher at TIMI

9	Visit to our project from CACILM Multi-country Secretariat in Bishkek - provided few example slides on device, sampling transects, and how generated maps look like	?? May 2009	Team leader SA	5 National CACILM Secretariat members
10	Meeting with OGME (Khorezm Oblast Hydro-geological Melioration Expedition) - to explain and demonstrate EM38	11.06.09	3 Senior researchers 1 research assistant	main hydro-melioration specialist of OGME
11	Meeting with Rural Restructuring Agency (RRA) of Uzbekistan	29.06.09	2 Senior researchers	Deputy Director General of RRA
12	Meeting with Tashkent Institute of Irrigation and Melioration (TIMI)	29.06.09	2 Senior researchers	Incharge of Eco-GIS Center of TIMI
13	Meeting with Asian Development Bank (ADB)	29.06.09	2 Senior researchers	ADB Programme Officer
14	Meeting with Melioration Fund of the ministry of finance	30.06.09	2 Senior researchers	Director and Head of finance
15	Meeting with SANIIRI	30.06.09	2 Senior researchers	Head of laboratory
16	SRI Djizzak survey results for comparison passed to SRI	07.07.09	SA team leader	SRI expedition leader for Djizzak
17	Meeting with SANIIRI – to formalize the details of joint experimentation /collaboration	03.08.09	2 Senior researchers	Director, head of laboratory
18	Signing the agreement by SANIIRI and ZEF	10.08.09	Project coordinator	Shavkar Rakhimov
19	Calibration work in collaboration with SANIIRI	19.08.09	SA team leader Research assistant	SANIIRI PhD student 2 assistants
20	2 nd Meeting with OGME (Follow up on presentation to OGME in Khorezm)	27.08.09	3 Senior researchers	chief engineer
21	Meeting with ADB's Land Improvement Project	31.08.09	2 Senior researchers	Team leader, LIP/ADB
22	Meeting with SANIIRI – on laboratory analyses completed and how data analyses were progressing	11.12.09	SA Team leader	Head of laboratory
23	Received incomplete report from SANIIRI	Mid January 2010		

Source: Authors compilation from Akramhanov and Ul-Hassan, 2010

The principal objective of the calibration work differs from a conventional salinity survey of a given area in respect to the range of soil salinity levels covered, basically requiring that the sampling has to capture the whole range. This difference is crucial for a correct calibration and had to be discussed several times over the period of sampling. Areas with a high degree of soil salinity had to be searched because most of the fields suitable for sampling were in the low-to-medium salinity levels. Altogether about 20 locations were sampled and measured. Soil samples were taken to SANIIRI for further analyses. The samples were analyzed for a number of parameters which presented some additional challenge in analyses. Therefore, considerable delays in data analysis could not be avoided and only by mid December 2009 the data collected by SANIIRI were completely analyzed. Unilaterally, SANIIRI repeatedly moved the deadlines back.

Despite earlier caution voiced by the FTI team leader that the study of all influencing factors on EM38 is outside of the scope of the calibration exercise, there was the ambition from SANIIRI to additionally investigate in depth influencing factors on EM38 readings. On one hand, the detailed information of influencing factors was considered to be useful to understand EM38 readings. On the other hand, however, the team leader feared that the report would maintain a standard SANIIRI structure of writing, implying that it would be too technical and scientific and too detailed, and be of little use for FTI joint

experimentation, which only required the comparison between EM38 and conventional salinity assessment methods in terms of accuracy, coverage and speed of assessing and mapping salinity.

During a meeting in December 2009, the FTI team expressed these concerns that the direct and too detailed comparison of salinity indicators between EM38 and conventional methods would leave out the added potential of EM38 but instead focus on what it does not offer compared to the conventional method. Following several reminders and agreements on deadlines, the very draft of the yet incomplete report was only received in mid-January 2010. The main message of the analysis was that while the device performs well on average soils, it needs to be further calibrated for sandy soils. SANIIRI proposed to run additional tests of the equipment at soils having all possible ranges of salinity and types of soils in Syr Darya province. Both partners intend to discuss this further in 2010.

2.5 Monitoring and Evaluating the Processes

From the beginning of the overall FTI process onwards (beginning of 2008), the importance of continuously monitoring and critically evaluating the process of each transdisciplinary team has been stressed in order to allow for feed-back mechanisms and reiterate learning within the teams. The following outlines the strategies of monitoring and evaluating developed and practiced by each of the four teams.

WUA Team

As part of the agreement of collaboration, the WUA's CCPG was to report on a monthly basis about its activities and achievements in line with the formally agreed roles and responsibilities. As such the monthly progress reports were submitted on time, but initially reported only positive highlights and success stories. Challenges faced as well as potential impacts of the WUA working team's activities on general members were not documented. Consequently, a WUA performance discussion meeting was convened on 24 July 2009 with the two objectives of assessing a) WUA Ashirmat's performance according to the WUA staff and respective farmers, and b) the approach taken by the FTI WUA team in strengthening and empowering the WUA for improved water management.

Yet, due to the local bazaar, which was scheduled on the same day, as well as some irrigation problems of several farmers, merely three commercial farmers out of 21 and three kitchen garden farmers attended the meeting. Despite this drawback, a number of issues came out as summarized in Box 1.

In order to provide a platform for expressing some of the mentioned concerns and therefore allow for mutual learning, WUA Ashirmat together with the project team then decided to install a complaints box near the WUA office, so that water users could send anonymous complaints to indicate areas for improvement.

Box 1:

WUA Managers and Farmers Perception about WUA's performance in 2009 Cropping Season

According to the Chairman of CCPG:

- Despite having achieved most of the steps of the WUA improvement plan and a higher awareness amongst farmers about WUA managing water distribution remained a challenge: due to uncertain water supply, farmers continued to disobey WUA rules and to take more water than needed.
- The initial enthusiasm for SMID approach was lost due to the high work load for the installation of pumps and electricity problems, but should be awakened again.
- Uniting Zey Yop canal WUAs in one hydrographic WUA remained a challenge.
- Fee collection remained a problem. Until June 2009, WUA only managed to collect 15% of tamorka fees (2000 UZS per ha) and 15-20% fees of commercial farming fees (17000 UZS per ha). The total outstanding debt of farmers to WUA was estimated to 2.5 million Uzbek Soms.
- Regarding WUA's role and responsibilities, the WUA staff believed that farmers regarded water as free while WUA's role was assumed to be in charge of opening water gates (similar to the role of the water master during soviet time).

According to Farmers:

- Farmers were not prepared for excessive water supply in spring 2009,
- Several upstream farmers did not obey the WUA rules which resulted in water scarcity in the tail end areas.
- Regarding WUA payments, the faulty record keeping at the WUA level was criticized. Some farmers claimed to have paid, but possessed no record of payments because part of their farm was previously, before the process of land consolidation in late 2008, cultivated by someone else.
- Regarding WUA's role and responsibilities, the farmers were convinced that WUA staff should chase the debtors. Additionally, in 2008 and early 2009 being water scarce years, farmers had to install pumps by themselves and incur additional costs to abstract saline drainage water for irrigating their fields and thus poor yields. For what service should they pay then?

Source: Author's compilation based on Djanebekov, et. al., 2010

In order to follow up some of the concerns voiced by the farmers and counterbalance the low attendance rate of farmers during the meeting, it was additionally decided by the project's WUA team to carry out a perception survey amongst farmers and households capturing their expectations, positive and negative experiences and attitudes towards the WUA. The perception survey was administered in September 2009 and the preliminary findings of the survey reported during the fourth FTI training in November 2009.

It here became obvious that despite a high degree of awareness amongst farmers and rural households about the location and staff of the WUA, a low degree of ownership existed. The majority of the respondents continued to regard the WUA as a service organization from which farmers could order water in accordance with crop demand and timing. Consequently, this called for reviewing the social mobilization strategy during the Annual General Assembly meeting of the WUA in January 2010.

CA Team

While the WUA team monitored and critically discussed the FTI process, the CA team monitored and evaluated less the FTI process but instead the resulting adjustments to the innovation itself. Consequently, and as stated in the agreements of collaboration, the project's CA team was solely responsible for formulating the respective indicators. Regular data collection activities in the field had been launched to monitor input and water use as well as crop growth (see Annex 5). To supplement these innovation-centered assessments, the research team decided to arrange for a field day at the cotton research institute, where elements of CA research trials were ongoing. The one day field experience in June 2009 (the date was chosen taking the time for the wheat harvest into account) was hoped to offer insights into the farmers' perceptions and judgments of the project's activities on CA, based on the visual estimation of crop stand and yield prediction according to crop management and tillage practices, like fertilization, leveling and irrigation. Furthermore, the team regarded the field day as a continuation to the first stakeholders' meeting in November 2008, when farmers were only theoretically familiarized with conservation agriculture.

The field day resulted in the following main findings:

- The farmers associated the status of crop stand (late or well-timed maturity; density or scantiness; fullness of spikes, bending, color, weakness, etc.) with adequacy of irrigation and fertilizers;
- Any changes in the application rates of fertilizers, e.g. non-use, or different than state recommended amounts of nitrogen, were highly questioned by farmers as these are generally staunchly believed norms, even though it might give better results to adjust the norm to local field soil fertility;
- Since laser leveling displaces top soil and thus may alter soil fertility, possibly resulting in patches of differing productivity, the farmers linked it to reduced fertilizer application and assessed it as improper field preparation;
- The farmers did not distinguish between plowed and unplowed winter wheat plots, whilst the tillage practice and retention of crop residues on the cotton plot attracted the attention of farmers;
- The farmers expressed their interest in a proper cost-benefit analyses on cotton under conservation agriculture as cotton remains their major state determined crop;
- Since planting wheat in cotton fields is a usual practice, farmers saw no difference between their practice and what researchers suggest. Consequently, the status of wheat stand was not associated with crop residues. This called in the eyes of the research team, for better arguments to convince farmers to retain the residue. Moreover, the partial attention of farmers is probably explained by the fact that effect of residues on soil improvement could not be evaluated visually only (like salinity). Yet, alternative solutions for crop residues management (e.g. length and amount of residues left from harvesting; fuel wood substitutes) should be offered to farmers due to their priorities given to livestock management and household needs. Furthermore, winter wheat could be planted as part of the CA system (like minimum tillage into cotton or surface seeding into rice);
- TV broadcasting and mass demonstration events were proposed by participants as potential dissemination strategies.

Based on these insights and the close monitoring of the innovation itself under 'real-life' conditions as listed in Annex 5, the CA team distilled the following lessons learned (Egamberdieve, 2009):

- The provision of targeted incentives (contribution to inputs, provision of equipment) which led to a cost and risk sharing between the partners helped setting up the demonstration and receiving in-depth feedback from the collaborating farmers.
- Accepting the collaborating farmers as serious partners led to feedback that was helpful in the further development of the innovation.
- The stepwise approach aiming at the introduction of CA principles in a piece meal fashion, rather than as a complete and complicated package warranted the gradual progress.
- Using demonstrations as an extension support tool helped overcoming farmers' initial reluctance. In general LL and CA technology can be regarded as resource saving technology (time, fuel and labor, etc.), provided the above mentioned equipment is given.
- Farmers suggest trying out zero tillage method on sandy type of soil rather than heavy loamy soils.
- Intermediate tillage is seen as alternative solution to avoid the yield penalties. This means: plowing for cotton, no tillage for wheat (in cotton/wheat system); plowing for rice, no tillage for wheat (in rice/wheat system).
- To reduce the tillage intensity, as well as to provide the long-term effect of land leveling and keep the system functioning, potential replacement will be the disc harrowing or using the rotavator instead of conventionally practiced moldboard plow and chiseling.
- Yet, at present, a wide spread distribution would not be possible due to general unavailability of appropriate equipment such as a seeder, chopper, spray, needed inputs, etc. Thus, beyond the technical and scientific findings to declare the CA technology "fit" for such conditions, further

research needs to be undertaken for adapting the technology to fit all kinds of farmers and farming conditions.

AF Team

One of the team members of the Afforestation team visited the sites on a monthly basis, occasionally accompanied by other team members, in order to monitor the establishment and growth of trees and discuss with the farmers specifics of their experience so far and in-between agronomic practices on the maintenance of the trees. The team leader paid visits to these farmers once every year and occasionally provided advice regarding the innovation itself over the phone to the visiting researcher who conveyed this to the farmers during her next visit.

At the initial stages farmers seemed to adopt a “Try, Wait and See” approach towards the afforestation experiments. That partially explains the initial lack of ownership of innovation by farmers and greater expectations for inputs from the project. For example, all the three farmers in the beginning appeared to believe that the project researchers were “doing scientific research” on their plots. In the case of Ibrahim, one of the farmers, on whose plot the trees failed to germinate, the farmer strengthened his perception that his degraded land was unsuitable and that afforestation alone to remedy his land was unsuitable approach. On the contrary, Farmer Muborak found evidences on appropriateness of afforestation to suit her degraded land. Participatory Monitoring and Evaluation (MPE) exercises conducted during the fourth FTI training and later provided researchers additional food for reflecting the entire process of innovation validation under a joint experimentation and the researchers expected that some changes in the perceptions of farmers would occur overtime (Kan, 2010).

SA Team

The SA team of the project did regularly monitor the FTI process itself, adjusting its stakeholder selection, ways and styles of interacting as well as revisiting the team's objectives of the overall process. For example, the team initially staunchly believed that partnering with OGME's local branch would be the best strategy. However, the lack of follow-up by OGME on its promises triggered the team to approach another set of stakeholders. The team even approached donor funded projects to partner with. Through this hit and trial strategy, it was finally able to identify the most relevant stakeholder to test the innovation. Yet, the team did not feel the need to re-evaluate the innovation itself again. Instead the project team decided to let their chosen partner, SANIIRI, collect and analyze the data itself. Only cautionary explanations were provided that a lot more peer reviewed research existed explaining the relationships between technical parameters of soil and accuracy of the estimates and might not need to be researched again. However, the SANIIRI scientists produced exhaustive research reports anyway ignoring these cautions. The team planned to discuss the results with the technical specialist of SANIIRI in August 2010 and carry out a ranking of various methods of soil salinity assessment.

3 Enhancing Capacities Further: The Fourth FTI Training

Towards the end of 2009, the fourth FTI training workshop was supposed to encourage the team to review the second year of ‘following the innovation’ and to provide additional insights, methods and tools into impact assessment. The four-day training workshop ‘Taking Stock and Looking for Impact’ took place in Urgench, Uzbekistan from 2nd to 5th of November 2009. It was facilitated by a consultant from ETC EcoCulture and co-facilitated by the project's FTI facilitator as well as the coordinator of the social science part in the project.

It brought together 22 participants, 15 directly associated with the project as senior researchers, PhD students or research assistants and 7 stakeholder representatives (2 farmers, 4 staff members of the Ashirmat Water User Association and one of the Forestry Research Institute (FRI)). This was the third FTI workshop in which project stakeholders actively participated (including the internal review workshop). The WUA stakeholders and the head of FRI attended the whole workshop and contributed substantially. Two CA farmers joined only the first day (van Veldhuizen, 2010).

The specific objectives of this workshop were to enable participants:

- To critically review FTI implementation to date, identify lessons learnt and inspire planning for continuation of FTI in 2010;
- To obtain insights in participatory impact assessment, methods and tools, and discuss and operationalize their use and relevance for FTI implementation in each of the teams;
- To review once more the organization of the FTI teams and their functioning, also in view of recent staff changes, take measures to improve or re-strategize where needed; and
- To decide on inclusion of additional innovation areas in the FTI program.

The four-day program comprised of the following blocks:

- Welcome, introductions, participant expectation, background to the workshop program
- Recap of FTI and FTI trainings I, II, and III
- Analysis of progress in the four FTI teams to date
- Introduction into Impact Assessment
- Designing participatory impact assessment
- Introduction into Most Significant Change approach to Impact Assessment
- Field Study on IA
- Strengthening the FTI teams, communication and coordination

While the workshop was a success in terms of participation, topics covered and the level of engagement of participants, all teams reported from their interaction with stakeholders on the complexity of real life situations. All teams did show a lot of learning on the relevance or not of their innovation. Four types of factors emerge in analyzing why stakeholders show reluctance to directly accept FTI innovations: the innovation itself (needs to be adapted?), the system and institutions, the people involved, and the way FTI process was implemented. The systems and institutions are a key bottleneck in Uzbekistan. Some teams have started to incorporate options from the farmers/stakeholder themselves, not just the innovation, which was recognized as an important step in FTI. However, a need for more reflection on the FTI process and interaction, the process, with the stakeholders, at least once at the end of the season clearly was identified. It was also learned that the stakeholder involvement and influence in decision making in the FTI process differs across the 4 teams, but generally could be further increased.

The participants learned how to design, implement and analyze participatory impact assessment exercises. It was noticed that earlier M&E activities were largely too scientific and the stakeholders did not have much input apart from data provision. Therefore the FTI teams were asked to design their own PIA methodology for each innovation.

Overall the main issues and agreements reached included the following:

1. Development of team and innovation specific suggestions to proceed further from where the teams have been;
2. The Flexible Water Management was dropped as an FTI innovation because it was still at the level of a scientific idea needing further testing before undertaking FTI with stakeholders in their real life situation. Besides, the capacity in the project on this topic was also not enough anymore.
3. Several new innovations were considered for inclusion but considering the time left for the present project phase and resource and staff availability, it was decided to only include Kulavat Irrigation System Water Allocation Model (KIS-WAM) under FTI.
4. It was agreed that the FTI teams would compile and review their process documentation reflecting the team progress in the light of suggestions and comments made at this workshop and share this for review by early January 2010.
5. It was also decided to hold an interim review workshop in mid March coinciding with the project's planned workshop for donors in March 2010. The team work plans would be jointly reviewed and refined.
6. The fifth and the final FTI training workshop was decided to be conducted along a "write-shop" model, in order to assist the teams to come up with their final peer-reviewed outputs for publication.

7. Finally the future of FTI promotion and ownership in Uzbekistan after the project ends was reviewed briefly. The project will have to strategize potential organizations that could carry the FTI message forward and involve these in activities in 2010-11.

4 Issues and Challenges

4.1 Integrating Stakeholders

Despite intensive discussions at the beginning on the importance of stakeholder identification, it proved to be difficult, to actually identify interested stakeholders, who were ready to invest into the transdisciplinary process and validate and adapt the innovations together with the interdisciplinary teams. Out of the four teams, the SA team eventually reached, partly due to the high dependency of the project on the stakeholder, the highest degree of stakeholder involvement, whereby the stakeholder took the charge of the process, designed the experiment and assessed the validity of the innovations almost independently. The WUA stakeholders were initially integrated well through participatory processes, but since the departure of the team leader, the interactions remained rather limited due to the lack of staff on one hand, and a gradual shift from the initial joint experimentation to a more "laissez faire" approach. However, the results of monitoring had been shared and discussed with the WUA, who agreed to the results. For CA, while informal consultations and exchange of opinions and experiences regularly took place between the CA expert and the farmers, the farmers were not clear about the nature of the CA joint experiments and continued to refer to them as "the expert's research trials". In case of AF, the stakeholders appeared to rely substantially and for almost everything on the visiting FTI member. Their perception was that even the choice of species was undertaken by the researcher, while the researchers felt that the farmers had been the one freely selecting species. However, the team very well integrated the head of the Forestry Research Institute into the FTI process, who described the FTI process as extremely "interesting" and "educating".

The Uzbek farmers remain quite busy due to not only their farming, but also due to their obligatory participation in state organized events, meetings, training seminars, as well as in resolving business issues with agricultural input providers and banks. Gauged only by their participation in FTI trainings would therefore not do justice. Regardless of whether the stakeholders could correctly spell out the nature of the joint experimentation or not, their agreement to participate is no less significant on several accounts. Firstly, within the extremely controlled production system of Uzbekistan, a farmer agreeing to experiment with agriculture for anything not recommended by state authorities is a substantial risk a farmer takes demonstrating his or her innovativeness. Secondly, by experimenting, farmer accepts a disproportionate risk of otherwise profitable agriculture. Thirdly, the input and labor contributions demonstrate farmers interest in innovations. Fourthly, some of the Uzbek farmers tend to trust experts more than their own knowledge on innovations they have never tried before, as in the case with AF, and thus might be perceived rather passive during meetings and discussions. Fifthly, they treat outsiders as guests and respect their guests. Arguing with visitors whom they do not see more frequently is socially unacceptable in local traditions. Thus, wherever they might have been identified as "less active" it might not necessarily mean they were not interested or well integrated. All engaged farmers in AF and CA experiments actively participated in one-on-one meetings with CA expert or AF PhD student.

4.2 Staff transitions within FTI teams

An important, but unavoidable issue that considerably influenced the performance of various FTI teams was that of staff transitions. Most of the PhD students who joined the teams initially out of the relevance of the innovation to their PhD work had to leave at some stage for completing their studies. There had been tendencies to fill these gaps through contributions of the research assistants from relevant work packages. The research assistants nevertheless did not necessarily possess the required skills and knowledge required for working inter- and transdisciplinarily and always required to be supervised and coordinated by the respective senior scientists. Amongst the senior staff, two senior

economists, two senior water management specialists, and a tree specialist changed their jobs during the course of the initial two years. Some of these vacancies were re-filled, but the replacements had missed the earlier discussions and trainings, and thus neither had the interest nor the required exposure to the FTI work. Besides the missing FTI expertise, the newly joining colleagues, if at all interested in the FTI work, had to gain the stakeholders' trust and respect again from scratch. The WUA, SA and AF teams substantially suffered from these setbacks. To fill these gaps, the FTI facilitator was required to jump in and assume major responsibilities in at least two of the four teams. However, this gap filling strategy was not as ideal as having those senior scientists continuously involved who were also specialists with regard to the innovations at hand. In effect these transitions and departures of PhD-students to Germany resulted in an overall decrease in team members from 2008 to the end of 2009 in all four teams: The WUA team shrank from initial 10 members to 5, the CA team from 14 to 4, the SA team from 9 to 3, and the AF team from 7 to 5 members.

4.3 Spreading human resources thinly

Apart from the FTI facilitator, for all other researchers involved in the FTI-process, 'following the innovation' was only one amongst many other job assignments, which was regularly overshadowed by the 'main' responsibilities of the respective researchers. While junior researchers by default had to some degree focus on their actual research in order to progress in their PhDs, the senior researchers involved were at the same time responsible for at least one self-standing work package within the project, that only little would contribute to and extract from the FTI experience. In order to fulfill the objectives of each work package, each senior scientist involved in the FTI experience, was additionally and with the prime focus conceptually, methodologically and operationally designing research activities that could but did not necessarily relate to their FTI work, supervise PhD- and MA-students as well as research assistants and teach. In addition, they were required to write and publish peer reviewed papers, participate in conferences and seminars, attend academic activities and coordinate visits of collaborating scientists of the project from elsewhere. Besides, the current project phase being the terminal phase, the Uzbek project researchers decided to form a self-sustaining, non-governmental scientific implementing agency called Khorezm Rural Agricultural Support Services (KRASS) for sustaining project efforts. Launching KRASS consumed a lot of time of all in Urgench-based post-doctoral researchers. As members and drivers of KRASS, the researchers needed to participate in preparing and negotiating proposals for and with donor agencies. As one outcome of this, KRASS managed to attract a research and implementation grant from the United Nations' Development Fund, which put further stress on researchers' time. The focus on FTI as a cross-cutting key activity of the project's third phase therefore was constantly challenged and could hardly be maintained. Despite being aware and convinced of the necessity to discuss the FTI work in a structured and coordinated way within each team, as well as across teams, the key researchers involved rarely managed to actually hold these structured meetings and thus, the implementation of FTI activities, process documentation, attention to detail, and appropriate reflection within the teams was compromised.

4.4 Team Coordination Challenges

Especially within the CA team and partly due to the multitude of assignments of the key FTI members, tendencies could be observed, to undertake FTI interactions with stakeholders in a 'solo-flight' mode, basically dropping by the stakeholders whenever they were passing by their locations without consulting or informing the FTI team members. Since note taking and process documentation were not systematically undertaken, the rest of the team members would remain unaware of interactions and the insightful discussions between the expert and the stakeholders.⁶ Comparing the four teams with regard to their internal coordination and interaction, it can be stated, that more frequent and structured stakeholder-FTI team discussions were common within the WUA and SA teams and happened rarely within the CA and AF teams. Part of the problem was in the team design. In the case of the AF team for example, the members apart from the PhD student comprised the project coordinator in the field, the

⁶ This partly explains the limited details on activities, meetings and events of interaction outlined in section 2.3.

head of the Uzbek Republican Forestry Research Institute, Tashkent, and an afforestation specialist based in Bonn, all of which were rarely available for meetings with stakeholders. In the case of the CA team, one senior member had to regularly travel to Tashkent for academic assignments, while other members of the team had a multitude of assignments running in parallel. The coordination and scheduling of common meetings was therefore difficult and in the end severely hampered.

In order to counterbalance these observed difficulties and as mitigation strategy, it was decided in the interim review workshop in May 2009 to hold fortnightly FTI coordination meetings in Urgench, coordinated by the FTI-facilitator. These meetings were regularly held during the entire vegetation season of 2009 (June – October). The team leaders would share and discuss their plans and problems with other FTI teams and with the facilitator and decisions would be taken jointly. There were tendencies, however, that not all members of the FTI teams would participate in the coordination meetings and instead the ‘team leader’ or one representative of the group only, which sometimes negatively affected the decision-making capacities during the meetings. Nevertheless, the meetings were documented and the minutes were shared for comments and distributed to all FTI members based in Urgench, Bonn and elsewhere. The advantages of these meetings were i) the overlaps and conflicts in schedules of separate meetings of the four teams were avoided by holding regular meetings with all four teams involved ii) each of the FTI groups knew what the other group was going to do; and c) decision-making was guided by collective wisdom of a relatively larger group, the overall FTI team. The disadvantage nevertheless was that detailed planning of individual groups was discussed briefly only. The detailed planning by the groups was usually addressed within their group specific formal or informal and undocumented meetings.

4.5 Honoring commitments

An important issue that remained challenging for several teams as well as the overall FTI process was the sudden adding of new responsibilities for the involved researchers and the resultant changing priorities for the individual, which then again also impinged upon other FTI member’s schedules. During each of the FTI trainings, for example, a few key FTI members had to miss important sessions due to ongoing field work, although the training programs had been announced two to three months in advance. Despite the fact that the FTI teams identified milestones and timelines for the performance of FTI activities themselves, very often, the timelines were not followed by the teams. For example, it was discussed and agreed in the plenary during the third training workshop in November 2009 that the next interim review workshop was to be held in March 2010, but since March, due to the early arrival of water, was very busy for researchers carrying out or supervising field activities related to leaching of cotton fields, the review had to be pushed to the end of April 2010. Even announcing the new date more than one month in advance did not help, as a sudden visit of two researchers from a collaborating organization did not let the CA expert participate in the review. Here the priority setting sometimes was unclear and not in favor of the FTI process.

4.6 Process documentation

Achieving systematic process documentation remained a key challenge throughout the year. The FTI teams, except for the WUA team, struggled with the overarching questions of what process documentation actually was and how it was to be done. The FTI facilitator provided guidelines that could help the teams to document their respective processes. These guidelines also included elements highlighting the importance of reflection on the documentation. Yet, two teams, CA and AF, nevertheless remained rather passive in documenting the processes. Following the interim review in May 2009, an assistant was recruited to assist the FTI teams in recording the proceedings of important meetings and discussions. The only condition was to inform the assistant and coordinate the schedules with him. However, many interactions between the stakeholders and FTI members in the CA and AF teams remained undocumented, because the assistant was not informed beforehand in order to participate and document. This lack of regular process documentation resulted in incomplete and sketchy annual reports by these teams. To assist the teams in closing those knowledge gaps, the mitigation strategy was to get the process reports reviewed by three reviewers, the FTI facilitator, the social science coordinator as well

as the external reviewer familiar with the FTI process with the task to ask detailed enough questions to capture the missing points. The reviewers provided in-depth comments and suggestions that the teams are addressing at the time of writing this in 2010.

4.7 Team reflection

Literature on project based learning such as Markham et al (2003) cautions against the danger of team members of 'action based learning' getting caught up in action without adequate reflection, and thus neither making full use of the learning opportunity for themselves nor for the process in which they are involved in. The 'Follow the Innovation' experience outlined here can be regarded as an empirical example of this. Initially, the team members debated, from various perspectives, on how to go about their innovation specific processes, what elements should be included or dropped, how experiments should be designed, etc. However, as the process proceeded towards greater interaction with the stakeholders, the tendencies to look back critically and identify gaps and loopholes reduced. Within the WUA team, initially some of the team members regularly encouraged and demanded the rest of the team to critically reflect and re-assess their actions, intended and actually achieved effects. Yet, towards the second half of 2009, these team members left the team and partly also the project and the regularity and level of assessment and reflection reduced. While the series of FTI trainings and internal review workshops were designed to address this issue (the preparatory guidelines circulated beforehand clearly highlighted the need to critically reflect while summarizing the teams' experiences) the reports and team presentations indicated that self-criticism was not always easy for the teams, and the discussions remained less critical than expected (van Veldhuizen et al, 2010). Consequently, the social science coordinator and FTI facilitator decided to encourage critical self-reflection once more by inviting the external FTI consultant with a strong expertise in participatory innovation diffusion processes and familiar with the project's FTI process while at the same time distant to it, to provide a written review of the process documentations prepared by all four teams by mid March 2010 and pointing out areas in which a more detailed self-reflection might be advisable. Additionally and as a follow-up of this, it was also discussed and agreed with the teams that the FTI facilitator and the social science coordinator would strongly assist the teams in reviewing their process and critically assessing it with the aim to extract analytically interesting insights. This is currently, at the time of writing, taking place.

5 Concluding Remarks

The five innovations included in the FTI process varied substantially, with regard to the nature of the innovations themselves, the stakeholder groups addressed and the change induced by and required for further diffusion. The WUA team worked on testing and eventually modifying (localizing) a revised institutional approach to strengthening WUAs in Uzbekistan, the CA team ventured into introducing a complete set of agronomic practices for irrigated areas that challenge the conventional practices of resource intensive agriculture and consequently demand a systemic change in agriculture. The AF team wanted to test a productive but currently unconsidered alternative land use for lands that produced poorly and the SA team aspired to check for the acceptability of a more efficient way for salinity mapping. Only the team on flexible irrigation scheduling wanted to actually test whether or not the suggested approach would work at all. It was therefore the only team that left room for the possibility that the innovation would not at all make sense. Partly this was due to the innovation being in the process of development, meaning that empirical benchmark data on soils, groundwater and irrigation and drainage parameters were still in the process of being collected. Scientifically it was therefore not clear yet, whether the innovation actually posed a 'plausible promise', for the transdisciplinary cooperation nevertheless, this meant that the creative space for stakeholders to substantially contribute to the shaping of this innovation was still open.

Initially there were substantial confusions amongst almost all teams on the actual objectives of 'following the innovation'. The WUA team interpreted the purpose of their FTI innovation as "an approach aimed at improving WUAs", the CA and AF teams understood their FTI processes as attempts of

disseminating (and even out scaling) the innovations, and the SA team understood it as an awareness building campaign for EM38. The initial work plans of all teams little emphasized the testing, learning from this testing and improving of the innovations, while strongly emphasizing to make things happen in the sense of implementation, diffusion and outscaling. Despite having devoted substantial time, numerous meetings and two four-day training workshops on this question (Hornidge et al., 2009; 2010), it nevertheless became clear in retrospect, that the invested time and held discussions were not sufficient in clarifying the actual objectives and clear aims of the overall experience.

Each team's choice of sites and stakeholders depended on the nature of the innovation; while the choice of stakeholders then again determined the design of the respective engagement strategies. Although the teams were initially exposed to stakeholder identification and engagement tools, the use of these tools did not go beyond stakeholder identification. Only the WUA team used participatory stakeholder tools for engagement. The CA team did so to some extent by using a modified version of a resource mapping exercise as CA trail evaluation by farmers to engage with. When discussed within the FTI team, it was repeatedly suggested that this could be explained with the disciplinary backgrounds and expertise of the team members. While the WUA team was headed by a staff member who had been exposed to the use of these tools in his previous job and further driven by three social science PhD-students who worked in the same WUA as part of their PhDs, the initial activities of the CA team were largely designed by a PhD student working on extension services. In contrast to this, the members of the remaining two teams originated from the bio-physical and economic disciplines without prior exposure to the use of participatory tools and bottom-up methods of interaction. Furthermore, the members of the remaining two teams were largely appointed, without any PhD-students and/or senior researchers involved using the FTI processes partly as additional research ground. The degree of motivation therefore to indulge into the process and accompany themselves with new tools, methods as well as theoretical concepts highly varied.

While the teams in early 2008 had either formally or informally agreed on the roles and responsibilities of various members, it remained rather unclear for the support members to what degree their contributions were valued and what type of benefits they could expect from participating. An earlier survey in October 2008 amongst the support members /PhD-students indicated that some members did not understand why they were asked to join a certain group. The comparatively high contribution of some PhD-students in the WUA-team could partly be explained by the students own interest in broadening their understanding of the WUA, in which their research was located. The inclusion of research assistants in the FTI teams helped in moving activities further, but understandably had to be closely supervised and coordinated by the senior researchers of the respective teams. The research assistants' responsibilities included collecting data, carrying out surveys and taking care of note taking and logistics during the major FTI-events.

Since most FTI members had to multi-task owing to their involvement in several research, capacity development and implementing activities, holding regular meetings and discussions to plan, carry out, sum up, and reflect upon FTI related activities proved to be difficult and the tendencies for task-specific specializations within teams (often without co-informing the rest of the team) and the resultant solo-flights increased. This also impinged upon adequate team reflections, for which time was not or rarely made available. Due to the multiplicity of ongoing and additionally popping-up tasks to be taken care of, priority setting clearly became an issue. Resultantly, most of the FTI teams, despite formulating annual roadmaps and revising them in FTI workshops, had been performing on a 'live by the day' principle. This was further compounded by the 'hop in - hop out' situation due to the high turnover rate in staff by some key FTI team members.

As the two main objectives of the FTI component were to jointly with stakeholders develop a) a locally-embedded approach to test, adapt, finalize and diffuse innovations, and b) 'plausible promises' into outscalable innovations, the focus clearly laid on developing a concept for out scaling and finalizing the 'plausible promises' according to the local context. It did not entail the actual out scaling and diffusing of the innovations. For developing a conceptual, locally embedded approach to innovation diffusion nevertheless, the four procedural FTI experiences by the project teams formed the empirical basis. On the methodological side, detailed and comprehensive process documentations therefore are crucial for the further analysis and conceptualizing. As nevertheless process documentations are comparable to a field

diary of a social scientist and therewith a method common in the social sciences, while most FTI team members are natural scientists and economists, for the majority of the FTI members the purpose, structure, content and level of detail of these process documentations were not clear. The following training and assistance on the matter were considered helpful but only taken up by some. Tendencies to not document due to a lack of time, skills, and interest also prevailed, which resulted in the team members reconstructing the process, from their own and other group members' memories, when pressured by deadlines and reminders. Consequently, important empirical details were left out and/or documented in retrospect.

Regarding continuous parallel monitoring and evaluating of the conducted processes, it has appeared to be taking place in a rather unstructured way for several, not to be ignored reasons: a) for the WUA, CA and AF-teams, it is basically too early to assess the impacts as all of these innovations start only producing impacts in a relatively longer term, and for SA, the innovation has to go through the validation process at SANIIRI, and be disseminated before actually seeing impact. Despite this, the project's current phase ends in April 2011 with a project extension being unknown at the present stage; b) since the FTI experimentation is taking place in a 'real-life' situation, the sheer number of variables influencing each of the four innovation settings makes the attribution of developments to FTI nearly impossible.

Overall, it can be assessed, that while all four FTI teams as well as the teams together with their stakeholders have come a long way from conventional approaches to innovation diffusion to participatory approaches to joint innovation development. Nevertheless, the above outlined challenges remain and pose difficulties for the development of a locally embedded innovation diffusion concept within the given and very limited time frame of overall three years. With the growing and Uzbek-specific FTI-experience in the project, there is ample room to strengthen reflection and learning across the FTI-teams and based on this to increasingly test, adapt and finalize the innovation packages jointly with stakeholders through participatory processes in which the project FTI-teams and their respective stakeholders 'follow the innovations'. The extra time given, based on the collected experiences, would then offer the project the possibility to extract an Uzbekistan-specific concept to innovation diffusion, which possibly could be applied throughout the whole of Central Asia. Yet, the above outline of the experiences of four FTI teams collected in their second year of the overall process illustrates that the development of a locally-embedded conceptual approach to innovation diffusion is a time and learning intensive process. The 'local embeddedness' of the approach can only be assured if it is based on action-based research together with the local stakeholders. Yet, this poses a challenge between the local and international researchers from different disciplines and between the project researchers and the local stakeholders. It is time and labor intensive, with the main learning taking place within the first two years. The increasingly reflected progressing of the four FTI processes as well as highly improved process documentations from early 2010 onwards, suggest that the third and most likely fourth year of the process can be regarded as the time in which the by now developed processes can be tested further and by doing so the innovations actually finalized according to the stakeholder needs. We therefore are looking with increased interest into year 3 and hope to be able to continue the process in year 4 for harvesting the results, this hopefully being a locally-embedded approach to innovation diffusion.

References

- Abdullaev, I., Franz, J., Oberkircher, L., Hoffman, I., Nizamedinkhodjaeva, N., Ataev, J., Tischbein, B., Schorcht, G., Jumaniyazova, Q., Djanibekova, N. 2008. Workplan: Improving WUA performance through Social Mobilization and Institutional Development. Available at Project Server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Groups\WUA Group\Work Plan.
- Akramhanov, A. 2005. The spatial distribution of soil salinity: Detection and prediction. PhD. Dissertation. Center for Development Research. Rheinische Friedrich-Wilhelms-Universität. Germany, Bonn.
- Akramhanov, A., Ibrakhimov, H., Tischbein, B. 2008. FTI – Flexible Irrigation Scheduling at field level and Soil Salinity Assessment Tool. December 2008.

- Available at Project Server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\Salinity Assessment
- Akramhanov, A and UI-Hassan, M. 2010. Institutionalizing rapid soil salinity assessment for environmental mitigation in Uzbekistan: Draft Updated Process Documentation Report. January 2010. Available at Project Server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\Salinity Assessment
- Djanebekov, N and UI-Hassan, M. 2010. Improving the performance of the Ashirmat Water Users Association through social mobilization and institutional development: Draft Updated Process Documentation Report, September 2010. Available at Project Server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team
- Egamberdiev, O. 2007. Dynamics of irrigated alluvial meadow soil properties under the influence of resource saving and soil protective technologies in the Khorezm region. PhD Dissertation. Tashkent Irrigation and Mechanization Institute. Uzbekistan, Tashkent.
- Egamberdiev, O., Ibragimov, N., Lamers, JP. 2008. The introduction of Conservation Agriculture practices in the Khorezm Region: Draft Road and Maneuver Map. December 2008. Available at project server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\Conservation Agriculture Team
- Hornidge, Anna-Katharina, Mehmood UI-Hassan and Peter P. Mollinga. 2009. "Follow the Innovation' - A Joint Experimentation & Learning Approach to Transdisciplinary Innovation Research", ZEF Working Paper Series. Vol. 39. Bonn: Zentrum für Entwicklungsforschung.
- Hornidge, Anna-Katharina, Mehmood UI-Hassan and Peter P. Mollinga. (forthcoming). Transdisciplinary Innovation Research in Uzbekistan – 1 year of 'Following The Innovation'", forthcoming in Development in Practice.
- Kan, E. 2010. Afforestation on marginal lands: adapting and validating forestry practices with farmers. Draft Annual Process Report. March 2010. Available at project server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\Afforestation
- Khamzina, A. 2006. Assessing the potential of trees for afforestation of degraded lands. PhD. Dissertation. Center for Development Research. Rheinische Friedrich-Wilhelms-Universität. Germany, Bonn.
- Lamers, JP., Khamzina, A., Kan, E. 2009. WP 420 / FTI component AF. Draft Wokplan January 2009. Available at project server: \\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\Afforestation
- Markham T, Mergendoller J, Lerner J, Ravitz J. 2003. Introduction to project based learning. Project Based Learning Handbook (2nd revised/special edition, pp. 3–8). Novato, CA: Buck Institute for Education. Retrieved June 1, 2009 from www.bie.org/index.php/site/PBL/pbl_handbook_introduction
- Rudenko, I and Egamberdiev, O. 2010. CA FTI Process and Innovation: Updated Process Documentation Report. June 2010. Available at project server: \\192.168.0.1\infozef\FTI\ Process Documentation System\FTI Teams\Conservation Agriculture Team
- UI Hassan, M. 2009. Report on Internal Monitoring and Review Workshop, May 15-16, 2009. Available at project server: \\192.168.0.1\infozef\FTI\Training and Materials\ Internal Monitoring 2009
- Van Veldhuizen, Laurens, 2010, Report on Training Workshop IV 'Taking Stock and Looking for Impact', Urgench, November 2-5, 2009.

Annex 1:

Agreement of Cooperation Between WUA Ashirmat and the Project

A G R E E M E N T O F C O – O P E R A T I O N (hereinafter referred to as "AoC")

between

WUA Ashirmat Koshkopir (hereinafter referred to as WUA)

and

The ZEF/UNESCO Program on Economic and Ecological Restructuring of Land and Water Use in the
Khorezm Region of Uzbekistan (hereinafter referred to as "ZEF/UNESCO project")

Rationale/Background

In January 2002, an agreement was signed between the Republic of Uzbekistan, UNESCO and the Center for Development Research (ZEF) of the University of Bonn (Germany), concerning an extended research program entitled "Ecological and Economic Restructuring of Land- and Water Use in the Region of Khorezm". This ZEF/UNESCO project in development research is funded by the German Federal Ministry of Science and Education (BMBF). It is implemented in the Khorezm Region of Uzbekistan in close collaboration with the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan and with UNESCO. From May 1, 2007 onwards, the German Government has agreed to support phase III of the project under the title "Change Oriented Research for Sustainable Innovation in Land and Water Use (2007-2010)" from May 2007 till December 2011.

As a result of the intensive collaboration between the ZEF/UNESCO Project and the Hokimiyat-Khorezm, the ZEF/UNESCO project has been engaged in social mobilization for improving water distribution and production in the WUA Ashirmat. Selected fields will be used for experimenting improved irrigation water scheduling for cotton and winter wheat production, but also for developing the WUA Ashirmat.

With this Agreement of Cooperation (AoC), the two parties conclude in detail their collaboration in the implementation of the mobilisation of social resources for improved water management as part of the ZEF/UNESCO Project Phase III.

This AoC defines the joint activities, responsibilities and duties of all parties, which are during the period of signing represented by:

The chairman of the WUA Ashirmat Koshkopir:

The Program coordinator of the ZEF/UNESCO
Program: Prof. (hon) Dr. Ir. J. P.A. Lamers.

.....January, 2009

I. Objective of the landscape development

Both parties herewith acknowledge the importance of the ZEF/UNESCO Program and are engaged to make an adequate contribution to the successful implementation of this Program. The general objective of this work is to improve livelihoods of the rural inhabitants and enhancing productivity of the irrigated agriculture through better water management which will be achieved by motivating /enabling water users through Social Mobilization and Institutional Development (SMID) activities to take the necessary steps to support their WUAs.

More explicit objective of the program is improving WUA work and to transforming existing water users association (WUA) into real, working WUA. The 12 steps WUA Improvement plan (hereinafter referred to as WUA Improvement plan) which is integral part of this AoC will be carried out during 2009-2010 period.

II. Detailed tasks and responsibilities

1. WUA working group will take following steps on implementation of WUA Improvement plan:
 - a. present and receive approval of WUA Improvement plan in a General Meeting of WUA
 - b. Start WUA Improvement plan implementation from January, 2009
 - c. Share reports on progress of WUA Improvement plan on monthly regularity
 - d. Request training or consultancy from Khorezm project if such needs will emerge during the implementation of WUA Improvement plan
 - e. Render 6 plots of cotton-wheat (3 for each crop) available for the assessing the water distribution in WUA and testing of improved irrigation scheduling. These lands will be cultivated by the farmers, but the farmer will let Khorezm project staff to enter for measurements in their fields.
 - f. Make a suitable location available for the installation of the weather station. Agrees to guard the instruments of the weather station and devices installed for water measurement in the 6 fields and major irrigation- drainage infrastructure of WUA
 - g. Repair the office of WUA by rendering available work force
 - h. Inform the authorities about the progress of WUA Improvement plan
 - i. Provide support and act as contact group for other innovations and research activities of Khorezm project within WUA
2. Khorezm project will take following steps to support the implementation of the WUA Improvement plan:
 - a. Provide consultancy and training for the WUA working group on demand for successful implementation of ;
 - b. Set up clear and agreed monitoring indicators for documenting of the progress of WUA Improvement plan and carry all costs for monitoring and documentation process
 - c. Provide materials for WUA office renovation during February, 2009. The cost of the renovation is based on agreed calculations in November, 2008
 - d. Conduct every month meeting to discuss and review the progress on FTI implementation and documents properly meetings
 - e. Share all documents , papers and reports with WUA working group regarding the progress of 12 step work plan

This agreement has been mutually discussed and agreed with both parties. English and Uzbek version of the agreement has the same force and content.

Chairman of WUA Ashirmat

German Uzbek project Manager

Annex 2:

Agreements between Farmers in MTP Amir Temur and the Project

AGREEMENT ON COOPERATION No. _____

ZEF/UNESCO Khorezm Project on Economic and Ecological Restructuring of Land and Water Use in the Khorezm Region of Uzbekistan (hereinafter referred to as "ZEF/UNESCO Project")

and

head of the Private Farm _____
(hereinafter referred to as "Farmer") have made an Agreement on Cooperation.

RATIONALE

ZEF/UNESCO Project has been present in the Khorezm region of Uzbekistan since 2002, the year when an agreement was signed between the Republic of Uzbekistan, UNESCO and the Center for Development Research (ZEF) of the University of Bonn (Germany), concerning an extended research program entitled "Ecological and Economic Restructuring of Land- and Water Use in the Region of Khorezm". Being funded by the German Federal Ministry of Science and Education (BMBF) the project is implemented in close collaboration with the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan and with UNESCO.

While the duration of the project is scheduled till 2011, the project is now in its third phase, the phase of implementing and disseminating some of the most promising research results from the past two phases of experimentation and research. Dissemination of results is currently concentrated around the "Follow the Innovation" (FTI) approach, an approach with active involvement of all interested (local) stakeholders, and most importantly, the farmers.

Several FTI groups have been formed, including the one on Conservation Agriculture (CA). The main tasks of this group are: to create awareness (1) and to introduce the basic principles of CA to local farmers (2); to conduct joint experimentation/joint on-field trials with farmers (3); and to conduct monitoring and evaluation of CA adoption by the engaged farmers and broadcasting this technology on a regional scale (4).

1. PURPOSE OF THE AGREEMENT

Both parties herewith acknowledge the importance of ZEF/UNESCO Project and agree to make an adequate/feasible contribution to the successful implementation of the project's activities. The general objective of this work package is to achieve sustainable land use and to enhance productivity of irrigated agriculture in the region Khorezm and thus to improve livelihoods of the rural population. With this Agreement, the two parties conclude in detail their collaboration in the implementation of joint experimentation of CA technology as part of ZEF/UNESCO Project Phase III. This Agreement defines the joint activities, responsibilities, obligations and tasks of the parties.

2. SUBJECT OF THE AGREEMENT

In accordance with the present Agreement the parties agree to jointly test, validate and adapt elements of CA to suit the local farming practices/conditions.

3. TASKS, OBLIGATIONS AND RESPONSIBILITIES OF THE PARTIES

3.1 CA FTI team of ZEF/UNESCO Project

In the framework of CA FTI activities the project promises to provide equipment, facilitation, technical guidance, information material, etc, or in details:

- Provide consultancy and training to farmers on conservation agriculture practices, laser levelling, etc.
- Set up clear and mutually accepted monitoring and evaluation indicators and bear all costs on monitoring and evaluation, documentation process
- Organize field trips

- Prepare and hand out leaflets and other information brochures
- Share all documents, papers and reports
- Provide technical support on levelling, planting and water measuring on fields
- Provide inputs, such as herbicides, etc. if needed
- Avoid activities potentially leading to economic risk of farmers
- Compensate (if any) the lacking profit caused by CA activities (?)

3.2 Farmer

The farmer will fulfil the following tasks and undertake the following responsibilities:

- Follow agreement conditions and instructions of CA FTI team
- Report to CA FTI team on activities' progress
- Include amendments/changes to activities according to the situation only after discussion and agreement from CA FTI team
- Provide land for experimentation
- Undertake all on-field agricultural activities, envisaged by CA FTI plan, both on conventional and CA fields
- Provide technical support (tractor, fuel, workers)
- Undertake preparation/cleaning of irrigation canals, furrows
- Provide the needed inputs upon agreement with CA FTI team
- Ensure water provision to CA fields
- Handle harvest at their discretion after yield sampling/measurement by CA FTI team
- Render any additional assistance to CA FTI team in the field

4. FORCE-MAJEURE

The Parties are not liable for non-compliance with the obligations under the present Agreement if such non-compliance is caused due to circumstances of compelling force, such as flood, earthquake, fire or other natural calamities, war, rebels, or other actions of authorities, occurred after signing of this Agreement. In case of duration of such circumstances over the period of three months each of the Parties shall be released from their Contract responsibilities and in this case neither of the Parties shall have the right for compensation from the other.

5. FAILURE TO FULFIL AGREEMENT OBLIGATIONS AND CONFLICT RESOLUTION

Negotiating Parties agree to try their best to settle all arising conflicts amicably through mutual discussions, open communication. However, in case the Parties fail to settle arising conflicts, specific to the present Agreement amicably, then such conflicts shall be settled in the Economic Court of the Republic of Uzbekistan.

6. OTHER CONDITIONS AND REQUIREMENTS

- 6.1 Any changes and amendments to this Agreement shall be mutually accepted in case they are fulfilled in writing and are signed by both Parties.
- 6.2 This Agreement shall be effective starting from the day of signing thereof by the Parties.
- 6.3 This Agreement shall be effective until completion of all the obligations of the Parties.
- 6.4 This Agreement has been mutually discussed and agreed with both Parties. English and Uzbek versions of the Agreement have the same force and content.

Farmer:

ZEF/UNESCO Project coordinator:
Prof. (hon) Dr. Ir. J. P.A. Lamers

Annex 3:

Agreements between Farmers in Amir Temur MTP and the Project

AGREEMENT ON COOPERATION No. _____

ZEF/UNESCO Khorezm Project on Economic and Ecological Restructuring of Land and Water Use in the Khorezm Region of Uzbekistan (hereinafter referred to as "ZEF/UNESCO Project")

and

head of the Private Farm _____
(hereinafter referred to as "Farmer") have made an Agreement on Cooperation.

RATIONALE

ZEF/UNESCO Project has been present in the Khorezm region of Uzbekistan since 2002, the year when an agreement was signed between the Republic of Uzbekistan, UNESCO and the Center for Development Research (ZEF) of the University of Bonn (Germany), concerning an extended research program entitled "Ecological and Economic Restructuring of Land- and Water Use in the Region of Khorezm". Being funded by the German Federal Ministry of Science and Education (BMBF) the project is implemented in close collaboration with the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan and with UNESCO.

While the duration of the project is scheduled till 2014, the project is now in its third phase (scheduled till 2011), the phase of implementing and disseminating some of the most promising research results from the past two phases of experimentation and research. The validation of research results is currently concentrated around the "Follow the Innovation" (FTI) approach, an approach with active involvement of all interested (local) stakeholders, and most importantly, the farmers.

Several FTI groups have been formed, including the one on Afforestation on marginal lands (AF). The main objective of this task group is validating and adapting of forestry and agro forestry practices to farmers as to convert degraded agricultural land into productive systems and promote trees and shrubs plantings on agricultural lands for ecological services.

1. PURPOSE OF THE AGREEMENT

Both parties herewith acknowledge the importance of the ZEF/UNESCO Project and agree to make an adequate/feasible contribution to the successful implementation of the project's activities. The general objective of the task group is to achieve sustainable land use and to enhance productivity of irrigated agriculture in the region Khorezm and thus to improve livelihoods of the rural population. With this Agreement, the two parties conclude in detail their collaboration in the implementation of joint experimentation of AF technology as part of ZEF/UNESCO Project Phase III. This Agreement defines the joint activities, responsibilities, obligations and tasks of the parties.

2. SUBJECT OF THE AGREEMENT

In accordance with the present Agreement the parties agree to jointly establish the multipurpose tree plantations as one of the alternative types of land use.

3. TASKS, OBLIGATIONS AND RESPONSIBILITIES OF THE PARTIES

3.3 AF FTI task force team of ZEF/UNESCO Project

In the framework of AF FTI activities the project promises to conduct the technical guidance and advisory work, informational support, planting material, etc., or in more details.

- Free-of-charge provision of planting material and transportation to the farmer's field.
- Prepare the manuals on planting the multipurpose trees and maintenance of plantations, as well as the other extension aid and learning materials and other means of information

- Provide the consulting and training (on assortment of multipurpose tree and bush species, types of plantations and their management; plant pathologists and entomologists' services)
- Set up clear and mutually accepted indicators on monitoring and evaluation of the established tree plantations according to the fixed schedule and bear all costs on monitoring and evaluation, and documentation process
- Conduct monitoring on the established tree plantations during the crop season according to the schedule;
- Share the documents, articles and reports on the proposed innovation

3.4 Farmer

The farmer will fulfil the following tasks and undertake the following responsibilities:

- Agree to participate and become a member of the team
- Voluntarily (as well as being interested in the innovation) allot the land for establishing tree plantation and inform the authorities
- Follow agreements made with AF FTI team
- Participate in the documentary process on implementing the innovation
- Agree to undertake all on-field agricultural activities concerning the established tree plantations only after consulting with the innovation team
- Independently take a decision on tree assortment and type of planting
- Bear all the expenses on field preparation, planting and maintenance activities during the crop season
- Ensure the irrigation of the established tree plantations
- Agree for monitoring and evaluation of the established tree plantations, which can be used as a testing ground for performance studies, economic studies of costs & gains, and ecological effect monitoring.
- For a better land output, the inter-row spaces can be used for planting the crops upon the selection of farmer
- Fully bear the responsibility for the status of the established tree plantations
- Has all the rights for use of the established tree plantations at his/her discretion

4. FORCE-MAJEURE

The Parties are not liable for non-compliance with the obligations under the present Agreement if such non-compliance is caused due to circumstances of compelling force, such as flood, earthquake, fire or other natural calamities, war, rebels, or other actions of authorities, occurred after signing of this Agreement. In case of duration of such circumstances over the period of three months each of the Parties shall be released from their Contract responsibilities and in this case neither of the Parties shall have the right for compensation from the other.

5. FAILURE TO FULFIL AGREEMENT OBLIGATIONS AND CONFLICT RESOLUTION

Negotiating Parties agree to try their best to settle all arising conflicts amicably through mutual discussions, open communication. However, in case the Parties fail to settle arising conflicts, specific to the present Agreement amicably, then such conflicts shall be settled in the Economic Court of the Republic of Uzbekistan.

6. OTHER CONDITIONS AND REQUIREMENTS

- 6.5 Any changes and amendments to this Agreement shall be mutually accepted in case they are fulfilled in writing and are signed by both Parties.
- 6.6 This Agreement shall be effective starting from the day of signing thereof by the Parties.
- 6.7 This Agreement shall be effective until completion of all the obligations of the Parties.
- 6.8 This Agreement has been mutually discussed and agreed with both Parties. English and Uzbek versions of the Agreement have the same force and content.

Farmer:

ZEF/UNESCO Project coordinator:
Prof. (hon) Dr. Ir. J. P.A. Lamers

Annex 4:

Agreement between SANIIRI and the Project

AGREEMENT OF CO-OPERATION

Between

The ZEF/UNESCO Program on Economic and Ecological Restructuring of Land and Water Use in
Khorezm Region of Uzbekistan

and

The Scientific Research Institute "SANIIRI" named after V. D. Zhurin

In 2002, an agreement was signed between the Republic of Uzbekistan, UNESCO and the Center for Development Research (ZEF) of the University of Bonn (Germany), concerning an extended research program entitled "Ecological and Economic Restructuring of Land- and Water Use in the Region of Khorezm", which is funded by the German Federal Ministry of higher education (BMBF). The program collaborates closely with the Ministry of Agriculture and Water Resources of Uzbekistan. A key intention is the collaboration with institutions in Uzbekistan. For this reason, a close cooperation between the ZEF/UNESCO Program and The Scientific Research Institute "SANIIRI" named after V.D.Zhurin is anticipated. SANIIRI is a research institute of irrigation mandated to provide recommendations on irrigation systems to all organizations engaged in agriculture. Recommendations on soil salinity assessment and monitoring are integral part of their activities.

In its present phase, the project uses, among others, a stakeholder-orientation process called "Follow-the-Innovation" (FTI) through which project scientists and relevant stakeholders jointly validate various research innovations and recommendation. The FTI is set up in close cooperation with the respective stakeholders. The ZEF/UNESCO Program and SANIIRI share objective of providing best recommendations for soil salinity assessment and monitoring, in a timely manner.

With this Agreement of Cooperation (AoC), the ZEF/UNESCO Program, represented by the Program Coordinator Dr. J. Lamers, and SANIIRI represented by the Director Prof. Sh. Rahimov, conclude their co-operation. Both parties acknowledge the importance of the ZEF/UNESCO Program and engage to make an adequate contribution to the successful implementation of the program. This AoC identifies roles and responsibilities for both the ZEF/UNESCO Program and SANIIRI regarding soil salinity assessment and monitoring through EM38. Much of what is set forth below reflects work that has already begun, this document memorializes those actions.

The contribution of ZEF/UNESCO Program involves the following:

1. ZEF/UNESCO Program provide training (when needed) on the use of electromagnetic conductivity meter (EM38) to assess soil salinity
2. ZEF/UNESCO Program will provide organizational and financial support to SANIIRI for the calibration work in amount of 150 USD
3. Collaborate on further steps to disseminate the results of calibration and soil salinity assessment and monitoring approaches

The contribution of SANIIRI is the following:

1. To calibrate the EM38 at SANIIRI research fields in Khorezm region during July 2009
2. Based on the findings, SANIIRI will provide the formal document (Act) valid in the Republic of Uzbekistan confirming the efficiency of the results of the calibration and while recommending its use in the country as an alternative express method. The document will be provided not later than 1 (one) month upon completion of the field work.
3. Provide a description of steps in Uzbek system which are needed to recommend an innovation as an alternative
4. Collaborate on further steps to disseminate the results of calibration and soil salinity assessment and monitoring approaches

Date:_____

Date:_____

Dr. J.P.A. Lamers
Program Coordinator
ZEF/UNESCO Program Uzbekistan

Prof. Sh. Rahimov
Director
SANIIRI

Annex 5:

Monitoring and Evaluating CA under 'Real-life' Conditions: Extracts from CA Process Documentation

The monitoring and evaluating of the innovation itself under 'real-life' conditions on the fields of the farmers yielded the following insights:

Laser land leveling		
Advantages	Disadvantages	Needs to be further improved
<ul style="list-style-type: none"> • uniform crop germination and water application • less time requirement for irrigation • less weed population in a first season • preferable crop yield • highest interest and farmers needs 	<ul style="list-style-type: none"> • soil compaction crop • differentiation between cut/fill parts of the field • less working efficiency (1-2 ha/day) • highest cost of equipment 	<ul style="list-style-type: none"> • sub-soiling pre/post laser leveling • post laser leveled irrigation • re-leveling again • increase working efficiency by 5-7 ha/day • minimize intensive soil tillage for keeping long-term leveled • analyzes of economical recovering of equipment costs.
Conservation Agriculture		
<ul style="list-style-type: none"> • uniform crop germination in a first crop planting season • less time and labor require for planting • visual biological improvement of soil surface under crop residue in no-till • winter wheat survival and development under crop residue in no-till • short term economical benefit interims of tillage cost saving • keeps soil moisture bit longer than conventional 	<ul style="list-style-type: none"> • poor crop germination after the second crop planting season • problem of seed drop and penetration of the openers into soil with higher residue, and specially dry and hard soil condition • dry direct seeding delaying crop germination in case of rice • problem of control the weed less residue cover in a soil surface as farmers circumstances systematic herbicide (roundup) controls pre-emergence weed but not post • emergence weed and selective herbicide (Gulliver) controls post-emergence weed but delaying crop maturity • visual effect of crop residue on rice keeping the soil condition cooler • higher risk to get good yield • visual feeling of fertilize deficiency of rice 	<ul style="list-style-type: none"> • pre-seeding irrigation • to be tested adequate planting equipment in case of different kind of openers • additional fertilizer testing pre-emergence seed in case of rice

Annex 6:

List of Process related Documents on Project Server

FTI: \\192.168.0.1\infozef\FTI:

1. FTI WUA ideas for WMO self assess
 2. Literature
 3. Presentations
 4. Process Documentation System
 5. Trainings and Materials
 6. Work Package Related
 7. IAPS_paper_final (05062009)
-
1. FTI WUA ideas for WMO self assess : \\192.168.0.1\infozef\FTI\FTI WUA ideas for WMO self assess:
 2. Draft methodology on CMO performance May 8 07 (09092008)
 3. Inventory data collection manual Nargiza June 2007 (18062007)
 4. CWC self assessment July 07 draft 3 n to send (09092008)
-
3. Presentations: \\192.168.0.1\infozef\FTI\Presentations:
 1. Duncan and Barnett, 2005 (15042008)
 2. Hall, 2007 (24052008)
 3. FTI (18082008)
 4. FTI@GLOWA_UZB (29122008)
 5. FTI4eval_final (15012009)
 6. Rolling_2006 (10022009)
 7. FTI4azerteam (22042009)
 8. Impact Assessment Indicators (15062009)
-
4. Process Documentation System: \\192.168.0.1\infozef\FTI\Process Documentation System:
 1. FTI Teams
 2. Coordination_05October2009
 3. Coordination_07September2009
 4. Documentation Format for FTI_final
 5. FTI Coordination_ 01062009
 6. FTI Coordination June 012009
 7. How to make notes
-
5. Trainings and Materials: \\192.168.0.1\infozef\FTI\Trainings and Materials:
 1. FTI 1 (Feb 2008)
 2. FTI 2 (June 2008)
 3. Facilitation and effective communication (1Aug2008)
 4. FTI 3 (Nov 2008)
 5. Team building training (14012009)
 6. ZEF Internal Monitoring- FTI workshop (15,16 May 2009)
 7. Material for IA presentation on Impact Evaluation (02062009)
 8. Potential participation next FTI Nov 2009 (02062009)
 9. FTI 4 (November 2009)
 10. Interim review 2010 (end April 2010)
 11. PRA training_2.12.2009
 12. WP39_Hornidge_et_al(2) (2009)
-
6. Work Package Related: \\192.168.0.1\infozef\FTI\Work Package Related:
 1. FTI Work plan-final draft (06052008)

2. FTI prgress4midterm_ final (10072008)
3. WP39_Hornidge_et_al(2) (2009)

FTI Teams: \\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams:

1. Afforestation
2. Conservation and Agriculture Team
3. Consortia and Networks
4. Croup coordination
5. Salinity Assessment
6. WAM
7. WUA Team
8. Feedback from support members-Some food for thought for FTI Teams on participation of members in team activities, 14 Oct 2008
9. FTI Team Leaders meeting- Progress Review and Stock-taking of issue210808

1. Afforestation: \\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Documents:

1. AF_FTI agreement on cooperation_Uzb_final (30.03.2009)
2. AF_FTI agreement on cooperation_Eng (30.03.2009)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Field Notes:

3. Notes_visit to farmer Muborak_010410
4. Notes_visit to farmer Ruzumbay_010410
5. Notes_visit to farmer Sobur_130310
6. Notes_visit to farmer Ruzumbay_120310
7. Notes_visit to farmer Muborak_120310
8. Notes_visit to Experimental station_020310

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Impact Assessment:

9. Field notes_Muborak_17122009_eng
10. Field notes_Ruzumbay_AF_30122009_eng
11. Field notes_Sobur_15122009_eng
12. Pictures

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Internal Meetings:

13. AF team_ Internal Meeting_ 160509
14. Notes_FTI_AF_061109

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Leaflet:

15. ICARDA workshop_Khamzina_ Leaflet_ update_01 (05.02.2009)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation\Selection:

16. Draft _ field location Amir Temur.pdf (11.03.2009)
17. Willing farmers_ 1 round (09.02.2009)
18. Willing farmers_ 2 round (04.03.2009)
19. ME_treestand_schedule_eng (18052009)
20. Farmers field EC (JPS data 23.04.2009)
21. Willing farmers_ 3 round (27.04.2009)
22. Willing farmers_ 4 round (28.04.2009)
23. Willing farmers_borders_1 round (28.04.2009)
24. Support letter for Afforestation (28.04.2009)
25. Willing farmers_ sorted out_ 3 round (28.04.2009)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Afforestation:

26. 00_Soil bonitet and transects in Khorezm.gif (23.12.2008)
27. Afforestation on Marginal lands.pptx (presentation, 16.05.2009)
28. AF_ Motivation_ May 2009 (01.06.2009)
29. FTI Process Notes_ forestry for carbon trade (28.08.2008)
30. Work plan_ FTI_ forestry_ draft 3 (19.01.2009)
31. WUA with transects.jpg (05032009)
32. Afforestation_FTI report_01_akh (march 2010)

2. Conservation Agriculture Team

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Conservation Agriculture Team\Impact Assessment:

1. Field notes_Atamurod_10.12.2009_nh.eng
2. Field notes_Maksud_18.12.2009_nh.eng
3. Field notes_Ruzumbay_11.12.2009_nh.eng
4. IA_Atamurod_10122009_da.eng
5. IA_Ruzumbay_11122009_da.eng

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Conservation Agriculture Team\Minutes:

6. FTI CA Meeting_09122009
7. FTI CA Meeting_09112009
8. Minutes FTI CA_AF_26102009
9. Notes_FTI_CA_08102009
10. 10062009_Notes_Field Day_Elena
11. 10062009_Notes_Field Day_Oybek
12. Reflections from CA Demo-Day_10062009
13. 04062009_Discussion Field Day
14. Minutes_270808 (discuss of draft work plan)
15. Field visit to CA Experiments (26082008)
16. LL_Pitnak_meeting_060808

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Conservation Agriculture Team:

17. Action work plan CA (26022009)
18. Brochure_Laser levelling_fin.(11112008)
19. CA FTI agreement on cooperation2_uzbek (03032009)
20. CA FTI agreement on cooperation_english (03032009)
21. CA_FTI_2009 (presentation, 15052009)
22. CA_FTI_2009_November (presentation)
23. CA_FTI_Motivation letter May 2009 (27052009)
24. CAN2LLTeam (facilitation support for team leader 13062008)
25. Comments from lisa_work package follow the innovations (05062008)
26. FTI CA Phase I_JL_01 (27082008)
27. FTI CA Phase I_JL_01_MUH (27082008)
28. FT_CA_2008 (presentation)
29. Road and Manouver Map for the FTI CA_MUH (14072008)
30. Work package Follow the Innovations (05062008)
31. CA FTI Process Report_OE01032010_akh

3. Consortia and Networks

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Consortia and Networks:

1. CA_ 26072008 Minutes of the Meeting on "Mainstreaming Conservation Agriculture, Icarda Tashkent
2. Minutes of meeting on CA networking_ 260708- on "Mainstreaming Conservation Agriculture, Icarda Tashkent

4. Team Coordination

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Team Coordination:

1. Coordination_05October2009
2. Coordination_07September2009
3. Coordination_06 July 2009
4. Coordination 01JUN09

5. Salinity Assessment

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\Salinity Assessment:

1. Roadmap FTI Salinity 221208
2. Roadmap FTI Flexible irrigation Scheduling (15.01.2009)
3. Recap 1 May05 2009 (email- seek advice on further steps regarding salinity device)
4. Recap 2 May18 2009 (email about background of the meeting- as a follow up of the outcomes from FTI).
5. Email exchange_ Merge with WUA (20.05.2009)
6. Notes 20May_ Akmal_ TIIM and SRI
7. Salinity FTI_ Motivation (21.05.2009)
8. Kuziev letter, asking EM38 and ZEF people for joint survey in Jizzak (21.05.2009)
9. Recap 3 May29 2009 SRI (update of activities)
10. Recap 4 June11 2009 OGME
11. Minutes of the meeting with RRA290609_ MUH
12. Minutes of the meeting with TIIM290609_ MUH
13. Meetings June29_30_Akmal and Mehmood
14. Recap 5 Aug 31 2009
15. Draft report on FTI_SA_180110_akh

6. WAM

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WAM:

1. 17052010_Protocol_training WAM_eng
2. 11052010_email exchanges_2nd training for Kulavat
3. 04052010_FTI WAM_meeting Maksud_ru
4. 04052010_FTI WAM_meeting Maksud_eng
5. Meeting_Maksud_130410
6. Notes_Meeting_KISWAM_020310
7. Tell.call_Water Forecast 2010_080110
8. Notes_meeting_KISWAM_231209
9. Field visit along Kulavat Irrigation System (12102009)
10. Calls with Maksud_29102009

7. WUA Team

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Email exchanges:

1. Email exchanges_ Bernard Hayot and Iskandar (merging with WUA team 04062009)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\farmer workshop\Documentation of Stakeholder Workshop\Notes:

2. Field notes_ Farida_ Xonobod-3_ uz (from stakeholder meeting 09062008)
3. Field notes_ Lisa_ 080614_ farmers workshop in Ashirmat
4. Field notes_ Jasur_ uz (from stakeholder meeting 16062008)
5. Notes from Stakeholder Meeting in Koshkupir Ashirmat WUA (16062008)
6. Notes Plenary Session (from stakeholder meeting 18062008)
7. Nargiza Notes from Stakeholder Meeting in Koshkupir Ashirmat WUA (19062008)
8. Xonobod-3 field note. Eng (from stakeholder meeting 19062008)
9. Participant interviews (18062008)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\farmer workshop\Documentation of Stakeholder Workshop\Report:

10. Annex 1-plan of a stakeholder meeting (18062008)
11. Annex 2 list of participants (18062008)
12. Annex 3-Participant survey (18062008)
13. Report on stakeholder meeting at WUA Ashirmat-Koshkupir (18062008)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\farmer workshop\Preperation to workshop:

14. Background material for water users workshop in Ashirmat Kohskupir WUA (120608)
15. Minutes_ on first farmer workshop 060608
16. Program of the meeting with water users eng. (100608)
17. Questionnaire about workshop_ 140608
18. Stakeholder meeting Koshkupir Ashirmat WUA (090608)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Meetings\Internal\Nargiza FTI:

19. CWC self-assessment July 07 draft 3 n to send
20. Draft Methodology on CMO performance May 8 07
21. Inventory data collection manual Nargiza June 2007

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Meetings\Internal:

22. 020708_ minutes of WUA FTI team meeting
23. 01072009_ Minutes_ IM_ FTI WUA
24. 01072009_ Minutes_ IM_ FTI WUA+Comments
25. 08062009_ Minutes of Meeting_ WUA
26. 08062009_ Minutes of Meeting_ WUA+Comments
27. 08062009_ Minutes of Meeting_ WUAIA
28. 19062009_ Observation_ Round table 1_ WUAs+Comments
29. Comments_ Lisa_ Minutes of first meeting (04062008)
30. Comments_ Lisa_ Work plan of FTI on WUA (020708)
31. FTI WUA Internal Meeting_19042010
32. FTI WUA Internal Meeting_22042010
33. FTI WUA Meeting_05112009
34. FTI_ minutes_ 250509_ sf
35. Minutes of first meeting (040608)
36. Minutes_FTI_WUA_23102009
37. Subteam meeting 010609_ Lisa_ IA comments
38. WUA FTI team meeting minutes May18-2009

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Meetings\WUA General Assembly 2010:

39. Doc-s prepared by WUA for General Assembly 2010_eng
40. FTI WUA_Notes_General Assembly_11012010
41. Photos from General Assembly

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Meetings\WUA-FTI team:

42. Visit to Ashirmat WUA_26042010
43. Comments Liza_Notes_Visit to Ashirmat WUA_130410
44. Notes_Visit to Ashirmat WUA_130410
45. Summary Perception Survey Sept2009_WUA
46. Minutes_Meeting at Ashirmat 04012010_comments Bashorat
47. Minutes_Meeting at Ashirmat 04012010

48. 09_11_17_visit to the WUA_nd
49. 09_11_17_visit to the WUA_BI
50. WUA FTI meeting 24July2009
51. Notes_FTI_WUA_07102009
52. 24072009_Notes_WUA Ashirmat Meeting
53. 19062009_Observation_Round table 1_ WUAs+Comments
54. 29062009_Field Notes
55. Protocol of Meeting WUA Ashirmat 05092008
56. 24July2009_WUA FTI Meeting + Pictures

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Reports from Ashirmat:

57. Report_Ashirmat WUA_February 2009
58. Report_Ashirmat WUA_March 2009
59. Report_Ashirmat WUA_April 2009
60. Report_Ashirmat WUA_May 2009
61. Report_Ashirmat WUA_June 2009
62. Report_Ashirmat WUA_August 2009
63. Report_Ashirmat WUA_September 2009
64. Report_Ashirmat WUA_October 2009

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\SMID Materials\ADB Manuals:

65. Water_User.exe

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\SMID Materials:

66. Baseline survey-WUA.pdf (08042008)
67. Conflict resolution.pdf (24062008)
68. Follow up survey 2004 WUA (08042008)
69. IWRM for WUA.pdf (24062008)
70. SMID_Strategy eng(1).pdf (240608)
71. SMID Strategy_ rus (16122005)
72. WUA_ eng(1).pdf (240608)
73. WUA_ uzb(1).pdf (240608)

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\day One (15.12.2008):

74. Presentation 1
75. Problems and participation – presentation
76. Start up presentation
77. WUA presentation
78. Day Program
79. List of participants

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Day 2:

80. Communication presentation
81. Conflict presentation
82. Water reforms presentation
83. WUA SMID presentation
84. Day program

\\192.168.0.1\infoze\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Day 3\Module Description:

85. Module 1

- 86. Module 2
- 87. Module 3
- 88. Module 4
- 89. Module 5

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Day 3\Presentations on WM in WUA:

- 90. Module 1
- 91. Module 2
- 92. Module 3
- 93. Module 4
- 94. Module 5
- 95. Day program

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Day 4:

- 96. Presentation-tasks for Day 4
- 97. Day program

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Print out materials for SMIDWM training\Module Description:

- 98. Module 1
- 99. Module 2
- 100. Module 3
- 101. Module 4
- 102. Module 5

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Print out materials for SMIDWM training\СФУ Акборобод хужжатлари

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM\Print out materials for SMIDWM training:

- 103. Brief report-Fergana trip for WUA FTI team uzbek
- 104. FTI Monitoring indicators-uzb
- 105. Protocol of Meeting WUA Ashirmat 05092008
- 106. Report for water users-uz
- 107. Report_Ashirmat_161008_uz
- 108. Work plan uzbek

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Training on SMID and WM:

- 109. Training report-uz
- 110. Seminar photos

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team\Work Plan:

- 111. Work plan draft-3rdAug2008

\\192.168.0.1\infozef\FTI\Process Documentation System\FTI Teams\WUA Team:

- 112. Agreement in FTI_ final_ updated version (16022009)
- 113. Brief report-Fergana trip for FTI_ final (03122008)
- 114. Documentation format for FTI_ final (17022009)
- 115. Farms location in WUA Ashirmat (16092009)
- 116. Meeting in Ashirmat_ Farida on 12 steps (17.04.2009)
- 117. Minutes of first meeting (no map) (13062008)

- 118. Motivation to continue_ May 2009
- 119. Plan June 2009_ Lisa (16062009)
- 120. Server address of SMID material (19012009)
- 121. Stakeholder meeting in Koshkupir Ashirmat WUA (13062008)
- 122. Training report –English on Social involvement and Water Distribution (19012009)
- 123. Work plan- last version approved (16022009)
- 124. WUA Team Notes (13062008)
- 125. WUA perception survey checklist_final (14092009)
- 126. WUA performance indicators_2009 (07012010)
- 127. WUAHM (report of WUAs chairmen gathering of hydrographic WUA-19062009)
- 128. FTI_WUA_Report_190110_final_akh

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- 1 Evers, Hans-Dieter and Solvay Gerke (2005). Closing the Digital Divide: Southeast Asia's Path Towards a Knowledge Society.
- 2 Bhuiyan, Shajahan and Hans-Dieter Evers (2005). Social Capital and Sustainable Development: Theories and Concepts.
- 3 Schetter, Conrad (2005). Ethnicity and the Political Reconstruction of Afghanistan.
- 4 Kassahun, Samson (2005). Social Capital and Community Efficacy. In Poor Localities of Addis Ababa Ethiopia.
- 5 Fuest, Veronika (2005). Policies, Practices and Outcomes of Demand-oriented Community Water Supply in Ghana: The National Community Water and Sanitation Programme 1994 – 2004.
- 6 Menkhoff, Thomas and Hans-Dieter Evers (2005). Strategic Groups in a Knowledge Society: Knowledge Elites as Drivers of Biotechnology Development in Singapore.
- 7 Mollinga, Peter P. (2005). The Water Resources Policy Process in India: Centralisation, Polarisation and New Demands on Governance.
- 8 Evers, Hans-Dieter (2005). Wissen ist Macht: Experten als Strategische Gruppe.
- 8a Evers, Hans-Dieter and Solvay Gerke (2005). Knowledge is Power: Experts as Strategic Group.
- 9 Fuest, Veronika (2005). Partnerschaft, Patronage oder Paternalismus? Eine empirische Analyse der Praxis universitärer Forschungskooperation mit Entwicklungsländern.
- 10 Laube, Wolfram (2005). Promise and Perils of Water Reform: Perspectives from Northern Ghana.
- 11 Mollinga, Peter P. (2004). Sleeping with the Enemy: Dichotomies and Polarisation in Indian Policy Debates on the Environmental and Social Effects of Irrigation.
- 12 Wall, Caleb (2006). Knowledge for Development: Local and External Knowledge in Development Research.
- 13 Laube, Wolfram and Eva Youkhana (2006). Cultural, Socio-Economic and Political Constraints for Virtual Water Trade: Perspectives from the Volta Basin, West Africa.
- 14 Hornidge, Anna-Katharina (2006). Singapore: The Knowledge-Hub in the Straits of Malacca.
- 15 Evers, Hans-Dieter and Caleb Wall (2006). Knowledge Loss: Managing Local Knowledge in Rural Uzbekistan.
- 16 Youkhana, Eva, Lautze, J. and B. Barry (2006). Changing Interfaces in Volta Basin Water Management: Customary, National and Transboundary.
- 17 Evers, Hans-Dieter and Solvay Gerke (2006). The Strategic Importance of the Straits of Malacca for World Trade and Regional Development.
- 18 Hornidge, Anna-Katharina (2006). Defining Knowledge in Germany and Singapore: Do the Country-Specific Definitions of Knowledge Converge?
- 19 Mollinga, Peter M. (2007). Water Policy – Water Politics: Social Engineering and Strategic Action in Water Sector Reform.
- 20 Evers, Hans-Dieter and Anna-Katharina Hornidge (2007). Knowledge Hubs Along the Straits of Malacca.
- 21 Sultana, Nayeem (2007). Trans-National Identities, Modes of Networking and Integration in a Multi-Cultural Society. A Study of Migrant Bangladeshis in Peninsular Malaysia.
- 22 Yalcin, Resul and Peter M. Mollinga (2007). Institutional Transformation in Uzbekistan's Agricultural and Water Resources Administration: The Creation of a New Bureaucracy.
- 23 Menkhoff, T., Loh, P. H. M., Chua, S. B., Evers, H.-D. and Chay Yue Wah (2007). Riau Vegetables for Singapore Consumers: A Collaborative Knowledge-Transfer Project Across the Straits of Malacca.
- 24 Evers, Hans-Dieter and Solvay Gerke (2007). Social and Cultural Dimensions of Market Expansion.
- 25 Obeng, G. Y., Evers, H.-D., Akuffo, F. O., Braimah, I. and A. Brew-Hammond (2007). Solar PV Rural Electrification and Energy-Poverty Assessment in Ghana: A Principal Component Analysis.
- 26 Eguavoen, Irit; E. Youkhana (2008). Small Towns Face Big Challenge. The Management of Piped Systems after the Water Sector Reform in Ghana.
- 27 Evers, Hans-Dieter (2008). Knowledge Hubs and Knowledge Clusters: Designing a Knowledge Architecture for Development
- 28 Ampomah, Ben Y., Adjei, B. and E. Youkhana (2008). The Transboundary Water Resources Management Regime of the Volta Basin.
- 29 Saravanan.V.S.; McDonald, Geoffrey T. and Peter P. Mollinga (2008). Critical Review of Integrated Water Resources Management: Moving Beyond Polarised Discourse.
- 30 Laube, Wolfram; Awo, Martha and Benjamin Schraven (2008). Erratic Rains and Erratic Markets: Environmental change, economic globalisation and the expansion of shallow groundwater irrigation in West Africa.
- 31 Mollinga, Peter P. (2008). For a Political Sociology of Water Resources Management.
- 32 Hauck, Jennifer; Youkhana, Eva (2008). Histories of water and fisheries management in Northern Ghana.
- 33 Mollinga, Peter P. (2008). The Rational Organisation of Dissent. Boundary concepts, boundary objects and boundary settings in the interdisciplinary study of natural resources management.
- 34 Evers, Hans-Dieter; Gerke, Solvay (2009). Strategic Group Analysis.
- 35 Evers, Hans-Dieter; Benedikter, Simon (2009). Strategic Group Formation in the Mekong Delta - The Development of a Modern Hydraulic Society.
- 36 Obeng, George Yaw; Evers, Hans-Dieter (2009). Solar PV Rural Electrification and Energy-Poverty: A Review and Conceptual Framework With Reference to Ghana.
- 37 Scholtes, Fabian (2009). Analysing and explaining power in a capability perspective.
- 38 Eguavoen, Irit (2009). The Acquisition of Water Storage Facilities in the Abay River Basin, Ethiopia.
- 39 Hornidge, Anna-Katharina; Mehmood Ul Hassan; Mollinga, Peter P. (2009). 'Follow the Innovation' – A joint experimentation and learning approach to transdisciplinary innovation research.
- 40 Scholtes, Fabian (2009). How does moral knowledge matter in development practice, and how can it be researched?
- 41 Laube, Wolfram (2009). Creative Bureaucracy: Balancing power in irrigation administration in northern Ghana.
- 42 Laube, Wolfram (2009). Changing the Course of History? Implementing water reforms in Ghana and South Africa.

- 43 Scholtes, Fabian (2009). Status quo and prospects of smallholders in the Brazilian sugarcane and ethanol sector: Lessons for development and poverty reduction.
- 44 Evers, Hans-Dieter, Genschick, Sven, Schraven, Benjamin (2009). Constructing Epistemic Landscapes: Methods of GIS-Based Mapping.
- 45 Saravanan V.S. (2009). Integration of Policies in Framing Water Management Problem: Analysing Policy Processes using a Bayesian Network.
- 46 Saravanan V.S. (2009). Dancing to the Tune of Democracy: Agents Negotiating Power to Decentralise Water Management.
- 47 Huu, Pham Cong, Rhlers, Eckart, Saravanan, V. Subramanian (2009). Dyke System Planing: Theory and Practice in Can Tho City, Vietnam.
- 48 Evers, Hans-Dieter, Bauer, Tatjana (2009). Emerging Epistemic Landscapes: Knowledge Clusters in Ho Chi Minh City and the Mekong Delta.
- 49 Reis, Nadine; Mollinga, Peter P. (2009). Microcredit for Rural Water Supply and Sanitation in the Mekong Delta. Policy implementation between the needs for clean water and 'beautiful latrines'.
- 50 Gerke, Solvay; Ehlert, Judith (2009). Local Knowledge as Strategic Resource: Fishery in the Seasonal Floodplains of the Mekong Delta, Vietnam
- 51 Schraven, Benjamin; Eguavoen, Irit; Manske, Günther (2009). Doctoral degrees for capacity development: Results from a survey among African BiGS-DR alumni.
- 52 Nguyen, Loan (2010). Legal Framework of the Water Sector in Vietnam.
- 53 Nguyen, Loan (2010). Problems of Law Enforcement in Vietnam. The Case of Wastewater Management in Can Tho City.
- 54 Oberkircher, Lisa et al. (2010). Rethinking Water Management in Khorezm, Uzbekistan. Concepts and Recommendations.
- 55 Waibel, Gabi (2010). State Management in Transition: Understanding Water Resources Management in Vietnam.
- 56 Saravanan V.S., Mollinga, Peter P. (2010). Water Pollution and Human Health. Transdisciplinary Research on Risk Governance in a Complex Society.
- 57 Vormoor, Klaus (2010). Water Engineering, Agricultural Development and Socio-Economic Trends in the Mekong Delta, Vietnam.
- 58 Hornidge, Anna-Katharina, Kurfürst, Sandra (2010). Envisioning the Future, Conceptualising Public Space. Hanoi and Singapore Negotiating Spaces for Negotiation.
- 59 Mollinga, Peter P. (2010). Transdisciplinary Method for Water Pollution and Human Health Research.
- 60 Youkhana, Eva (2010). Gender and the development of handicraft production in rural Yucatán/Mexico.
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