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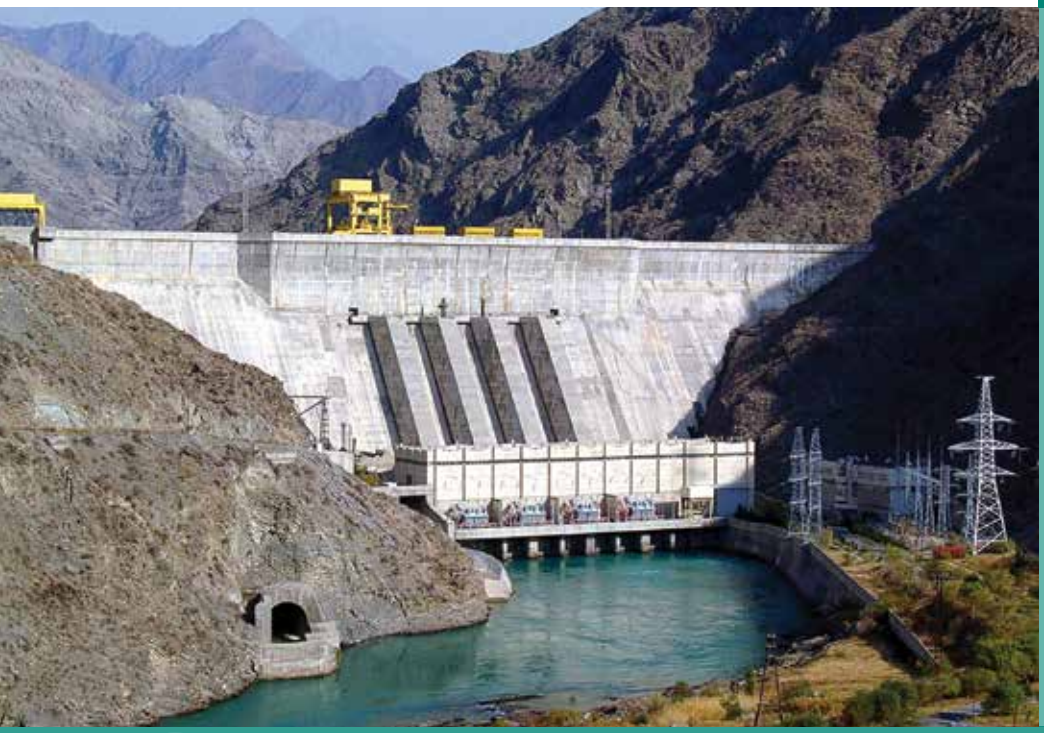

2018

Training modules on water management in Central Asia

DIGEST

The German Society
on the International Cooperation (GIZ)

"Transboundary water resources management in Central Asia"
Programme (TWRM CA)

This publication has been prepared by Water Initiative Support Programme of the Regional Environmental Center for Central Asia within the frames of the projects "Building capacity of regional, national and local organizations and dissemination of lessons learned" with the financial support of "Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH" programme "Transboundary water resources management in Central Asia" (GIZ programme "TWRM CA").

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CAREC (Regional Environmental Centre for Central Asia) shall be responsible for the content of the publication that does not necessarily reflect the views of USAID or the United States Government.

Training modules on water management in Central Asia

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Establishment of Water Users Cooperative for ensuring access to the clean drinking water

TRAINING MODULE 1

Alexander Kamenskyi

Introduction

"Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH" programme "Transboundary water resources management in Central Asia" (GIZ programme "TWRM CA").

On April 1, 2008, at the water conference "Water Unites" in Berlin the German Foreign Ministry announced launching of the "Water Initiative for Central Asia". This initiative is a proposal of the German government to countries of Central Asia to assist in water resources management and making the water a subject of enhanced transboundary cooperation. The priority task is to initialize a process of political rapprochement in Central Asia that could promote strengthening cooperation in using water as a limited resource and in the long term could lead to the joint management of water and energy resources.

In furtherance of the Berlin Initiative and in order to determine main areas of activities in countries of Central Asia for the period of 2012–2014, on 8 March 2012 in Berlin at invitation of the Minister of Foreign Affairs of the Federal Republic of Germany, a meeting of representatives of Ministries of Foreign Affairs and Water Management bodies of Central Asia (CA) was held.

The most extensive component of the "Berlin Process" is the TWRM CA programme, implemented by GIZ under the authority of the German Foreign Ministry. Within the second phase of this programme, activities carried out during the period from 2012 to 2014 allowed not only to optimize cooperation in the water sector of Central Asian countries, but also to improve living standards of the population in the region. As a part of implementation of the second phase of the GIZ TWRM CA programme, the funding structure of the programme projects was changed. The regional cooperation and implementation of national pilot projects will be continued with the financial support of the German Foreign Ministry. In addition, two projects funded by the European Union are implemented under the European Union Regional Environmental Program for Central Asia (EURECA).


Erkin Bozhurov

Since beginning of 2015, realization of the third phase of the Programme started through implementation of following projects:

- "Capacity-building for sustainable water resources management at the regional, national and basin levels". The project executing agency is the Regional Environmental Center for Central Asia. The project will also support strengthening of cooperation between regional organizations operating in Central Asia, such as EC IFAS, SIC ICWC, SIC ICSD, BWO "Amudarya" and "Syrdarya", etc.

- "Regional dialogue and cooperation on water resources management in Central Asia". The project executing agency is UNECE. Implementation of the projects is aimed at supporting activities of EC IFAS and of basin water management associations Amudarya and Syrdarya.

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CAREC was established following the resolution of the IV Pan-European Conference, held in 1998 in Aarhus (Denmark). CAREC began its operations in 2001 after ratification by the Republic of Kazakhstan of the Agreement on operating conditions of the Center, as an independent, non-profit and non-political, international organization. CAREC's founders are countries of Central Asia: the Republic of Kazakhstan, the Kyrgyz Republic, Uzbekistan, Tajikistan, Turkmenistan, the United Nations Development Program (UNDP) and the European Commission (EC). The Head office of CAREC is located in Almaty, Kazakhstan. Also five country offices are successfully operating in each capital of Central Asian countries, including a project office in Afghanistan (Kabul).

The main thematic areas of CAREC activities include:

- Climate change and sustainable energy
- Education for sustainable development
- Health and environment
- Environmental management
- Water initiatives support

Countries of Central Asia are facing serious problems and challenges in the sphere of water resources regulation and management. These problems include inefficient irrigation, drainage and water supply systems, outdated legislative and regulatory documents and agreements at all levels, lack of awareness about the most topical problems in water resources management and methods of their solutions, inadequate engagement and participation of local communities in water resources management, lack of incentives in terms of economic instruments for supporting basin ecosystems. These and many other issues of sustainable water resources management form the basis for the Water Initiative Support Programme (WISP) activities. In particular, the objective of the WIS programme is to increase the water users capacity on issues of effective water resources management at all levels: from transboundary water apportioning to rational use of water resources at the field level.

Key topics taken as a basis for development of training modules:

- Establishment of a water users cooperative for provision of the access to clean drinking water – TWRM CA and CAREC experience;
- Effective irrigation systems and drainage water management – experience of the TWRM CA in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan;
- Application of water accounting devices on irrigation systems – experience of the TWRM CA and CAREC of Kazakhstan, Kyrgyzstan and Tajikistan; and
- Methodology for assessment of the compliance of hydropower projects with the sustainable development criteria – the TWRM CA experience in the Shardara water storage basin (Kazakhstan).

Some of the above mentioned topics either are very widespread in the region of Central Asian and have to be studied more in-depth, or they are insufficiently studied in the region and the increased attention should be drawn to them.

The main purpose of this module is to convey the positive experience of applying "best practices" in the region to the wide audience.

Target groups for studying these materials can be very diverse – from students who study water resources management to water sector specialists interested in implementation of innovative technologies for water conservation, water accounting and providing access to clean drinking water.

The training module consists **of three main parts:**

1. Preamble with information about the topic, goals and objectives, including brief description of these trainig sessions;
2. Text version of the module, where the information on training topics is given;
3. Presentations where all visual materials are presented.

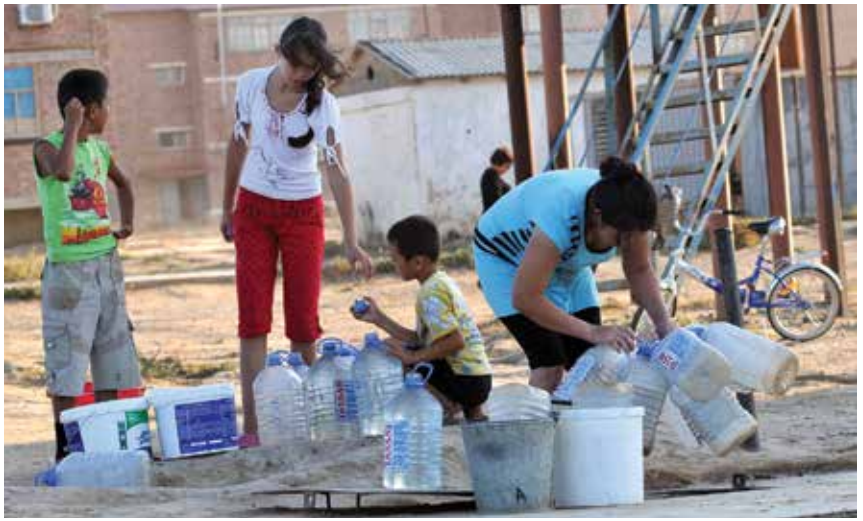
We hope that this publication will help state authorized bodies, local basin organizations, as well as all interested parties in applying innovative tools for more efficient and rational use of water resources at all levels of water consumption.

Preamble

In the period from 2003 up to 2010 the WISP CAREC implemented a project on reconstruction of drinking water supply systems in villages of Almaty oblast, Kazakhstan. In 2015 a similar project was implemented also in Kyrgyzstan. Based on results of this project, drinking water supply systems in 13 villages were reconstructed, 10 water users cooperatives were established and more than 13,000 people got access to drinking water.

More than 60% of the population of Central Asia live in villages, kishlaks and auls. In the most part of these residential areas there is no centralized water supply. Many villagers use low quality water from surface and underground sources or use imported water. Such water is unsafe for consumption and often becomes a source of infectious diseases and, as a rule, children and old people are more susceptible to these diseases.

The water supply systems that were built at the end of the 20th century are physically worn out by 60–80% and do not meet technical and sanitary standards. The level of diseases associated with the low-quality water is particularly high in the spring-autumn period, when rain and melt waters penetrate into sources of drinking water.



Training objectives

- Defining the term "water users cooperative";
- To consider possibilities for application of the project implementation experience;
- Benefits for concerned parties at establishment of water users cooperatives;
- Getting acquainted with CAREC's successful practices and experience at implementation of projects related to drinking water..

Target groups

The training is intended both for different target groups engaged in addressing drinking water related issues and also for individuals. Groups can be formed by interests:

- some start with capital others with lower case;
- farmers, small entrepreneurs;
- representatives of local, regional and state authorities;
- NGOs;
- representatives of local, regional and state authorities engaged in issues of drinking water;
- large entrepreneurs and companies;
- basin councils or similar groups subject to the national legislation;
- various regional groups and councils.

Also, training can be intended for mentioned above mixed groups.

Training duration and programme

Продолжительность тренинга составляет один день.

Registration participants	30 min
Getting acquainted	30 min
Rules development, welcoming remarks, Discussion of expected results	30 min
Session 1	60 min
Break	30 min
Session 2	60 min
Session 3	60 min
Break	60 min
Session 4	30 min
Break	30 min
Conclusion	40 min

Getting acquainted

Each participant presents himself: name, place of work or what he/she is currently doing, briefly describes the situation with drinking water in his/her region and what he/she can do to improve this situation.

Participants are suggested to draw a picture or pictures that should answer the following questions:

The current situation with drinking water supply in the country.
What can be done to improve this situation?

Rules development

- The hand – raising rule
- Time limit – not more than 5 minutes

- Not to be late for sessions
- Criticize the idea, not the person
- Not to take the criticism personally
- Jokes are welcome

Session

Session 1

Annex 1

Presentation **"Establishment of Water Users Cooperative"**

Discussion of the issue – what we mean by Water Users Cooperative. It is a non-profit organization where the initiative of the cooperative establishment and management belongs to a group of water users representing one village. The main issue is on the initiative of creation and a comparative analysis of two principles.

1. the "top-down principle" of establishment
2. the "bottom-up" principle of establishment

As a result, we see that a successful project – it is understanding of the problem and participation both on the top and also on the grass-roots level.

Result: participants become aware of how to establish Water Users Cooperatives.

Brainstorming.

Group 1 considers and discusses advantages and disadvantages of the "top-down principle". **Group 2** discusses advantages and disadvantages of the "bottom-up" principle.

While preparing presentation on this material, it is necessary to provide examples from a specific region.

Session 2

Annex 2

Presentation **"Clean water for rural residential areas in Kazakhstan"**

Participants get familiarized with CAREC positive experience in Kazakhstan, review some examples of villages in Kazakhstan, Almaty region and villages in Kyrgyzstan in Chui oblast, how the project was perceived at the beginning and how it was perceived at the end. Information about dissemination of this project in all oblasts of Kazakhstan as well as about the final conference in Astana was given. Examples are also provided on CA practices related to CAREC activities, on sustainability and growth of established water users cooperatives in the local context. Participants of the training were invited to get continuously engaged in the process.

Result: participants were familiarized with the positive experience of CAREC

Session 3

Annex 3

Presentation **"Cooperatives management and tariff calculation"**

Familiarization with the cooperative structure, management bodies, service personnel, tariff calculations. The role play is proposed – "Meeting of the Water Users Cooperative". Roles of the "Chairman of the cooperative", "The servicing agency", "The head of the rural district" etc. are distributed between participants. For participants a problem is set, which they will have to solve positively at this meeting. Each participant that is playing the key figure has to decide how to promote this issue or, on the contrary, to oppose it.

Due to this game, participants will get acquainted closer with problems of the village water supply, will clearly conceive how the cooperative is managed and how it interacts with local authorities and ordinary members of the cooperative.

Result: participants become familiar with the structure of the cooperative, with management bodies, service personnel, with calculation of tariffs.

Session 4

Annex 4

Presentation **"Legal basis for Water Users Cooperatives on the example of Kazakhstan"**

In this session, participants get acquainted with the legal basis for establishment of Water Users Cooperatives in Kazakhstan. Together with participants we discuss what is missing in the legislation of the region and what additions in their opinion would improve or simplify establishment of Water Users Cooperatives in the region.

Result: participants become familiar with the legal basis for establishment of Water Users Cooperatives in Kazakhstan.

Conclusion

We finalize findings and answer participants' questions.

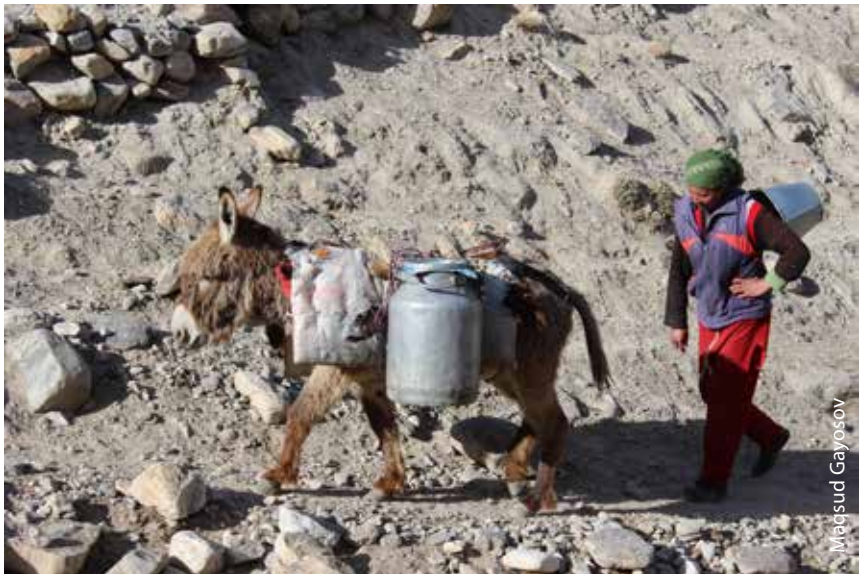
Each participant fills in a questionnaire with the following questions:

- What did you expect to get in result of the training?
- What did you get in result of the training?
- Which session would you like to expand or would you like to add a new one?
- What session do you consider needless?
- Have you learned anything new for yourself?
- Will the knowledge gained in the training help you improve the situation with drinking water in your region?

Please, evaluate the training on a five-point system.

Narrative part

Provision of the access to high-quality drinking water for the population for today is one of the most important issues for rural areas in the CA region. As it is seen from materials of the General Prosecutor's Office of the Republic of Kazakhstan, the majority of rural residential areas lack a mechanism for operation and maintenance of newly constructed water supply facilities. Systems constructed earlier were transferred under the authority of rural akims (akim – the head of local state executive authority in Kazakhstan), but they are not provided with basic facilities and specialists. In this regard, many akims had to hand over water networks for the free use to entrepreneurs who provided drinking water to the population at excessive tariffs. However, new owners often do not carry out any works on preparing water facilities for operation in summer and winter periods that leads to deterioration of sanitary and technical conditions of water pipes, as well as to restricting access to drinking water.



The methodology proposed by authors of the project was developed by the International Center for Environmental Finance (ICEF) under the Global Environment and Technology Fund. CAREC has adapted it to the local conditions of Central Asia. It is based on the principle of long-term sustainable development and implies responsibility of water users for private property and pursuing the financial plan for organization, use and maintenance of the water supply system. This approach is recognized as the most prospective in terms of providing access to water in developing countries. Within the frames of the first stage of the programme "Clean Water for Rural Communities of Kazakhstan", the methodology was piloted in seven villages of Koksuiskyi, Eskeldinskyi and Karatal districts of Almaty region , not covered by the sectoral programme on reconstruction of water supply systems and the state programme "Drinking Waters". According to the data at the end of 2007, almost 7000 residents of these areas got access to clean drinking water.

The initial steps of the project: selection of the village. We use the data obtained in the local administration. The village is selected jointly by the CAREC and the district administration. At selection of the village, the following criteria are used:

1. Demand of the village in clean drinking water

2. Commitment (interest) of the local population

That is, whether the water supply line is lacking in the village or it is in critical conditions, whether people use water from open sources or receive poor-quality water from the water supply line.

Does the local population understand that the situation can not be changed without their own participation, and are they ready to change the situation for the better?

3. Compacted location of homes

4. Population not more than 1000 people

As the practice shows, the best options are villages consisting of three or four straight streets, that preconditions the simplicity and lower costs for reconstruction of the water pipe. Considering these criteria, we first of all proceed from the set task – to demonstrate an example and not to provide the entire population of the country with water.

5. he water supply system does not fall under the state's sectoral programme.

Here it is understood that the village does not fall under the coverage of state programmes which provide for planned reconstruction – repairs of the water supply system.

Why is the initiative and interest of the local population important in implementation of the project. When local residents directly participate in decision-making, contribute to the construction with their natural labor, involve their technics or simply make financial contribution then their attitude will be completely different. What is meant here is a "sense of ownership" – then each of the villagers will keep an eye on condition of the water supply system, will respond in time to breakages and remove them.

Brainstorming. Participants are divided into two groups. Group 1 studies the "top-down" situation, group 2 studies – the "bottom-up" situation. The moderator is in the second group and helps in creating a situation when villagers lobby ana idea in the akimat: what difficulties they are facing (red tape, bureaucracy, negligence of authorities etc.).

After considering two situations, we come to a conclusion that we can get a successful sustainable project only with the consent and commitment of two parties – on the top and on the grass-roots level.

We repeat ourselves and would remind that as the methodological basis of the project was taken the methodology of the International Center for Environmental Finance (ICEF) under the Global Environmental and Technology Fund (GETF) which is based on the principle of involving the administration and the population into implementation of water supply projects through fulfillment of two mandatory conditions:

- ✓ establishment of an operational body (Water Users Cooperative) together with local water users.

- ✓ co-financing of reconstruction works assessed at:

- 70% – contribution of donors expressed in money equivalent and thematic content (seminars, trainings).

- 20%-contribution of the regional or district administration consisting of preparing all accompanying and permissive documentation.

- 10%-contribution of the local population, including two options – financial contribution and contribution of natural labor with participation of local residents in reconstruction of the water supply system.

In this case, we discuss how the administration and the population shall be involved in implementation of projects. On the initial stage of the project, when negotiations are going on with local residents and administration, the share participation of each project participant shall be discussed.

Tender or selection of a contractor

After carrying out all mentioned above preparatory measures, we pass to the stage of direct construction (reconstruction) of the water supply system. As it was already mentioned earlier, the administrative bodies undertake preparation of design specifications and estimates (DSE). In the DSE shall be reflected the amount needed for construction of a water-supply line. Based on this amount a competition for finding a contractor shall be announced. The announcement will be submitted to local media of regional and regional importance and also will be distributed through CAREC websites and local akimats' media. After collecting applications of bidders, a tender shall be announced for the contractor selection. Collection of applications usually takes a month from the moment of submitting the announcement. After collection of applications, a tender commission shall be appointed which will include the CAREC staff, employees of the akimat and residents of the village. During selection of the contractor, attention shall be paid to the following criteria: pricing policy, experience of participation in similar projects, availability of construction equipment located at the worksite of the project, time-frame for implementation of works .

Implementation of works depending on the complexity of works and the time of the year usually takes from 1 to 5 months. During the construction, monitoring from the side of CAREC shall be carried out 2–3 times on different stages of the construction, from the side of the akimat and local residents – continuously.

Comments, questions. It is proposed to discuss where and when someone from the participants has met with similar projects.

Replication of the experience in countries of Central Asia

More than 60% of the CA population live in villages, kishlaks and auls. In the most part of these residential areas there is no centralized water supply system. People have to use imported water. Only in Kazakhstan in 2014 about 389 thousand people used imported water. Many villagers use low quality water from surface and underground sources.

Such water is unsafe for consumption and often becomes a source of infectious diseases. The water supply systems constructed in the end of the 20th century are physically worn out by 60-80%, and do not meet technical and sanitary standards. The level of diseases associated with low-quality water, is especially high in summer and it is typical for rural areas. In 2002, the Government of the Republic of Kazakhstan launched the sectoral programme "Drinking Waters" for the period of 2002–2010. Currently "Ak Bulak" programme is being realized. Both programmes are aimed at improving the population's access to drinking water. First of all, construction and reconstruction of water supply systems in cities and large villages is carried out. Villages with a population of up to 1,000 people are not covered by mentioned above programmes.

We know about the pilot approbation of methodology in the Almaty region from the first session "Replication of experience and presentation of the methodology in all areas of the Republic of Kazakhstan". In September 2008, CAREC launched implementation of the second phase of the programme.

The main task on this stage was presentation of the methodology and its replication in all areas of Kazakhstan. In 2009 for regional akimats were held 14 conferences with participation of the Ministry of Agriculture of the Republic of Kazakhstan and the Committee on Water Resources of the Republic of Kazakhstan. The thematic content of the conferences consisted of a direct presentation of the project, addresses of the representative of the akimat of Almaty region and of a representative of the Committee on Water Resources of the Republic of Kazakhstan.

Participants of conferences: akims of the districts, deputy akims of the region on construction or agriculture issues, and also representatives of the construction department and of the housing and utilities sector. All conferences were successful and were covered in regional newspapers and broadcasted by television through regional channels. The final conference in Astana was the closing conference on the second part of the project. Heads of construction and

housing and utilities departments of region, residents of pilot villages were invited to the conference. The conference was attended by representatives of the Ministry of Agriculture, representatives of the Committee on Water Resources of the Republic of Kazakhstan, NGOs, national media.

Due to CAREC's regional status its activities cover all countries of the Central Asian region. Therefore, when implementing projects in each individual country, its features and approaches to work are taken into account. Since 2010, CA countries have started researches on identifying needs for such programmes, as well as on legislative and institutional capacities in each individual country. Since the 2009 the GIZ Programme on "Transboundary Water Resources Management in Central Asia", as a part of the "Water Initiative for Central Asia (Berlin, 2008)", started supporting projects for reconstruction of water supply systems in small villages of Kazakhstan. Restoration works were carried out in two villages: Maulenbai and Kenaral.

Kenaral (Kaz. Kenaral) is a village in Koksu district of the Almaty region of Kazakhstan. It is a part of Enbekshinsky rural district. According to the census 2009, in the village 367 people were living (185 men and 182 women). The water supply system became worn out 20 years ago and after the flood in spring 2010 the situation with water supply deteriorated. In autumn 2010, complete reconstruction of the water supply system was accomplished that included: renovation of pumps and pipes, construction of a water tower, and installation of a plumbing to the school. The cooperative was established, which after completion of construction received all the rights and responsibilities for the further operation, protection and repair of the water-supply line. It should be mentioned separately about contribution of the local administration, i.e. akimat of Koksyi district in development of design estimates, organization and coordination of construction works. Above all, new asphalt road about 10 km was laid from the highway to the village. The infrastructure of the village was improved.

Since April 2012, CAREC has been implementing the project "Stakeholders partnership in collaborative policymaking: fostering transboundary cooperation on small watersheds in Central Asia" with the financial support of the US Agency for International Development (USAID). The goal of the project is enhancing transboundary cooperation and improving the social welfare of local residents in the pilot areas of the project through implementation of Integrated Water Resources Management (IWRM) principles in small transboundary rivers Aspara, Isfara and Ugam.

Within the framework of this project on the pilot territory basin councils were created. The competence of these councils included addressing the most acute problems.

Based on this BC on the Aspara River, the Kyrgyz side approved the methodology of reconstruction of the water supply system with establishment of RWCC in the village of Cholokaryk. The population here is 246 people, the number of households – 52. The main activity of the population is cattle breeding and farming. The distance from the central village of the aiyl district is 8 km, from the district center – more than 25 km. Children study in the village Chaldovar, there is a ФАП.in the village.. The road leading to the village and in the village itself has a ground and gravel coating. Residents of the village of Cholok-Aryk on their meeting supported the ongoing project and collected 32,000 soms thus providing a natural contribution (every day five residents participated in reconstruction works), an initiative group was established (for taking control over tye quality of the work), an open tender was announced and the company for reconstruction of the drinking water supply system in the village of Cholok-Aryk was selected. In 2015 reconstruction of the water supply system was completed.

In total, the following works were accomplished:

- construction of a fencing from a barbed wiring with gates;
- laying of plastic pipes with the diameter of 159 mm;
- laying of plastic pipes with the diameter of 110 mm;
- laying of plastic pipes with the diameter of 50 mm;
- installation of valves;
- construction of concrete wells.

Calculation of tariffs for the water supply

The calculation methodology and approval of tariffs should be oriented to the market-based methods of management being formed in this sector. This assumes transition from calculation of the production cost (estimated costs, expected СПКВ costs and adjusted taking into account the specific resource costs reduction and

rational consumption standards) to determination of the consumption price (tariff corresponding to the service cost, i.e.to its quality, limited by the real solvency of consumers) . That is, the consumption price is a socially justified tariff.

The main stages in formation of the production cost of a service and of an economically justified tariff (EJT) include the analysis and adjustment of actual costs, formation of the planned cost price, and its verification by normative indicators.

An economically justified tariff (EJT) is defined as follows:

EJT = C + P, where C is the planned cost price of a service unit, P is a revolver fund. The calculation of an economically justified tariff is based on determination of required revenues of an enterprise, which formed from the planned operating costs (required for financing of the rationally organized current activity of the RWCC) and from the profit sufficient for modernization of the water supply network. The calculated value of EJT in such a way is checked for compliance with standards established taking into account local circumstances

Anexes

Presentation	**"Establishment of Water users cooperatives"**
Presentation	**"Clean water for rural residential areas"**
Presentation	**"Cooperatives management and tariff calculation"**
Presentation	**"Legal basis for Water Users Cooperatives on the example of Kazakhstan"**

Automatization of water accounting systems

TRAINING MODULE 2

Anna Inozemtceva

Introduction

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Some of the above mentioned topics either are very widespread in the region of Central Asian and have to be studied more in-depth, or they are insufficiently studied in the region and the increased attention should be drawn to them.

The main purpose of this module is to convey the positive experience of applying **"best practices"** in the region to the wide audience.

Target groups for studying these materials can be very diverse – from students who study water resources management to water sector specialists interested in implementation of innovative technologies for water conservation, water accounting and providing access to clean drinking water.

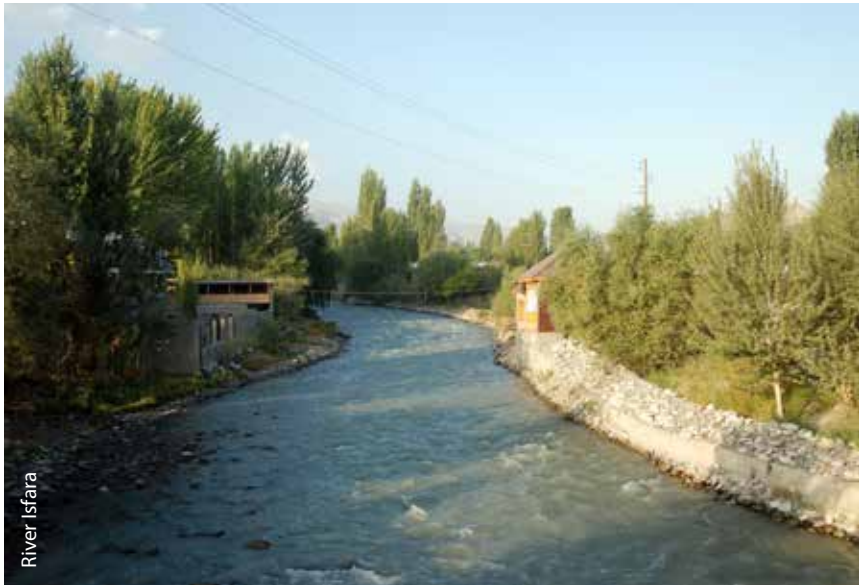
The training module consists **of three main parts:**

1. Preamble with information about the topic, goals and objectives, includung brief description of these trainig sessions;

2. Text version of the module, where the information on training topics is given;

3. Presentations where all visual materials are presented.

We hope that this publication will help state authorized bodies, local basin organizations, as well as all interested parties in applying innovative tools for more efficient and rational use of water resources at all levels of water consumption.



River Isfara

Preamble

Automatization of water accounting systems is a topical issue for the Central Asian region. This issue is especially critical in transboundary areas, where distribution of water is already becoming an issue of interstate importance. Unfortunately, because of limited funding, countries of Central Asia are not able to provide automatization of their water accounting systems to the full extend. In this regard international organizations and development partners make efforts to automatize water accounting system in Central Asian region.

Materials of this training (a practical part) are based on the experience of GIZ and CAREC in implementation of pilot projects on small transboundary rivers in the region: Aspara river (between the Republic of Kazakhstan and the Kyrgyz Republic) and Isfara river (between the Republic of Tajikistan and the Kyrgyz Republic).

Training objectives

- Acquainting participants with basic water metering devices, their types and using purposes
- Considering possibilities for using these devices in the region of Central Asia
- Getting to know about successful CAREC practices and experience in application of water metering devices at implementation of projects

Target groups

Training is intended for different target groups, engaged in issues of water distribution, irrigation systems consumers:

- Village residents;
- Farmers, small entrepreneurs;
- Representatives of local, regional, state authorities;
- NGOs;

- representatives of local, regional state authorities engaged in issues of drinking water;
- large entrepreneurs and companies;
- basin councils or similar groups subject to the national legislation;
- various regional groups and councils.

Also, training can be intended for mentioned above mixed groups, as well as for students of universities and colleges by the specialty "Water resources and water management".

Training duration and programme

Duration of the training – 1 day.

Registration of participants	30 min
Getting acquainted	30 min
Rules development, welcoming remarks, discussion of expected results	10 min
Session 1	120 min
Break	30 min
Session 2	180 min
Break	60 min
Session 3	120 min
Discussion of results	40 min

Getting acquainted

Each participant presents himself: name, place of work or what he/she is currently doing, briefly describes the situation with drinking water in his/her region and what he/she can do to improve this situation.

Participants are suggested to draw a picture or pictures that should answer the following questions:

The current situation with water accounting in your region?

What can be done to improve this situation?

Rules development

- The hand-raising rule
- Time limit – not more than 5 minutes
- Not to be late for sessions
- Criticize the idea, not the person
- Not to take the criticism personally
- Jokes are welcome

Sessions

Session 1

Narrative part **"Introduction. Types of water accounting and devices for automatization of water accounting process"**

Participants understand what are devices for automatization of water accounting process.

While preparing presentations on this material, it is necessary to give examples from a certain region (country, oblast, taking into consideration their specificity), rather than abstract examples.

Session 2

Annex 1

Presentation **"Classification and brief description of water accounting devices"**

Session 3

Annex 2

Presentation **"Examples of applying water accounting devices on irrigation systems of different level: GIZ and CAREC pilot projects in basins of rivers Aspara and Isfara"**

Conclusion

Interactive discussion on training results. Additional clarification questions from participants.

Before starting of the training, a feedback questionnaire should be developed.

The questionnaire should include the following questions:

- Did your expectations match with the information received on the training?
- Would you like to expand any of sessions? If so, then what session and by what information?
- Did you get a new information for yourself?
- Will you use the knowledge obtained in your daily work?

The questionnaire can be modified according to your organization's requirements and it is intended to improve both the content and also delivery of materials of this training.

Narrative part

After the collapse of the USSR, in countries of Central Asia the process of agriculture sector reforming started. Large collective and state farms were transformed into shirkat, dekhkan farms, farms and other forms of ownership. Emergence of this large army of land users complicated the problem of distributing irrigation water between them. Previously state water supply organizations (district water authorities – 'raivodkhozes') delivered water up to the borders of collective farms and then water was distributed by hydrotechnics and mirabs[1] of collective farms. Now the task has become more complicated. Today, for example, from one secondary canal[2] at a time several farms of various forms of ownership (shirkats, farms, subsidiary husbandries etc.) can take water. At that, each farm considers that just his lands need to be watered first. With such combination and variety of forms of management, lack of queuing and fair principles of water distribution, conflicts and disputes between these farms have become a common occurrence. This problem was effective solved by installation of water metering devices and of flow-measuring structures. At that, the main function of these stations and devices was a fair distribution of irrigation water among water users. One of basic conditions for regular and correct operation of irrigation systems and rational use of water is the proper organization of a system of primary water metering and measurement.

On irrigation systems, works on water metering and measurement are entrusted to a special operational hydrology (metrological service) within the organization that operates the system. The main tasks of the metrological service on irrigation systems are the following:

- systematic observation over the water discharge, levels and other characteristics of the water flow in points of water withdrawal, distribution, allotment and discharge of water; submission of operational information to the irrigation system administration;

1 Mirab – a person who deals with the irrigation system and is charge for the order of water using (in low water rivers of Central Asia). Efremova's explanatory dictionary. T. F. Efremova. 2000.

2 Secondary canal – a part of the irrigation system delivering water from the main canal to the farmer

- compilation of hydrometric tables, graphs, diagrams etc. for taking control over the operating mode of canals, hydraulic structures, pump stations, irrigation, collector-drainage and discharge networks;

- provision of water balance in the irrigation system as a whole and in certain sections specifying the volume of water losses, water use ratio, efficiency coefficient of the system and of sites;

- operation, repair, calibration and verification of hydrometric stations, facilities, equipment and instruments. The irrigation system should have a hydrometric network of special posts, calibrated facilities, water measuring devices and instruments located in accordance with the project or scheme. The following groups of hydrometric stations should be established on the irrigation system for the functional purpose:

- basic stations – for determining the main hydrological regime parameters of the water object at the place of water withdrawal into the irrigation system (are established in case if there are no such posts, management bodies on the use and protection of the water fund or management bodies in the sphere of hydrometeorology and environmental monitoring);

- head posts – for taking into account the volume of water withdrawal from a water object into the irrigation system, gravity channel or computer-aided mainline;

- distribution points – for taking into account the volume of water supply in head branches of the main canal and of various distributors at boundaries of administrative districts, at points for water distribution to consumers;

- discharge (end) posts – for taking into account remains of unused irrigation water and volumes of collector-drainage flows.

Principles of automatization of water supply on irrigation systems

Irrigation system – it is a complex set of hydraulic structures designed to supply water to any areas at a certain time and in the needed quantity. This problem is complicated by that the water supply regime quite often varies in time and the work of these structures in the course of their operation have to be reorganized. Consequently, observations have to be carried out practically continuously on most of hydraulic unit and on some structures. The complexity is also in that distances between certain units and structures of systems are significant. Currently, on irrigation systems the management system of hydraulic structures and devices is automatized with the help of electric, radio, and tele-equipment. And means for the automatic control of the water supply at a certain hydraulic structure include a considerable number of instruments and devices recommended by various authors; some of them are acceptable for the mass use, but they need to be further improvement.

The mainly objects of measurement at each hydrotechnical structure are the water level and the water discharge. Water measurability of the hydraulic structure, usually provided for at designing of the structure, allows to measure the level of water and to calculate the water discharge during operation of the facility. However, complexity of doing these measurements and calculations can be different. When water flows out from under the register gate or through the waste gate it is easy to determine the volume of water discharge. In order to determine the water discharge it is enough to know the water level before the register gate or the waste gate and the size of the gate opening. In cases of submerged flow it is also necessary to know the water level in the tail-bay. Therefore it becomes difficult to determine the water discharge and its accuracy decreases, because a variable coefficient of over-flow is introduced.

To keep a constant water flow passing through the waterworks during its operation, it is necessary to maneuver the gates on these facilities. For automatization of this process, many different constructions of water measuring devices and instruments based on well-known hydraulic principles have been developed.

In case of a segment gate, when the water pressure resultant goes through the geometric center, and the actual rotational axis of the flashboard does not match together with the geometric axis, there a moment occurs that helps to open or close the segment gate, depending on location of the actual rotational axis against the geometric center: if the actual axis is located below the geometric axis, then the hydrostatic pressure force moment helps to open the gate. And if it is located higher, then the force of the hydrostatic pressure pushes to press the gate to the foundation stab. These principles, like many others are often used in one or another constructive implementation in various automatic devices and give good results at operation.

Automatization of irrigation systems

Automatization degree of water distribution systems. The word "automatization" implies implementation of any technological operation without a human intervention. However, the automatization scales can vary within very wide ranges. For example, it is possible to automatize:

- a part of the process of measuring any given parameter of the object;
- the process of measuring of one parameter in full or a set of parameters on one object;
- the technological process at the object as a whole;
- a system of objects, a complex of systems at similar objects;
- the sector of the national economy (at scales of any region, republic or a country as a whole) etc.

At that it may be also that not all operations of the technological process or not all component elements of the object are automatized. Therefore, the concepts of automatization degree and stages have been introduced. The automatization degree can be partial, complex and complete. As regards to the water distribution process on irrigation systems, there are the following stages of automatization: **partial automatization,** when only some operations of the process or elements of the system are covered and therefore the process of automatic management of water distribution in the system is not closed. At the same time, on some hydraulic units, for example, on headworks, the process of the automatic control can be carried out completely, in a closed cycle, but as the water distribution is considered on a system-wide scale, the automatization is considered to be partial. **Complex automatization** – it is when the whole complex of water distribution operations, except for management, is performed automatically. The control process is closed through the dispatch operator. If necessary, he/she establishes the water consumption mode and its change without participation of the permanent operation personnel. The information on conditions of the controlled facility is received and control commands are transmitted through telecontrol devices. **Full automatization** – the whole process of water distribution is carried out in the optimal mode automatically, without direct involvement of the person or the dispatch operator with his device; it is carried out by computer and control machines. The ultimate goal of automatization of any technological process is to achieve the highest level, that is, a complete automatization. However, in practice, the automatization is introduced step by step.

Automatization of the water distribution process in irrigation systems, depending on availability of automation equipment, can be divided into the following stages:

Stage I (partial automatization) – facilities are equipped with local automatization equipment (automatic regulators or local software appliances) for stabilization of necessary parameters (levels, discharges), as well as with control and measuring instruments. The water distribution mode is changed and the control is carried out by a permanent line operating personnel.

The water use regime is developed by the dispatching apparatus. The dispatcher communicates with the line personnel (for receiving information and transmission of control commands via telephone, radio or couriers.

Stage II (partial automatization) – to the first stage telecontol devices of centralized control are added. The automatic entry of information to the operations control centre increases the efficiency of control and allows to carry out systematic monitoring of water distribution and to take control over it.

Stage III (complex automatization) – the second stage of automatization is enhanced by means of centralized remote control. Line operating personnel does not participate in the management of facilities operation.

All facilities are automatized. The control process is closed through the dispatch operator. The dispatching device processes the information received via telecontrol means, determines the optimal mode of water-distribution, generates control commands and transmits them to local automatization devices.

Stage IV (complex automatization) differs from the third stage by using the computer equipment to help the dispatch operator to process information and to determine the optimal mode for the water distribution. The decision on changing the mode and transmitting control commands is made by the dispatch operator.

Stage V (full automatization) – the process of water distribution is carried out without human intervention – automatically with the help of control machines. Thus, a higher stage of automatization is achieved through a gradual increasing provision of irrigation systems with automatization facilities. Means of appropriate automatization (hydraulic automatic regulators and other devices) serve as the basis for the automatic control.

However, the most important thing is to determine the efficient degree of automatization, taking into account specific features of the technological process. The main specificity of irrigation systems is the large number of water distribution hydro structures scattered on a vast territory that are subject to automatization. In any case, at this stage the complete automatization of the water distribution process on such systems is out of the question. So far, this is not feasible technically either. The decisive factors when choosing the degree of water distribution automatization on irrigation systems include technical and economic feasibility, as well as the competence level of the operating personnel. On different sections of irrigation systems a different degree of automatization should be provided for. Thus, in conditions of mountain irrigation systems (on this level of technological development) for the internal network the stage I of partial automatization is quite acceptable, for the inter-farm network – stage II and for large main canals, including the head water intake facility, stage III or IV (complex automatization) is acceptable. At that it is meant that over the time, if necessary, the degree of automatization of each of these sections can be increased by additionally equipping with appropriate technical means of automatization. Therefore, as a rule, at implementing any stage of automatization of irrigation systems or its units, the possibility should be provided for transferring them to a higher stage of automatization without reconstruction. However, it is still necessary to accurately determine the expected higher stage of automatization at this section, so that not to cause unnecessary complications of the object

Equipment for gauging stations automatization

Automatic measurement of the water level in field conditions is carried out with the help of devices named 'water level loggers sets' (WLLS). Therefore, WLLS is a hydrometric device which in combination with technical equipment provides an automatic recording of the water level position in an open water stream or water reservoir. WLLSs can be both an independent (separately standing) device and also a built-on or a built-in structure. At the same time, they all retain their function as a means for measuring water levels. Built-on WLLSs are usually a part of hydrological flow measuring device and the built-in ones are installed in some larger structures: embankments, dams etc. Hydrologists primarily deal with independent and built-on WLLSs; thus the major focus will be placed on built-on WLLSs.

As the main technical fitting-out of WLLSs, automatic recording instruments are used. The operation principle of these devices can have a different basis. There are known floating, hydrostatic, acoustic and other types of recording instruments. The entire WLLS device depends on the principle of working of the recording instrument. Currently, in hydrology, the floating automatic water level loggers of "Valdai" type are mainly spread.

Capacitive level meter is a level meter the operating principle of which is based on the difference in the liquid and air dielectric penetrability. In this connection, when detector electrodes of the level meter are submerged into the liquid, the volume between them changes in proportion to the level of water in the basin.

Level meters of the hydrostatic type allow to measure the pressure arising from the liquid column, which is converted by the inductor electronics into the measurable value of the product level. When measuring the hydrostatic pressure, it is necessary to know that it depends on the density of the liquid being measured and on the temperature. It does not depend completely on reservoir dimensions and on its volume. Structurally, hydrostatic level meters are differential pressure inductors. On one side the process pressure affects the inductor membrane, on the other hand – the atmospheric pressure. It is needed for more accurate measuring of the water level in the reservoir, taking into account changes in the atmospheric pressure. It should be remembered that the reservoir container should not be covered and the measurement product should not be under the excessive pressure, as it will have affect measurements. For measuring the level of the product with variable pressure (excess pressure or under pressure), it is necessary to connect the inductor membrane to the reservoir in a place where there is no measurable product, but there is a pressure (for example, a roof). In this case the level of the product will be measured taking into account the pressure in the reservoir.

By design, hydrostatic type inductors can be conditionally divided into the following types: membrane type or bell type (also called borehole or immersion inductors). In level meters of the membrane type the sensitive element of tensoresistive or capacitive type is used, which is connected directly to the membrane. The inductor membrane should be placed as lower as possible to

the bottom of the reservoir. The installation point of the inductor matches with the minimum measured level. When using a bell-type element, the inductor membrane is located in the inductor. It is a cylinder with a cable outlet and is immersed into the target medium on the cable. To equalize the pressure with the atmospheric pressure in the cable there is a hollow pipe that is connected on one side to the membrane and on the other side it goes out into the atmosphere. There is a filter for protecting the tube from dust intrusion.

The operating principle is based on measuring transmission time of the ultrasonic signal between the signal originator and its receiver. **Ultrasonic measuring systems** are a cost-effective solution. They control and manage the levels of liquids, dredges and free-flowing substances in applications with small or large measuring ranges in various industries. Inductors are resistant to dust, moisture, corrosion, vibration, flooding and extreme temperatures. They are mounted simply and practically do not need maintenance support.

Pneumometric tubes – these are devices for measuring the velocity magnitudes and directions, as well as of the liquid or the gas flow, based on measuring pressure in the flow. They are used for measuring the water flow velocity in rivers, canals, penstocks and pipes, of the airflow velocities and of relative travelling speed of ships and airplanes.

There is widely spread a combined Prandtl pitot tube. It is a cylindrical tube with a hemispherical nose, the axis of which is installed along the flow. Through the central opening in the hemisphere (critical point) the total pressure p0 is measured; another opening I (or a number of openings) is located on the lateral surface of the tube at a distance of several diameters of the tube from the nose and from the holder and serves for measuring the static pressure p.

The geometric shape of the Prandtl pitot tube, the shape of openings and the distance from them to the tube nose are selected so that the pressure in lateral openings, when possible, should not differ much from the static pressure at the flow point being studied. A moderate discrepancy of pressures is taken into account by the correction factor ξ, which is determined through calibrating. Knowing 'p' and 'p0', based on the Bernoulli equation the flow velocity 'v' is calculated. 'P' for the incompressible liquid can be found by the Clapeyron equation (see Clapeyron equation) or in another way. When measuring air velocities above 50–60 m/sec. the air compressibility should be taken into account. The Pitot-Static tube is also used for determining 'υ' and the Mach number M (see Mach number) in a supersonic flow. At low velocities of the flow (υ <6 m/sec) or at high vacuum pressures, when the Reynolds number Re is <300, a significant increase of the coefficient ξ is observed. The Prandtl pitot tube can also be used at very small Re, including also a free-molecular flow (see the Aerodynamics of rarefied gases) (at > 1). However, at its practical application for these flows, some difficulties are encountered that are connected with calibration and measurement of very small absolute pressures. For measuring the flow velocity there are a large number of modifications of the Pitot-Prandtl tube (Brabbe, Losievsky, Preston tubes etc.); in addition, the velocity is measured by the Venturi tube (see Venturi tube). The flow direction is measured by cylindrical and spherical nozzles, combinations of three angled Pitot tubes, etc., the indications of which are very sensitive to the flow direction.

The flowmeter, as it is seen from its name, is a device designed for measuring of the flow of any substance – usually of liquid or gas. If there is a channel with a diameter 'd' and a liquid or gas moves through it at an average velocity 'Va', the flow rate is the following magnitude:

formula for the substance flow a where A = πd2 / 4 is a cross-sectional area of the channel. It should be noted that substances the flow of which has to be measured can be compressible (gas) or incompressible (liquid), and the flow measurement techniques in both cases have their own characteristics. Regardless of the type of the used device, determination of the substance flow is quite a complex task. When completing this task many factors should be taken into account, such as:

- Physical characteristics of the investigated environment;
- Physical characteristics of the environment;
- The channel form and properties of the material from which it is made

To each inductor as a rule a set of documents describing the technical parameters of the device, its limitations and recommendations for operation is enclosed. Before buying a device, please examine all these documents and choose the device most suitable for your objectives.

Among quite a large variety of flowmeters by the operating principle the following main groups can be distinguished:

- Flow velocity inductors for differential pressure;
- Thermal flowmeters;
- Ultrasonic flowmeters;
- Electromagnetic flowmeters;
- Micro-flowmeters;
- Coriolis flowmeters;
- Flow meters with targets;
- Detectors for flow velocity variations.

Annex

Presentation	**"Classification and brief description of water accounting devices"**
Presentation	**"Examples of water accounting devices application on irrigation systems of different level: GIZ and CAREC pilot projects in basins of Aspara and Isfara rivers"**

Effective irrigation systems and drainage waters management

TRAINING MODULE 3

Said Sharipov

Introduction

"Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH" programme "Transboundary water resources management in Central Asia" (GIZ programme "TWRM CA")

On April 1, 2008, at the water conference "Water Unites" in Berlin the German Foreign Ministry announced launching of the "Water Initiative for Central Asia". This initiative is a proposal of the German government to countries of Central Asia to assist in water resources management and making the water a subject of enhanced transboundary cooperation. The priority task is to initialize a process of political rapprochement in Central Asia that could promote strengthening cooperation in using water as a limited resource and in the long term could lead to the joint management of water and energy resources.

IIn furtherance of the Berlin Initiative and in order to determine main areas of activities in countries of Central Asia for the period of 2012-2014, on 8 March 2012 in Berlin at invitation of the Minister of Foreign Affairs of the Federal Republic of Germany, a meeting of representatives of Ministries of Foreign Affairs and Water Management bodies of Central Asia (CA) was held.

The most extensive component of the "Berlin Process" is the TWRM CA programme, implemented by GIZ under the authority of the German Foreign Ministry. Within the second phase of this programme, activities carried out during the period from 2012 to 2014 allowed not only to optimize cooperation in the water sector of Central Asian countries, but also to improve living standards of the population in the region. As a part of implementation of the second phase of the GIZ TWRM CA programme, the funding structure of the programme projects was changed. The regional cooperation and implementation of national pilot projects will be continued with the financial support of the German Foreign Ministry. In addition, two projects funded by the European Union are implemented under the European Union Regional Environmental Program for Central Asia (EURECA).

Since beginning of 2015, realization of the third phase of the Programme started through implementation of following projects:

- "Capacity-building for sustainable water resources management at the regional, national and basin levels". The project executing agency is the Regional Environmental Center for Central Asia.

  The project will also support strengthening of cooperation between regional organizations operating in Central Asia, such as EC IFAS, SIC ICWC, SIC ICSD, BWO "Amudarya" and "Syrdarya", etc.

- "Regional dialogue and cooperation on water resources management in Central Asia". The project executing agency is UNECE.

Implementation of the projects is aimed at supporting activities of EC IFAS and of basin water management associations Amudarya and Syrdarya.

Regional Environmental Center for Central Asia (CAREC).

CAREC was established following the resolution of the IV Pan-European Conference, held in 1998 in Aarhus (Denmark). CAREC began its operations in 2001 after ratification by the Republic of Kazakhstan of the Agreement on operating conditions of the Center, as an independent, non-profit and non-political, international organization. CAREC's founders are countries of Central Asia: the Republic of Kazakhstan, the Kyrgyz Republic, Uzbekistan, Tajikistan, Turkmenistan, the United Nations Development Program (UNDP) and the European Commission (EC). The Head office of CAREC is located in Almaty, Kazakhstan. Also five country offices are successfully operating in each capital of Central Asian countries, including a project office in Afghanistan (Kabul).

The main thematic areas of CAREC activities include:

- Climate change and sustainable energy
- Education for sustainable development
- Health and environment

- Environment altitude management
- Water initiatives support

Countries of Central Asia are facing serious problems and challenges in the sphere of water resources regulation and management. These problems include inefficient irrigation, drainage and water supply systems, outdated legislative and regulatory documents and agreements at all levels, lack of awareness about the most topical problems in water resources management and methods of their solutions, inadequate engagement and participation of local communities in water resources management, lack of incentives in terms of economic instruments for supporting basin ecosystems. These and many other issues of sustainable water resources management form the basis for the Water Initiative Support Programme (WISP) activities. In particular, the objective of the WIS programme is to increase the water users' capacity on issues of effective water resources management at all levels: from transboundary water apportioning to rational use of water resources at the field level.

Key topics taken as a basis for development of training modules:

- Establishment of a water users cooperative for provision of the access to clean drinking water – TWRM CA and CAREC experience;
- Effective irrigation systems and drainage water management – experience of the TWRM CA in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan;
- Application of water accounting devices on irrigation systems – experience of the TWRM CA and CAREC of Kazakhstan, Kyrgyzstan and Tajikistan; and
- Methodology for assessment of the compliance of hydropower projects with the sustainable development criteria – the TWRM CA experience in the Shardara water storage basin (Kazakhstan).

Some of the above mentioned topics either are very widespread in the region of Central Asian and have to be studied more in-depth, or they are insufficiently studied in the region and the increased attention should be drawn to them.

The main purpose of this module is to convey the positive experience of applying "best practices" in the region to the wide audience.

Target groups for studying these materials can be very diverse – from students who study water resources management to water sector specialists interested in implementation of innovative technologies for water conservation, water accounting and providing access to clean drinking water.

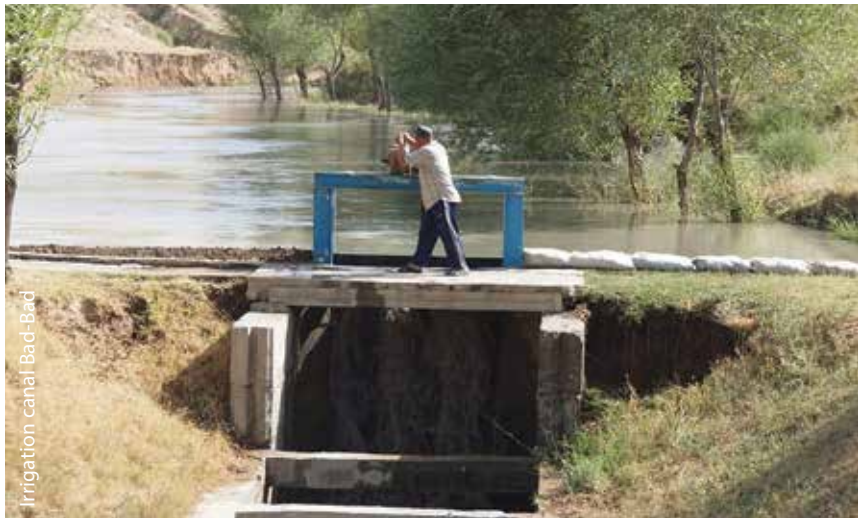
The training module consists of three main parts:

1. Preamble with information about the topic, goals and objectives, including brief description of these trainig sessions;

2. Text version of the module, where the information on training topics is given;

3. Presentations where all visual materials are presented.

We hope that this publication will help state authorized bodies, local basin organizations, as well as all interested parties in applying innovative tools for more efficient and rational use of water resources at all levels of water consumption.



Irrigation canal Bad-Bad

Preamble

In Central Asia in comparison with other regions of the world per hectare of lands a greater amount of water is used. It happens so because of that irrigation and drainage systems have become outdated and need reconstruction and rehabilitation. Also, not enough attention is paid to integrated water resources management systems.

This training module has been developed on the basis of National pilot projects (NPR) of Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan realized by the GIZ programme on TWRM CA with the purpose to exchange positive experiences.

The module consists of following topics:

- ***"Computerization of water metering devices in on-farm and inter-farm irrigation systems in Batken region", Kyrgyz Republic;***

- ***Rehabilitation of the Zumradsho headworks in Isfara, Tajikistan;***

- ***The irrigation system in Khangovuz: integrated water resources management and reutilization of drainage waters, Turkmenistan;***

- ***Rehabilitation of the Bad Bad irrigation canal and reconstruction of the head water intake, Uzbekistan.***

The overall objective of national pilot projects is to improve livelihoods of the population in rural areas through improvement of irrigation infrastructure and irrigation waters management.

It is expected that national pilot projects will become the first steps in beneficial trust-based relations and in taking measures on strengthening trans-boundary river basins management.

Training objectives

- Getting acquainted with successful practices and experience on establishing systems that allow to measure and keep records of the water discharge;
- Dissemination of information about benefits from participation of stakeholders in projects implementation.

Target group

The training is intended both for various target groups related to drinking water and also for individuals. Groups can be formed by interests:

- village residents;
- farmers, small entrepreneurs;
- representatives of local, regional, state authorities;
- NGOs;
- representatives of local, regional state management bodies engaged in issues of drinking water supply;
- large entrepreneurs and companies;
- basin councils or similar groups, depending on the national legislation;
- various regional groups and councils.

Also training can be intended for mentioned above mixed groups.

Training duration and programme

Training will be conducted during one day.

Registration of participants	30 min
Getting acquainted	30 min
Rules development, welcoming remarks, Discussion of expected results	30 min
Session 1	60 min
Break	30 min
Session 2	60 min
Session 3	60 min
Break	60 min
Session 4	30 min
Break	30 min
Conclusion	40 min

Getting acquainted

Each participant presents himself/herself: name, place of work or what is he engaged in currently; briefly describes the situation with drinking water in his region and what he can do to improve the situation.

Participants are suggested to draw a picture or pictures that should answer the following questions:

Current situation with irrigation and drainage systems in the country?

What can be done to improve this situation?

Target

To introduce participants to each other, get them to talk and put at ease, give them the possibility to express themselves, to compare the situation with drinking water in their region with the situation in neighboring region or country.

Rules development

- The hand-raising rule
- Time limit – not more than 5 minutes
- Not to be late for sessions
- Criticize the idea, not the person
- Not to take criticism personally
- Jokes are welcome

Sessions

Session 1

Annex 2

Presentation **"Computerization of water measuring devices in on-farm and inter-farm irrigation systems in Batken district"**

Getting participants acquainted with positive experience of the TWRM Central Asia programme in Kyrgyz Republic on computerization of water metering devices, reviewing some examples of resolution of conflicts arising from inequitable and non-transparent delivery of water between water suppliers and water users, dissemination of the experience on establishment of a system that allows to measure and keep records of water supplied to farmers and development of administrative documents.

Brainstorming. Participants discuss advantages and disadvantages of TWRM Central Asia programme approach and give examples based on their own experience.

Result. Participants got acquainted with the positive experience of the TWRM CA programme implementation in the Kyrgyz Republic.

Session 2

Annex 4

Presentation **"Rehabilitation of 'Zumratsho' headworks in Isfara"**
In this session, participants get to know about the following operations:

- Cleaning of the bypass channel by setting a temporary dam
- Rehabilitation of the existing dam and of the water intake through the by-channel
- Construction measures in the lower part of the armrest
- Cleaning and restoration of the water gallery for the bypass of charging floors
- Construction measures at the upper part of the armrest
- Rehabilitation of the roundabout gallery
- Rehabilitation and repair of electrical equipment

Brainstorming.

Results: participants got to know about rehabilitation of head structures, aimed at ensuring a continuous water flow into the main channel, prevention of solid matters flow and improvement of the water flow control and of the common operating environment.

Session 3

Annex 1

Presentation **"Irrigation system in Khangovuz: IWRM and reutilization of drainage waters"**

Discussion of the issue what we mean by definitions of IWRM and reutilization of drainage waters. Application of GIS tools and data management for correct determination of hydrographic boundaries of irrigation systems and establishment of an effective data management system. As a result, we see that a successful project implies understanding of the problem and participation of all stakeholders.

Results. Participants get to know what is IWRM and reutilization of drainage waters as well as what are benefits of using GIS technology and data management.

Brainstorming. **Group 1** discusses advantages and disadvantages of the IWRM and of reutilization of drainage waters. **Group 2** discusses advantages and disadvantages of GIS tools application and of the data management.

While preparing the presentation on this material not abstract examples, but materials of the GIZ project of the "TWRM CA" programme were used.

Session 4

*Ann*ex 3

Presentation **"Rehabilitation of the irrigation canal Bad Bad and reconstruction of the head water intake structure"**

Getting acquainted with application of water-saving technologies, restoration of the most damaged part of the transport channel and related structures, such as cross regulating devices and water intake facilities for irrigation water.

Results: participants have got to know about lessons learned in the course of restoration of the damaged part of the transport channel and related structures.

Conclusion

Now we summarize results and answer participants' questions.

Each participant fills in a questionnaire with the following questions:

What did you expect to get in result of the training?

What did you get in result of the training?

Which session would you like to expand or would you like to add a new one?

What session do you consider needless?

Have you learned anything new for yourself?

Will the knowledge gained in the training help you to improve the situation with drinking water in your region?

Please, evaluate the training on a five-point system.

Narrative part

National pilot projects in all five Central Asian countries were implemented within the framework of agreements with national partners and the Federal Ministry of foreign affairs of Germany.

In addition, on all five programs are consulted on strategic and technical issues by international experts invited on a short-term basis.

Computerization of water measuring devices on inter-farm and on-farm irrigation systems in Batken district , the Kyrgyz Republic

The team in Kyrgyzstan implements projects mainly based on activities within component 2 and 3, as well as on provision of services to other sections of the program. As regards the river basin approach, in particular, the close cooperation is set going with the team in Tajikistan. The State Committee on Water Management and Land Reclamation (Committee) of the Kyrgyz Republic participates in all types of the team activities, as a main national partner for the programme implementation.

Main water management subjects in the Kyrgyz Republic are Water User Associations, farmers and territorial bodies of the Committee. It often happens so that because of the lack of mutual trust and transparency, these organizations get in a dispute with water resources management in the irrigation season.

One of consequences causing damage to the long-term sustainability of water suppliers and to the entire water sector, is the non-timely payment for the consumed water. It is important to measure the water taken from main channels and sold to WUAs. Often, between WUAs and water suppliers disputes and mistrust arise because of that the exact volume of water used for the irrigation is not known for certain. The gauging stations, equipped with visual measuring system are not reliable. The traditional recording system is based on books that are filled in manually. This often leads to conflicts between water consumers and water suppliers.

The overall objective of the project is to eliminate conflicts arising on the basis of inequitable and non-transparent delivery of water between water suppliers and consumers.

Another important contribution of the Project is establishment of a permanent group from amongst of employees of the Batken District Water Department (DWD) and WUAs for proper operation and maintenance of the equipment and database. Also a number of trainings were conducted for local residents.

Important steps and measures

First, field studies were carried out for getting acquainted with similar current projects in the region.

After selection of the WUA, together with the DWD of the Batken oblast the approach on mitigating conflicts in the sphere of water flow measuring and accounting was presented to the WUA Kyzyl-Kira and the DWD of Batken oblast.

Then the DWD of Batken oblast purchased building materials for completing construction works, including reconstruction of key gauging stations.

After that, modern flowmeters were installed and calibrated in those points in the irrigation network of the WUA Kyzyl-Kira and the DWD where previously conflicts occurred.

The consultant developed a database for archiving records. The data recorded from the water flow sensors are entered into the database through the remote control board. The data on the water flow are related to the relevant section or the subsector of the irrigation network up to the level of one section. The database can be configured with a detailed description of lands and crops subject to irrigation.

The database includes the following information:

- Date and time
- Site extension
- Agricultural crops
- The amount of water planned for irrigation with intervals (day/month/season)
- The amount of water actually used for irrigation
- The cost of invoicing to a farmer

The following trainings were conducted:

- Operation and maintenance of the device with remote recording
- Operation of a database designed for automatic measuring of water
- Downloading data from a remote device to the computer
- On-the-job training on working with a database

Within the frames of the project, a network of key local experts was established, who can continuously maintain cooperation between key partners. This network has been operating since the spring of 2011.

Results. The project has significantly improved relations between WUAs, farmers and Batken DWD. The confidence was restored between the main participants of water resources management process.

Water measurement and relevant accounting system were based on the visual assessment of water consumption that led to rough and controversial assessments. Now water measurements are accurate enough and less involvement of the staff is required.

Using these reports in the database, schedules and invoices can be created automatically. The database is a historical reference for planners (land levelers), controlling their agricultural activities. The data can be exported to other databases in the form of tables.

The local staff gained an extensive experience from partners on how to manage off-farm and on-farm systems without conflicts in the field of water distribution.

Employees of water resources management of Kyzyl-Kyrsk WUA and of Batken DWD got an access to new technologies and modern technical devices.

Rehabilitation of the headworks 'Zumratsho' in Isfara, Tajikistan

In Tajikistan, the program team bears the primary responsibility for implementation of the river basin approach. It closely cooperates with the team in Kyrgyzstan and with regional programme advisers. The main partner of this subcomponent is the Kyrgyz-Tajik inter-ministerial working group, chaired by Heads of two relevant national authorities. As regards to development of river basin database systems and river basins planning, the team also works together with organizations of water resources management at the district level. In addition, the activities is coordinated with other international organizations, such as the United Nations Development Program (UNDP), the Swiss Agency on Development and Cooperation (SDC) and the Organization for Security and Co-operation in Europe (OSCE). Pilot projects for component 3 are implemented in consultation with the Ministry of Energy and Water Resources and its project institute 'Giprokhodkhoz' as well as with the Institute 'Nurofar'.

The catchment area of the Isfara River covers the Batken oblast (administrative district) in Kyrgyzstan and Sughd Oblast in Tajikistan and includes Uzbek territories in the tail part of the basin. The river, which historically is a tributary of the Syr-Darya, in the river mouth flows together with the Great Fergana channel.

Currently, the water of the channel is almost completely used by the local population for irrigation before it actually gets to Syr Darya. Seasonal mudslides resulting from annual snowmelt in spring threaten existence of the local population and functioning of the infrastructure.

The waterworks facility regulates the water supply to the bypass channel, which then supplies water to fields for irrigation needs in the Laccon valley. The Isfara headworks was constructed in 1960 and initially it served 10 000 hectares of arable lands. Because of continuous operation and not taking rehabilitation measures for long time its state has significantly deteriorated and currently it is serving about 8.000 hectares of lands.

Recently, the technical condition of the headworks was estimated as critical. The lower spillway dike, concrete encasement of upper and lower sections and of metal parts were in need for immediate rehabilitation.

'Zumratsho' headworks is located on the distance of three kilometers above Isfara town. It regulates water supply for drinking and irrigation needs for the population of Isfara and Laccon valley. It also distributes water between Isfara and Kanibadam districts.

Project objectives

The project is aimed at improvement of the hydrotechnical infrastructure of the district that will promote the rational use of water. This would also allow to regulate and distribute water for the population on a regular basis for drinking and irrigation needs. Rehabilitation of headgears is aimed at ensuring a continuous flow of water into the main channel, prevention of solid matters flow and also at improvement of the water flow control and of the common operating environment.

Initiated measures

Rehabilitation activities were conducted in several stages. The following measures were taken for the complete repair of parts of heads constructions:

1. Cleaning of the bypass channel by setting a temporary dam
2. Rehabilitation of the existing dam and water intake through the bypass channel
3. Construction measures in the lower part of the armrest
4. Cleaning and restoration of the water gallery for the bypass of charging floors
5. Construction measures at the upper part of the armrest
6. Rehabilitation of the roundabout gallery
7. Rehabilitation and repair of electrical equipment

Results

Rehabilitation of the headworks 'Zumratsho' led to expansion of its irrigation capacity. As a result the water supply increased by more than 2000 hectares of arable lands that returned the headworks to its original capacity of 10000 ha. As regards to drinking water supply the repaired headwork facility can now serve more than 100,000 people in the valley Lakkon, including Isfara. Restoration of the water supply and Is implementation of other agronomical measures contributes to the productivity increase. Thus, rehabilitation of the headwork improves living conditions of the local population.

The irrigation systems in Khangovuz: integrated water resources management and reutilization of drainage waters, Turkmenistan

The regional adviser and international expert on water resources management support the team in Turkmenistan in planning and implementation of activities within the component 2. Pilot projects are coordinated and supported by the Ministry of Nature Protection (MNP) and its agencies – Research Institution of Desert, Flora and Fauna and the Environmental Protection Agency of Mary, as well as by the Ministry of Water Management (MWM).

The main objective of the programme in national pilot projects implemented in Turkmenistan is promotion of IWRM principles. In Khangovuz irrigation system (KhIS) two national pilot projects were implemented. The main objectives of the project on the integrated water resources management (IWRM) in KhIS is to improve the water resources management through increasing the water consumption productivity and efficiency by application of the IWRM approach. The project contributed to the technical and technological support for improvement of the infrastructure, institutional arrangements and capacity-building activities, to studies on the water quality and on reutilization of drainage waters in KhIS. Expected results from the project – improvement of water resources management, increasing of the soil productivity in the area of KhIS. Improved conditions for farming will ensure the livelihoods of people in the region. Provision of the modern equipment for monitoring of the water quantity and quality will allow provincial water management bodies and also environmental protection bodies in Ashgabat to take control over the ecological status of surface and drainage waters in KhIS and in other regions of Turkmenistan. A national survey of drainage water resources will help to adjust the possible use of drainage waters as an alternative source of irrigation water for salt-tolerant plants on light soils.

Objectives

The project on drainage waters was implemented jointly with the MWM and includes such activities as updating and digitizing of the land use, compilation of maps of KhIS drainage networks. National partner institutions can use these maps for conducting field researches and monitoring the quality of drainage water resources.

In addition, tools and methods of the drainage water system monitoring and using of wastewater for irrigation will be developed. Within the frames of project the portable and laboratory equipment and chemicals needed for monitoring of the water quality was provided. In addition to technical support the measures were initiated on strengthening capacity for employees of laboratories in Mary and Ashgabat. Strategies on reutilization of drainage waters can be additionally checked by field tests with the support of both of the Government of Turkmenistan and of also of international organizations funds. Technical activities included using of GIS instruments and data management tools to help national partners to exactly define hydrographic boundaries of the irrigation system and to establish an effective system for their management. These efforts were combined with capacity-building activities in the sphere of GIS and database management for local specialists of the Ministry of Water Resources and its departments. The project supported the IWRM Working Group in developing the IWRM roadmap/ national plan for Turkmenistan.

Main processes include drainage water quality control, development of strategies for reutilization of drainage waters, development of the IWRM roadmap for the pilot region and introduction of extended geoinformation tools (GIS/Database) aimed at obtaining comprehensive information for planning and implementation of the IWRM strategy in KhIS.

Important Steps and Actions

- Memorandum of Understanding with both ministries-partners
- Creation of a national team of TWRM CA in Ashgabat
- Review of drainage waters reutilization in KhIS
- National overview of drainage and return waters
- Road map for the IWRM introduction in the Khankhovuz system
- Analytical review of the Murgab basin
- Seminars for discussing the concept of data management, GIS/DB tools with partners from the MWM and the MNP

- For the MNP and MWE (MWM-?) experts two working and one international trainings on GIS/DB were organized
- For employees of analytical laboratories at the Environment Monitoring Service in Ashgabat and Mary a professional training was organized
- Two national workshops for discussing preliminary results of the project were organized in Ashgabat
- A national seminar "The IWRM implementation in Turkmenistan" in Avaz was conducted

Results. Environmental monitoring services in Mary and Ashkhabad are much better equipped with portable devices and at doing measurements can receive information on four parameters.

It is necessary to track and monitor the impact of project interventions. However there are clear signs of changes in partner organizations in relation to the water resources management. Possibilities were provided on the basis of GIS/database, the IWRM concept was distributed among partners.

Thanks to the project efforts the water resources experts in Turkmenistan (for the first time) received practical (but basic) knowledge on digitization of cartographic materials and comparison of modern satellite imagery and graphic materials developed in previous periods (in times of the USSR).

Discussions on the IWRM principles helped to raise awareness among water specialists of Turkmenistan, especially at the level of water resources management hierarchy.

Rehabilitation of the irrigation canal Bad-Bad and reconstruction of the head water intake. Uzbekistan

The team in Uzbekistan closely cooperated with the Ministry of Agriculture and Water Resources of Uzbekistan (MAWR) and its subdivision on the project realization Batiometric Markas, as well as with Gosfondnadzor (the state authority on the water infrastructure safety) in accordance with activities on component 3. In addition to coordination and cooperation, visits to pilot project sites together

with partners and the team are regularly monitored. As for the component 2, the regional project advisor coordinates activities on data management and transboundary water management.

The overall objective of this national pilot project is to improve livelihoods in rural areas through improvement of the irrigation infrastructure and of irrigation waters management.

The official partner is the Ministry of Agriculture and Water Management the Republic of Uzbekistan. The executing agency is Batiometric Markas (the state industrial organization). Partners at the working level in the field are the Association on the basin irrigation system (ABIS) of Zerafshan river and the Water Users Association.

The main process is aimed at regulating the restoration of the ABIS operation, including planning, decision making, construction and procurement activities and also monitoring of construction activities. As regards to the maintenance concept, an important process included cooperation between the water agency, the Water Users Association, the consultant and the TWRM CA team.

The main output of the project is the improved hydraulic infrastructure.

The processes of cooperation and training were related to administrative issues such as avoiding waiting periods (delays) for decision-making at higher levels and for transferring of funds.

In the context of the facility rehabilitation, together with the national consultant, Water Users Association and the TWRM CA team the infrastructure maintenance concept was developed.

Presented documents and materials on TWMP were distributed among participants at trainings and seminars.

Within the frames of component 2 a database on water resources was developed that is now available on the Internet at *www.waterdataq.uz*.

Within the frames of a partner organization for water resources management a working group on IWRM was created. It consisted of specialists from various units, such as hydrometry and channels management. Together with the TWRM CA

team, this working group developed the IWRM work plan for the channel Bad Bad. These interventions are both technical and institutional. For example, technical measures include the repair and establishment of a field office near the Bad Bad channel. This office is now a platform for coordination, where the Administration on channels regularly meets with local water users and farmers to discuss issues of equal water distribution and channel infrastructure. Institutional measures include a number of activities on capacity-building, such as a study trip to a Swiss-sponsored project in Fergana region, social mobilization of WUA employees and representatives, hydrometry issues as well as of planning and distribution of water.

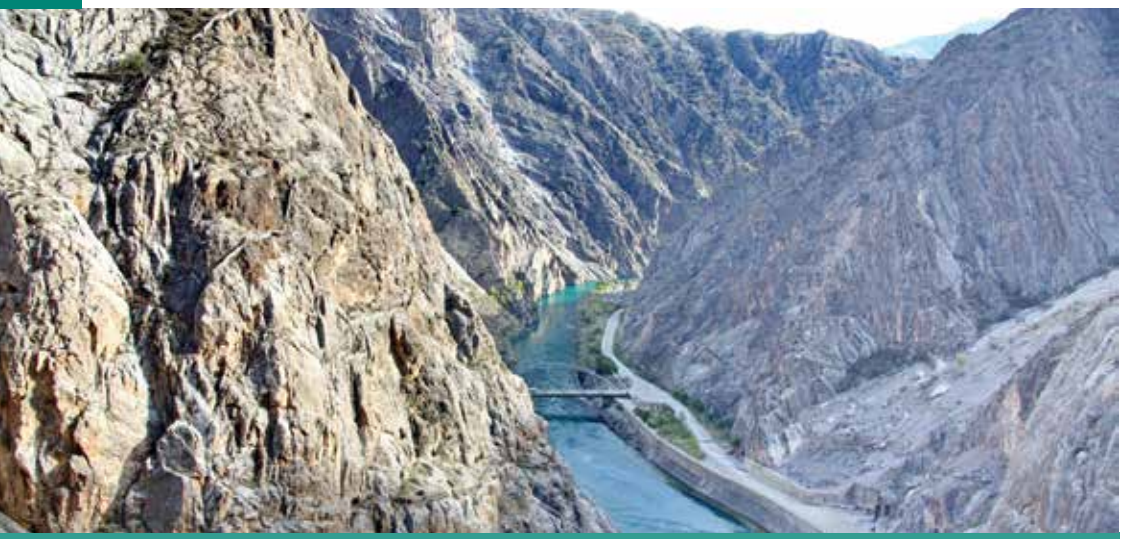
The following trainings and seminars were conducted:

- The IWRM concept and its implementation for the Samarkand WMO (BMO) (Water Management organization -?)
- Social mobilization as a tool for implementation of a joint approach to water resources management (the WUA level)
- Current state in the field of hydrometry for measurement of the water discharge in main channels
- Water resources distribution and planning for WMO staff and WUA representatives

Results. Reconstruction of the head water intake increases the inflow of water from 6 up to 10 m^3/sec improving the water supply for irrigation farmers. Rehabilitation of 4.4-kilometers' coverage of ВВИР with concrete will contribute to reduction of water losses in this part of the channel. Reconstruction of two rooms in the house and fitting them out with necessary equipment allows to manage the channel and the Water Users Association and also allows farmers to meet and coordinate their work, when the water and infrastructure management is required. The drip irrigation system allows to use the irrigation water exactly in the root zone of the crop and prevents non-productive evaporation of irrigation water from the soil surface around and between cultures. It also allows mixing irrigation water with fertilizers (fertigation) and pesticides (chemicalization) that makes it possible to apply them exactly to the root zone of irrigated crops.

Annex

Presentation	**"Computerization of water metering devices in on-farm and inter-farm irrigation systems in Batken district"**
Presentation	**"Rehabilitation of 'Zumratsho' headworks in Isfara"**
Presentation	**"Rehabilitation of the irrigation canal Bad-Bad and reconstruction of the head water intake. Uzbekistan"**
Presentation	**"Irrigation system in Khangovuz: IWRM and reutilization of drainage waters"**



Methodology for assessment of hydroenergy projects compliance with sustainable development criteria

TRAINING MODULE 4

Said Sharipov

Introduction

"Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH" programme "Transboundary water resources management in Central Asia" (GIZ programme "TWRM CA")

On April 1, 2008, at the water conference "Water Unites" in Berlin the German Foreign Ministry announced launching of the "Water Initiative for Central Asia". This initiative is a proposal of the German government to countries of Central Asia to assist in water resources management and making the water a subject of enhanced transboundary cooperation. The priority task is to initialize a process of political rapprochement in Central Asia that could promote strengthening cooperation in using water as a limited resource and in the long term could lead to the joint management of water and energy resources.

In furtherance of the Berlin Initiative and in order to determine main areas of activities in countries of Central Asia for the period of 2012–2014, on 8 March 2012 in Berlin at invitation of the Minister of Foreign Affairs of the Federal Republic of Germany, a meeting of representatives of Ministries of Foreign Affairs and Water Management bodies of Central Asia (CA) was held.

The most extensive component of the "Berlin Process" is the TWRM CA programme, implemented by GIZ under the authority of the German Foreign Ministry. Within the second phase of this programme, activities carried out during the period from 2012 to 2014 allowed not only to optimize cooperation in the water sector of Central Asian countries, but also to improve living standards of the population in the region. As a part of implementation of the second phase of the GIZ TWRM CA programme, the funding structure of the programme projects was changed. The regional cooperation and implementation of national pilot projects will be continued with the financial support of the German Foreign Ministry. In addition, two projects funded by the European Union are implemented under the European Union Regional Environmental Program for Central Asia (EURECA).

Since beginning of 2015, realization of the third phase of the Programme started through implementation of following projects:

- "Capacity-building for sustainable water resources management at the regional, national and basin levels".

  The project executing agency is the Regional Environmental Center for Central Asia. The project will also support strengthening of cooperation between regional organizations operating in Central Asia, such as EC IFAS, SIC ICWC, SIC ICSD, BWO "Amudarya" and "Syrdarya", etc.

- "Regional dialogue and cooperation on water resources management in Central Asia". The project executing agency is UNECE,

Implementation of the projects is aimed at supporting activities of EC IFAS and of basin water management associations Amudarya and Syrdarya.

Regional Environmental Center for Central Asia (CAREC)

CAREC was established following the resolution of the IV Pan-European Conference, held in 1998 in Aarhus (Denmark). CAREC began its operations in 2001 after ratification by the Republic of Kazakhstan of the Agreement on operating conditions of the Center, as an independent, non-profit and non-political, international organization. CAREC's founders are countries of Central Asia: the Republic of Kazakhstan, the Kyrgyz Republic, Uzbekistan, Tajikistan, Turkmenistan, the United Nations Development Program (UNDP) and the European Commission (EC). The Head office of CAREC is located in Almaty, Kazakhstan. Also five country offices are successfully operating in each capital of Central Asian countries, including a project office in Afghanistan (Kabul).

The main thematic areas of CAREC activities include:

- Climate change and sustainable energy
- Education for sustainable development
- Health and environment
- Environmental Management
- Water initiatives support

Countries of Central Asia are facing serious problems and challenges in the sphere of water resources regulation and management. These problems include inefficient irrigation, drainage and water supply systems, outdated legislative and regulatory documents and agreements at all levels, lack of awareness about the most topical problems in water resources management and methods of their solutions, inadequate engagement and participation of local communities in water resources management, lack of incentives in terms of economic instruments for supporting basin ecosystems. These and many other issues of sustainable water resources management form the basis for the Water Initiative Support Programme (WISP) activities. In particular, the objective of the WIS programme is to increase the water users' capacity on issues of effective water resources management at all levels: from transboundary water apportioning to rational use of water resources at the field level.

Key topics taken as a basis for development of training modules:

- Establishment of a water user cooperative for provision of the access to clean drinking water – TWRM CA and CAREC experience;
- Effective irrigation systems and drainage water management – experience of the TWRM CA in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan;
- Application of water accounting devices on irrigation systems – experience of the TWRM CA and CAREC of Kazakhstan, Kyrgyzstan and Tajikistan; and
- Methodology for assessment of the compliance of hydropower projects with the sustainable development criteria – the TWRM CA experience in the Shardara water storage basin (Kazakhstan).

Some of the above mentioned topics either are very widespread in the region of Central Asian and have to be studied more in-depth, or they are insufficiently studied in the region and the increased attention should be drawn to them.

The main purpose of this module is to convey the positive experience of applying "best practices" in the region to the wide audience.

Target groups for studying these materials can be very diverse – from students who study water resources management to water sector specialists interested in implementation of innovative technologies for water conservation, water accounting and providing access to clean drinking water.

The training module consists **of three main parts:**

1. Preamble with information about the topic, goals and objectives, including brief description of these trainig sessions;

2. Text version of the module, where the information on training topics is given;

3. Presentations where all visual materials are presented.

We hope that this publication will help state authorized bodies, local basin organizations, as well as all interested parties in applying innovative tools for more efficient and rational use of water resources at all levels of water consumption.

Introductory clause

This training has been developed based on the assessment of the Shardara water storage reservoir – a multi-purpose hydropower plant in the Southern Kazakhstan, and of hydroelectric power stations on Syr Darya river. Assessment was carried out with the support of GIZ programme "Transboundary Water Resources Management in Central Asia" in December 2010.

Within the frames of the project "Capacity building in the sphere of sustainable water resources management at the regional, national and basin levels", CAREC in cooperation with the International Hydropower Association Sustainability Ltd (IHAS) has organized and conducted trainings for trainers on the topic "Application of the methodology for assessment of hydropower projects compliance with the sustainable development criteria – TWRM CA experience on the Shardara water storage reservoir".

IHAS is a subsidiary of the company "International Hydropower Association "(IHA). In the period from 2008 to 2010, jointly with a broad group of specialists representing industry enterprises, financial institutions, civil society and state authorities, the IHAS developed the Hydropower Sustainability Assessment Protocol.

Training objectives

- Familiarization of participants with the methodology of assessment of hydropower projects compliance with the sustainable development criteria (Protocol);

- Formulation of participants' clear understanding of sustainable development factors at implementation of hydrotechnical projects at initiation, designing, implementation and operation stages;

- Discussion of possibilities to apply the Protocol in the region of Central Asia.

Target group

The module has been designed for representatives of local, regional, state authorities; NGOs; farmers, small entrepreneurs; large and small companies; basin councils or similar groups established subject to the national legislation; different regional groups and councils.

Expected results

Within the frames of this module, participants will get acquainted not only with theoretical basic principles of the Protocol, but they also will learn how to practically apply the obtained skills. Participants will review main stages of making assessment by the Protocol and will rank each of subject areas of sustainability assessment by points in accordance with performance assessment scales graduated for the compliance to the basic industry level (the average score) and the best industry practices (the highest score). Results of this module:

- raising awareness in Central Asia as regards to the Protocol and sustainability issues, for addressing of which it was aimed;
- training participants are ready for application of the Protocol in Central Asia.

Training duration and programme

Duration of the training is one day.

Registration of participants	10 min
Знакомство	20 min
Development of rules, welcoming results, Discussion of expected results	10 min
Session 1	60 min
Session 2	60 min
Break	20 min
Session 3	60 min
Перерыв	60 min
Session 4	60 min
Session 5	60 min
Break	20 min
Session 6	60 min
Discussion of results	40 min

Getting acquainted

Each participant presents himself: name, place of work or what he/she is currently doing, briefly describes the situation with drinking water in his/her region and what he/she can do to improve this situation.

Participants are suggested to draw a picture or pictures that should answer the following questions:

The current situation with assessment of hydro-technical utilities in the country?

What can be done to improve this situation?

Rules development

- The hand – raising rule
- Time limit – not more than 5 minutes
- Not to be late for sessions
- Criticize the idea, not the person
- Not to take the criticism personally
- Jokes are welcome

Sessions

Session 1

Annex 1

Presentations **"Introduction to the training module"**

"Key elements of the methodology"

Introduction to the Methodology, acquainting participants with basic bullet points, structure, sustainability aspects, tools, criteria, assessment criteria levels, scoring, additional advantages etc.

While preparing the presentation on this material, it is necessary to provide examples from CAREC projects implemented and being realized on a regional, national and local levels, rather than abstract examples.

Session 2

Annex 2

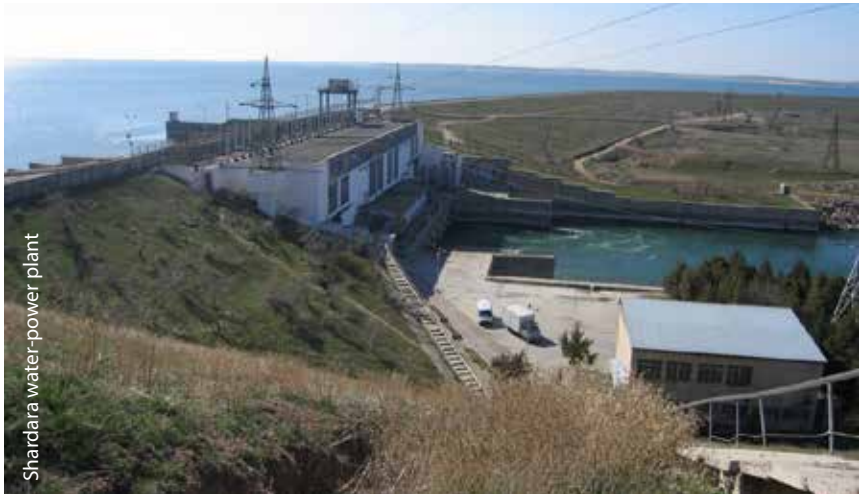
Presentations **"Development and Stakeholders Management"**

"Documents within the frames of the Protocol"

"Major deficiencies"

In this session the history of the Protocol development is described, as well as reference documents, such as the methodology development, role of the methodology and its targeted users, the principles underlying the methodology; What is a hydropower project that meets criteria for the sustainable development? Structure of the methodology, scoring and presentation of results, preparing and carrying out assessment with the use of the Methodology, terms and definitions.

What is the difference between basic and best proven practices, what are the criteria of the assessment level? Need in evaluation schemes. Work with supporting documentations; what does a notion "substantial" mean in the project evaluation.



Shardara water-power plant

Session 3

Annex 3

Presentations **"Case Study"**

"Example: the project 'Kabeli A' "

In this session general assessment estimates are reviewed as well as lower-middle incomes, management of environmental and social issues, issues of carrying out assessment, issues related to the local population, biodiversity and invasive species etc. Here also an example of the situation with low incomes: the project "Cabeli A", Nepal is considered.

Assessment on such chapters as Interaction and Consultation; Management; Planting on the area and designing; Assessment of the impact on the ecological and social environment and management; Integrated project management; Hydrological Resources; Infrastructural safety; Financial feasibility; Benefits from the project implementation; Economic viability; Supply and procurement. Communities and livelihoods affected by the project; Resettlement; Local population; Labor resources and working environment; Cultural heritage; Health of the population. Biodiversity and invasive kinds. Erosion and sediments; Water quality; Management of the water storage reservoir; Modes of outward flows.

Session 4

Annex 4

Presentations **"Advantages of the Protocol application"**

"Protocol and international financing,

"Additional materials and information sources"

"Exercise: the project assessment"

The following subjects are considered in this session: risk prioritization, social acceptance, reduction of the capital cost, increasing capacity, application of the Protocol for ОВСЭС improvement, identification of risks and impacts, involvement of stakeholders, application of the Protocol for enhancement of dams safety, application of the Protocol for delays prevention; non-technical problems – the main reason for delays, how to avoid delays with the help of the Protocol.

Working in pairs. Both participants are accredited experts within the academic (hypothetical) assessment of the Protocol. Based on interviews with the social expert you have to take an assessment (on a scoring system) of the aspect I–9; communities and livelihoods affected by the project.

Session 5

Annex 5

Presentations **"Assessment phases and roles within the frames of the assessment"**

"Resource requirements"

In this session the following issues were considered: initiation, planning, "on-site" assessment, reporting, definition of roles within the frames of the official assessment.

Example: "Troung Song" project, Vietnam. Preparing a schedule for taking assessment, inspection of the project site, preparing a checklist of steps to be taken .

Effectiveness of using human and financial resources; factors that increase costs. Example: "Trevallin" project, Australia. Expenses associated with the work of the assessment team, reduction of costs.

Сессия 6

Annex 6

Presentations **"Interviews and supporting documents"**

"Reporting and activities planning"

Planning and interview management. How to avoid being prejudicial while choosing interviewees. Organization of interviews. Training of interviewees. Self-training of assessors. Conducting interviews in communities. Collection and dissemination of supporting documentation.

Express-test of knowledge of the Protocol based on studied materials. The express-test will consist of 20 open and closed questions.

Shardara water-power plant

Conclusion

Interactive discussion on results of the training. Additional clarifying questions from participants.

Before starting the training, a feedback questionnaire should be developed. The questionnaire should include the following questions:

- Did your expectations match with the information received on the training?
- Would you like to expand any of sessions? If so, then what session and by what information?
- Did you get a new information for yourself?
- Will you apply the obtained knowledge in your daily work?

The questionnaire can be modified according to your organization's requirements and it is intended to improve both the content and also delivery of materials of this training.

Narrative part

The methodology for assessing compliance of hydropower projects with the sustainable development criteria (hereinafter referred to as the "Methodology") was developed in the period of increased interest in hydropower as a result of the growing need in safe energy production with reduced emissions of carbon dioxide, sustainable energy supply and more efficient water resources management.

The methodology as a system for assessing compliance of projects with the sustainable development criteria on the most important factors is applied at all stages of the project life cycle. The result of its application is the profile of the project conformity with three criteria of sustainable development.

The methodology consists of four documents – independent assessment instruments at relevant stages of hydropower projects life cycle

Description of system tools is given in four documents:

- Methodology for assessing compliance of hydropower projects with the sustainable development criteria. "Initiation" stage.
- Methodology for assessing compliance of hydropower projects with the sustainable development criteria. "Designing" stage.
- Methodology for assessing compliance of hydropower projects with the sustainable development criteria. "Implementation" stage.
- Methodology for assessing compliance of hydropower projects with the sustainable development criteria. "Operation" stage.

The assessment methodology at the initiation stage (hereinafter – the strategic assessment) by comparing the input data and the expected results allows to assess risks and build up a dialogue with concerned parties (stakeholders) at the initiation stage of the project (before development of the project documentation). Methodologies for the next stages of projects life cycle – designing, implementation and operation – allow to rank each of subject areas of sustainability assessment by points in accordance with performance assessment scales graduated for compliance with the basic industry level (average score) and the best industry practices (the highest score). Ranking gives an opportunity to stimulate a continuous improvement of the stability profile structure.

Assessments for giving points on each of the subject areas are based on objective indicators; such indicators should be realistic, reproducible and verifiable. The method will be the most effective if integrated into business systems and processes.

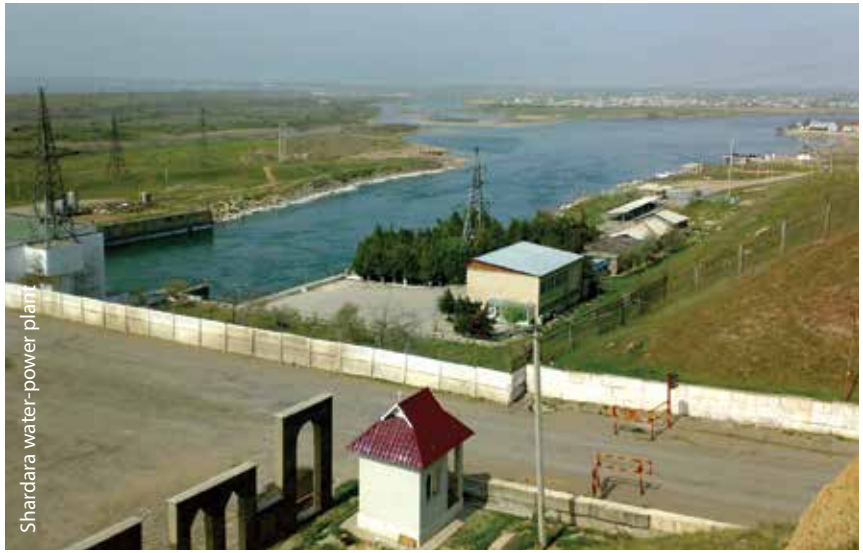
Assessment results can be used as a justification and also for decision making, for prioritization of future activities, and/or for facilitation of the external dialogue with the public. It is advisable to provide a possibility for wide application of this methodology. In order to ensure its wide application it is advisable to provide a maximum accessibility of the information and to take into account different points of view. Assessment of the hydropower project being developed implies involvement of parties with different functions and responsibilities. It is well known that state structures, private and joint companies can participate in the course of development and operation of the project and their role can vary at different stages of the project life cycle.

It is assumed that the organization undertaking the main responsibility for the hydropower project at a specific stage of its life cycle (the Developer), will play a key role in every case of this Methodology application, though, probably, it will not bear the primary responsibility for compliance with sustainable development criteria in all subject areas. Its functions and responsibilities relating to various subject areas of the sustainability assessment should be discussed in the process of assessment and reflected in the final report on assessment results.

МАГ and organizations that support this Methodology request for counter proposals and recommendations from users in order to improve future versions of the Methodology. In order to send counter proposals and recommendations, please apply to the МАГ Central Office.

Principles underlying the Methodology

- Sustainable development – it is development that meets current needs, however not infringing opportunities of future generations to meet their needs.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- The model of sustainable development implies poverty alleviation, respect for human rights, changing irrational models of production and consumption, long-term economic sustainability, protection of natural resources and resource base development, as well as accountable management of environmental conditions.

- For realization of the sustainable development model it is required to analyze synergies between economic, social and environmental values and to find acceptable compromises. This balance should be achieved and guaranteed due to the information openness and responsible approach; using advantages of the knowledge base expansion, opportunities for taking into account multiple points of view and introducing innovations.

- Social responsibility, information openness and accountability – these are basic principles of sustainable development.

- Hydropower, the development and management of which is organized in accordance with principles of sustainable development, can bring benefits at the national, regional and local levels and play an important role in ensuring sustainable development of the society.

Scoring and presentation of results

Assessment tools used at the stages of design, implementation and operation of the project allow to create a complete picture of the project being analyzed in terms of its compliance with the sustainable development criteria. When assessing each of given factors, project characteristics for meeting requirements of this important factor are described. With that it is taken into account that different organizations can bear the primary responsibility for different factors of sustainable development. As there is a probability that types of responsibility vary in various countries and at different stages of the project life cycle, the provisions of the Methodology do not give specific recommendations as regards to organizational types of responsibilities. However, it is expected that the assessment report will include information on responsibility areas of the organization.

Scoring level

In assessment methodologies for each factor of project stages "Designing", "Implementation" and "Operation", points corresponding to five different levels are awarded. Evaluation statements of levels 3 and 5 are the most significant and important landmarks. In relation to these landmarks the evaluation statements are formulated and points are awarded at all other levels.

Level 3 describes the recommended basic standard for any factor of sustainable development. Assessment statements of level 3 were developed based on the opinion that all projects, regardless of their implementation context, should aim to achieve this basic standard, even in regions with a minimum set of resources or opportunities, and even if the scale and complexity of the project are quite insignificant. It should be noted that the Methodology does not specify level 3 as a certain standard that should be necessarily achieved.

Expected results by levels of the project efficiency shall be determined by organizations by themselves. These organizations make decisions or opinions, based on assessments presented by results of the Methodology application.

Level 5 describes the proven best practice for any factor of sustainable development, which has been realized in various countries. Evaluation statements of level 5 were developed based on the opinion that these are challenging goals. However there are evidences of that these goals have been achieved in various countries and not only in frames of the largest projects that have a large amount of

resources at their disposal. It is a very difficult task to get 5 points by all aspects as practical solutions in each case should be taken on the basis of priority corporate/ project objectives, as well as the availability of their own or allocated resources (time, funds, human resources) and the programme of works.

On pages with description of factors, the assessment statements of level 3 are presented fully and from amongst of assessment statements of level 5 only those are presented that correspond to characteristics of the project complementing assessment statements of the level 3. Thus, assessment statements of level 5 should be read only together with statements of level 3.

The rest of assessment statements are represented by standard statements which, as a reference points, use the recommended basic standards and proven good practice:

Level 1 – there are significant shortcomings, basic requirements are not met.

Level 2 – most basic requirements are met, but there is at least one significant shortcoming.

Level 4 – all basic requirements are met, and in some cases basic indicators are even surpassed, but increased requirements, providing compliance with the best industry patterns, are not met at least by one indicator.

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Annex

Presentations **"Introduction to the training module"**

"Key elements of the methodology".

Presentations **"Development and stakeholders management"**

"Documents under the Protocol"

"Major deficiencies"

Presentations **"Case Studies"**

"Example: the project 'Kabeli A' "

Presentations **"Advantages of the Protocol application"**

"Protocol and International Financing"

"Additional materials and information sources"

"Exercise: project assessment"

Presentations **"Assessment stages and roles within the frames of the assessment"**

"Resource requirements"

Presentations **"Interviews and supporting documents"**

"Reporting and planning activities"

Abbreviations

ABIS	Association on the Basin Irrigation System
BWO	Basin Water Organization
CAREC	Regional Environmental Centre for Central Asia
CA	Central Asia water level loggers set
DED	Design and Estimate Documentation
DWD	District Water Department
EC	European Commission
EC IFAS	Executive Committee of the International Fund for saving the Aral Sea
ESR	Economically Substantiated Rate
GIZ	The German Society on the International Cooperation
IHA	International Hydroenergy Association
IWRM	Integrated Water Resources Management
KhIS	Khangovuz Irrigation System
NGO	Non-Government Organization
RWUC	Rural Water Users Cooperatives
SBC	Small Basin Council
SIC ICSD	Scientific and Information Centre of the Interstate Commission on Sustainable Development
SIC ICWC	Scientific and Information Centre of the Interstate Commission on Water Coordination
HSAP	Hydropower Sustainability Assessment Protocol
TWRM CA	Transboundary Water Resources Management in Central Asia
USAID	United States Agency for International Development
UNECE	United Nations Economic Commission for Europe
UNDP	United Nations Development Programme
WIS	Water Initiatives Support Programmes
WLLS	Water Level Loggers Sets
HUI	Housing and Utilities Infrastructure