Quarterly Project Summary*

Please provide a brief summary of project activities carried out between October 1 and December 31, 2015, including specific events, ongoing research, planning, and data-gathering activities. You should include PEER project-related events from before October 1, 2015, only if you did not include them in your previous quarterly report or if this is the first report you have submitted on your project.

Over the reporting period, all organizational aspects were settled and research activity started for the first stage (preparatory period). The tasks were distributed among all key executors (from SIC ICWC, BWO Amudarya and national branches in basin countries) and the work schedule was approved. Preparation to the work meeting of project executors to be held in early February is underway. World class experts from research institutes and students from higher educational institutions got involved in the work.

A part of research activity was completed, particularly concerning the following tasks: Study water management problems in Amudarya basin; Development of research methodology. The scheme was developed for combination of scenarios (climate, water resources, HEPS operation, and agricultural development) that will be studied in the Project. Under the task "Data collection and analysis" we collected and analyzed climatic data, divided the Amudarya basin into zones in terms of water, and partially collected and analyzed information on water and land resources, HEPS operation regimes, water and irrigated land use, agricultural product and electricity prices. Terms of reference were prepared for the second stage: started research on adaptation of the ASBmm model, as well as analysis of scenarios and modeling of water consumption.

As a result of the study of water management problems in the Amudarya river basin, we could analyze operation of water-management systems in the Amudarya basin and develop a logical (function) model for water management. This model, which integrates interstate and national management levels, will be used for studying elements (objects) of water-management systems, building and studying scenarios of water and hydropower development in the riparian countries under conditions of demographic growth, potential climate change and other future challenges. Here, the aspects related to water protection will be taken into account as well.

Methodology of research of water management along transboundary rivers in the Amudarya basin was developed. Under this methodology, PEER research activity and capacity building of researchers in Central Asia will be undertaken on topics and in areas that are of priority for USAID and in partnership and cooperation with the US scientific community. In particular, scientific and innovative approaches to selection of strategic decisions on management, development, food security, environmental improvement, and transboundary conflict prevention will be supported. As a result of PEER project, it is planned to improve capacities of Amudarya riparian countries in the area of water management and create a platform for scientific collaboration as a mechanism of trust building in the region. Cooperation with the USAID mission in Tashkent would ensure effective project impact on development and formation of a new kind of partnership.

The Amudarya basin was divided into zones in terms of water. Consequently, the key research objects were identified. Those included planning zones (PZ), reservoirs, HEPS. Those objects were referenced to boundaries of large water-management districts at the national level and to basins of main tributaries of the Amudarya River. Based on this zoning and the selected research objects, the data is collected and the development of the structure of the project DB was started.

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Project Events

Using the template available here, please provide, if applicable, the requested information for each event held to support the project during the quarter (brief description, dates, number of participants and cost

breakdown) as indicated in the template, including (but not limited to) meetings with local officials or community groups, teaching opportunities with schools or universities, and symposia. Internal meetings only involving project team members should not be included as training events. Please upload your completed event template below.

Major Equipment Purchased

Please list any major equipment purchased during the quarter, such as computers, lab equipment, etc. It is not necessary to list supplies or reagents purchased.

Equipment is to be purchased in the 1st quarter 2016.

Challenges

Please give explanations on any particular difficulties that have arisen during the quarter (visas, funds transfers, problems purchasing equipment, etc.).

Due to earlier closing of banks in Pre-New Year period and in context of Christmas holidays, there was delay in financial transactions. It is expected to settle the situation in the 1st quarter 2016.

Future plans*

Please give a detailed summary of your plans on the project for the coming 3-6 months (including training or outreach events, field work, exchange visits, purchasing of equipment, etc.). Please note: if your project is scheduled to end in the next 3-6 months and you will need a no-cost extension, please include that request in this section and make sure to e-mail your grant manager as well regarding the extension request.

Based on the function (logical) model, which considers all risks and destabilizing factors, it is planned to build analogs of possible conflict situations. It will be taken into account that each state seeks to get water from the limited transboundary source in needed for this state quantity, place, and time in order to meet its demands (ecology, hydropower, irrigation, drinking water, industry). At the same time, it will be assumed that there is a certain common component in the range of states' interest (otherwise, there will be no sense to solve the conflict problem), and this component needs to be found. For example, one can select from the transboundary water resource a certain quantity of water that is used for multiyear year regulation to compensate water and energy shortage. It is assumed that further growth of hydropower development would allow more effective coordination of management to meet demands of irrigation, energy, and nature under conditions of growing flow fluctuations. Afghanistan's demand for water from transboundary rivers will be taken into account as well.

The package of models ASBmm is planned to be used for integrated analysis of alternative development and management. The developed scheme of combination of all main scenarios showing plausible basin development by 2050 will serve as a reference for planned numerical experiments. This scheme include: climate change scenarios that impact on crop water requirements and river flow regimes; hydrological series of river flow in the flow formation zone; variants of HEPS operation regimes; cropping patterns built on the basis of scenarios of national agricultural development, with account of innovations.

One of the project tasks, which is to study scenarios of water consumption in some provinces (planning zones) in riparian countries, is connected directly with the scenarios of irrigated

agriculture development that are a part of national agricultural and socio-economic development scenarios; the project will study (February-April 2016) three scenarios: i) business as usual, ii) food security and import substitution, and ii) agricultural export orientation. Food security, import substitution and agricultural export should be in the focus of agrarian policy in the future.

Climatic factor that impacts on crop water requirements and water resources will be studied as the main global external factor at the beginning of 2016. One of possible climate change scenarios to be studied in the project will be the regional scenario REMO 0406 (University of Wurzburg) – projection for Central Asia of the medium warming scenarios, which is based on the ECHAM 5 general circulation model's A1B.
For modeling river flow by 2015-2050, historical cycle-series will be used and adjusted to account for future climate change. Given approach used in the model package ASBmm and tested with actual data is based on the concept of cyclic fluctuations of nature processes that are considered not as a simple repetition of observed phenomena but as the progressive development which is influenced by climate change; the series will be corrected by coefficients calculated from the NIGMI (Research Institute of the Center of Hydrometeorological Service at the Uzbek Cabinet of Ministers) model.

Additional information

Please include additional information that you would like to share with us, for example if you have published any journal articles or made conference presentations on your project results. Please list reference citations, but**please do not include detailed research analysis or raw data.**

One of characteristics of the Amudarya River basin is the limited nature of water resources and, consequently, limited production of food and vulnerability of aquatic ecosystems. This manifests in uneven distribution of water scarcity over the area and time and in unequal consequences for states, water-management districts, and users (consumers). The natural water scarcity is aggravated by artificial shortage caused mainly by operation of large reservoirs with hydropower. Moreover, aquatic ecosystems need stable annual supply.
The function model of the Amudarya basin is built with account of given characteristics and a number of principles that will be recommended as general reference points for water development in the riparian countries until 2050. For instance, all riparian countries seeking consensus in water management should agree with the following point: no development in the riparian countries is possible without innovations and measures aimed at reduction of unit (per capita) water demand, with ensured observance of water limits set for the countries from transboundary rivers and the environmental flows. The second important point: one should acknowledge that contradictions between hydropower and irrigation demands for river flow exist and will remain in the future. These contradictions can be solved through efficient operation of large reservoirs and cascades of HEPS according to the rules (restrictions) and in line of principles (multiyear flow regulation, meeting of environmental demand, etc.) as agreed by the states. The third point: the sovereign rights of each state should be recognized; however, it is also important to respect rights of other countries and follow the key principles of the international water law, such as equitable and reasonable water and no harm.
Research methodology assumes application of new approaches based on advanced US experience, particularly in part of adaptation of existing model and tools for water management to conditions and characteristics of the Amudarya basin. For adaptation of ASBmm (www.asbmm.uz), the system approach will be used. According to such approach, the components (planning zones, rivers, lakes, reservoirs, HEPS) are considered as large complex systems – models of management and, simultaneously, as the elements of a general system – model of management at country and basin level. The following methods of complex system modeling are planned for the use: methods of ICAM (Integrated Computer-Aided Manufacture)

developed in US for the industry computerization program, including Function Modeling – re-thinking and development of radically new function processes, Information Modeling – building of an information model on a new logical level - a software, which implements new function processes and logics in ASBmm.

The management theory provides methods for solution of the two main types of problems. The first one implies methods for solution of management system performance analysis problems. These methods will be used in the Project for analysis of the period of time 2010 - 2015. The second type of problems is the synthesis problems that set reference points and requirements and one should find how management (of water, land resources) should be performed and existing potentials (hydropower, etc.) should be developed – to be studied in the Project for 2015 – 2050. The main method, which will be applied in project research, is the simulation modeling, with organization of numerical experiment. Particular attention during simulation will be paid to solution of conflict situations occurring under various processes connected with the common resources in time, space, and in quantitative terms. Simulation of the basin will include a number of processes related to functioning of objects and processes taking place simultaneously or in parallel, with a certain time step.

The Project will give possibility to define more exactly and deepen information on the mechanisms of formation of water balance for rivers, water-management districts and planning zones. The scientific community will get a unique experience in implementation of the adaptation approach, which is new for the region and which suggests maximum approximation of real conditions during modeling and fills data gaps.