

Project name*

Transboundary water management adaptation in the Amudarya basin to climate change uncertainties

Family/Last Name of PEER applicant*

Dukhovniy

Institution*

Scientific-Information Center of the Interstate Commission for Water Coordination of Central Asia

Reporting Period Start Date*

10/1/2016

Reporting Period End Date*

11/12/2017

Section 1: Financial Report**Financial Report***

The annual financial report should be prepared by your financial person and uploaded below:

Receipts

Please upload below your receipts (if required) in a single document

Section 2: Technical Summary**Summary of Activities During Reporting Period***

Please describe what has been accomplished on your PEER project during the reporting period, outlining the activities that were undertaken and specifically discussing achievements in relation to the milestones or targets set in the original PEER work plan. (If this will be your final report on your project, please also include an overall summary of your results and impacts.)

During the reporting period, the major part of activities under two final stages was completed:

- Stage 3 – completed numerical experiments by the models and the results got on comprehensive assessment of future basin development (2020-2055), including: assessment of climate impact on water consumption, water resources and water availability for irrigated land and aquatic ecosystems, based on a combination of scenarios of agricultural development, alternative hydroscheme operation regime, and growing water intake by Afghanistan; recommendations for adaptation to climate change on management of transboundary water resources, usage of positive climate effects on crop water requirements. Preparation of recommendations on legal and institutional aspects is under way.
- Stage 4 – completed work on dissemination of PEER project results: developed and filled project DB, which includes the data for the base period (2010-2015) and the indicators for 2020-2055 – output of scenario-based modeling of basin development (access to DB via Interface); the project results uploaded on the project web-site in form of reports, publications, and presentations; materials prepared and organization is underway for the final workshop, where stakeholders, students, and representatives of international organizations were invited. The final report is also to be finalised.

The PEER project objectives and results were coordinated with the aims of USAID activity regarding a regional development cooperation strategy:

- the project made contribution to addressing of controversial issues related to water and energy resources: through the analysis of alternative operation of the Vakhsh HPS cascade, the ways for consensus-building, for generation of regional and national benefits throughout the basin, and perspectives for advancement were demonstrated,
- the project showed a number of options of irrigated agriculture development: various cropping patterns; scope and rates of adoption of innovation technologies to improve productivity and save irrigation water for each state and the basin as a whole,
- the project rendered support to the regional institution BWO Amu Darya and its territorial branches by assisting in approaches to improvement of transboundary river water management and water demand management under conditions of climate change and other factors (Afghanistan, Golden Age lake, HPS operation regimes),

- the project contributed to enhancement of regional water cooperation by improving data quality, developing analytical tools, and generating knowledge.

The series of calculations made by computer models for various combinations of scenarios and limitations in the Amu Darya River Basin and the conducted analysis of modeling results allowed getting the comprehensive assessment of climate impact on basin's water resource and their yearly, seasonal, and monthly variability for 2020-2055 and identifying time and degree of water scarcity, its geographical distribution and possibilities to compensate such scarcity through better flow regulation and water demand management. One of important project outputs is the channel balances of Amu Darya River and its tributaries that show dynamical distribution of water resources, losses and scarcity in the basin and by country, province (planning zone) and river reach.

Thanks to the project efforts, the scientific community has got a unique experience in developing an adaptation approach, where modeling is performed with the maximum approximation to real conditions and fills the data gaps.

The project showed that, given the periodical droughts in the future, effective water demand management, involving water saving and innovations should be among major means for survival. The main targets of agrarian policies in the riparian countries should be food security (FSD scenario) and export orientation (ESA scenario). Seasonal energy deficit in Tajikistan is proposed to be eliminated through a set of measures that will reduce electricity demand, improve performance of hydropower stations, export electricity in summer and import it in winter; it is recommended to transfer to energy-irrigation regime of operation that ensures maximum generation throughout a year. Regional development should imply integration of national economies – transboundary trade and markets ensuring export-import of seasonal electricity flows and agricultural product sales.

The project showed advantages of the regional consensus-based approach to development in the region that would decrease deficit and losses of electricity and irrigation water. As part of the project, decision-makers were provided with a number of policy briefs on key issues that provided the analysis of basin development and allowed assessment of opportunities, selection of priorities and helped to gain more political flexibility.

The riparian countries of the Amu Darya Basin should maintain interstate cooperation and, based on this, organize more effective joint work for coordination of their actions in basin water management. National water and energy strategy documents should lay down responsibilities of the countries for soonest development of comprehensive joint decisions in the fields, where the interests of national economic sectors intersect.

As was discussed during the PEER project workshop in the city of Urgench, it is necessary to start promoting IWRM at the basin level. To this end, first priority should be given to establishment of a Basin Council among the representatives of local governments, HEPS operators, environmentalists and direct partners of BWO Amu Darya territorial units, i.e. provincial and local water managers in order to ensure public participation and involvement in water planning and monitoring and decision making in the context of growing water scarcity.

The analysis of the project's results shows that if the recommendations are implemented, the Amu Darya Basin can adapt (under “soft” climatic scenarios) that would secure more or less sustainable country development on a number of indicators.

Section 3: Stakeholder Events

Details of events during reporting period*

Please complete and upload the below spreadsheet detailing the events organized by the project. Events include workshops, conferences, short courses, and stakeholder outreach events. Technical presentations given at events organized by others should not be included in this section. If there are no events to report for this quarter, please note it in the spreadsheet.

October 13-23, 2016. A trip of R.Khafazov, SIC ICWC programmer, to the Johns Hopkins University, Department of Earth and Planetary Sciences (Baltimore, USA). The results of the first year of the project, methodological approach to modeling by SIC ICWC (IDEF family of methods), planning zone models (function part, interface and database) were presented to the US partners of the project. The use of planning zone model via interface (located at <http://asbmm/uz:2016/>) was presented. The University staff made some

suggestions related to the modeling, use of remote sensing methods to acquire input data for the planning zone model, climatic models to analyze crop water requirements, and NASA Land Data Assimilation System to acquire the missing climatic and hydrological data.

October 26, 2016. Workshop on the “Transboundary water management adaptation in the Amudarya basin to climate change uncertainties” project. The participants were represented by SIC ICWC staff, BWO Amudarya and invitees. At the workshop, the outcomes were summarized for stage I – Planning and designing and stage II – Research. Tasks were set for stages III and IV. The agenda incorporated the following issues: outcomes of the first year of the project (A.Sorokin), information provision of the project – data sources, database, GIS, project web-site (D.Sorokin, R.Toshpulatov, etc.), specifics of the Amudarya River management in the national territorial administrations (BWO Amudarya Director M.Makhramov, A.Nazariy), constructing hydrological runoff series (A.Sorokin), scenarios for agriculture development in the Amudarya basin (Sh.Muminov), climate change effects on plant development stages (G.Stulina), modeling crop water requirements (G.Solodkiy), legal and institutional framework (D.Ziganshina, V.Dukhovniy), coordinating actions between executors, and harmonizing approaches to construction of scenarios and modeling.

December 29, 2016. Workshop on the “Algebraic modeling language GAMS as a simulation tool for the tasks of PEER”. The participants were represented by SIC ICWC staff and invitees. They discussed the ways to organize project activities in 2017, including optimization of scenarios. GAMS was approved as the main tool for optimization solutions.

May 4-5, 2017. The training workshop “Approaches to efficient water resource management by BWO Amudarya and its territorial branches in the context of climate change”. The training workshop was held at the Training Center of BWO Amudarya in Urgench to: - present results of the first project year to project partners and beneficiaries and discuss the tasks related to preparation of recommendations for adaptation and the dissemination; - instruct the staff of BWO and its territorial branch, partners, lecturers, graduate and postgraduate students in approaches to efficient water resource management in the context of climate change; - provide practical training on the DB and models developed or improved by the Project. The Participants of training workshop included the staff of central office and territorial branches of BWO Amudarya from Tajikistan, Turkmenistan and Uzbekistan (Upper Amudarya, Middle Amudarya and Lower Amudarya branches, Upradik, and Dashoguz Directorate); lecturers and students of Khorezm State University, Khorezm Rural Advisory Support Service (KRASS), Director of the Analytical Agency “Ynanch-Vepa”, and SIC ICWC research team.

Project Event Template Upload*

EVENTS ORGANIZED BY SIC ICWC

Event Title	Brief Description of Event	Event Organizer (s)	Event Date(s)	Description of Participants	Number of Female Participants	Number of Male Participants	Costs of event in US dollars (PEER/USAID funding used)			Cost of event in US dollars (non-PEER/non-USAID funding sources)		
							Instruction costs (registration fees, workshop fees, supplies, instructor transportation costs, etc)	Travel costs (International and (or) local travel)	Participant costs (e.g. allowance or per diem, lodging, meals etc.)	Instruction costs (registration fees, workshop fees, supplies, instructor transportation costs, etc)	Travel costs (International and (or) local travel)	Participant costs (e.g. allowance or per diem, lodging, meals etc.)
Workshop on the "Transboundary water management adaptation in the Amudarya basin to climate change uncertainties" project.	At the workshop, the outcomes were summarized for stage I -Planning and design stage II - Research Tasks were set for stages III and IV	SIC ICWC	October 26, 2016	Participants-SIC ICWC staff, BWO Amudarya and invitees	4	16	643	232	845			
Workshop on the "Algebraic modeling language GAMS is a simulation tool for the tasks of PEER"	The participants were represented by SIC ICWC staff and invitees. They discussed relative issues and made decisions on activities for the second year of the project, including optimization of scenarios. GAMS was approved as the main tool for optimization	SIC ICWC	December 29, 2016	Participants-SIC ICWC staff and invitees	3	11	0	0	0			
The training workshop "Approaches to efficient water resource management by BWO Amudarya and its territorial branches in the context of climate change"	The training workshop was held at the Training Center of BWO Amudarya in Urgench to: - present results of the first project year to project partners and beneficiaries and discuss the tasks related to preparation of recommendations for adaptation and dis	SIC ICWC	May 4-5, 2017	Staff of central office and territorial branches of BWO Amudarya in Tajikistan, Turkmenistan and Uzbekistan (Upper Amudarya, Middle Amudarya and Lower Amudarya branches, Upradik, and Dashoguz Directorate); lecturers and students of Khorezm State Universit	13	27	272	2095	4067			

During the reporting period, how many events did you organize in total?*

3

During the reporting period, how many females participated in the events you organized?*

20

During the reporting period, how many males participated in the events you organized?*

54

Section 4: Research Team

Please provide the following demographic information on the number of students involved on the project research team.

Female Undergraduate Students (BA, BSc)*

0

Male Undergraduate Students (BA, BSc)*

0

Female Master's Students (MA, MSc)*

0

Male Master's Students (MA, MSc)*

1

Female Doctoral Students (PhD)*

0

Male Doctoral Students (PhD)*

0

Female Postdoctoral Scholars*

0

Male Postdoctoral Scholars*

0

Female Research Assistants/Project Employees.*

Please do not include researchers listed above.

7

Male Research Assistants/Project Employees*

Please do not include researchers listed above.

14

Additional Research Team Information* .

Date student began participation on research team	Date student's participation on research team ended	Institution where student conducted research	Institution location	Trainee/Student Type	Additional Notes {Optional}
September 1, 2015	June 30, 2018	National Research University Higher School of Economics	B.20, Myasnitskaya str., Moscow, 101000, Russian Federation	Master Student	Research area "Applied mathematics and informatics" as part of the Data science program. Kadirov Timur in the project was responsible for development of the economic mathematical model and optimization calculations of cropping patterns for individual pro

Section 5: Educational Impacts

Discuss new courses or degree programs created (if any) or changes to existing course curricula.*

Please only include developments that occurred during the reporting period.

N/A

During the reporting period how many new or updated courses or degree programs did you develop?*

0

Number of female students participating in new or updated courses.*

0

Number of male students participating in new or updated courses.*

0

Section 6: Research Outputs

Please provide the number of international patent applications submitted in the past year.*

0

Please provide the number of national patent applications submitted in the past year.*

0

Please list the patent details.*

N/A

Peer-reviewed Publications and Proceedings*

*Please list the research products you authored or co-authored about your PEER science project. The list should be **limited to peer-reviewed products that were published or accepted for publication during the reporting period**. Provide full reference citations for all journal articles, technical reports, books or book chapters (written or edited). Please include the list of authors, full title of item and publication in which it appeared, volume number, page numbers, and date.*

N/A

For each type of published technical document, please list the number of each type and the full references in the boxes provided below:

Peer-reviewed Journal Articles*

0

Of this total, number of journal articles published with U.S. PEER Partner.*

0

Journal References

N/A

Link to Journal Reference #1

Link to Journal Reference #2

Link to Journal Reference #3

Peer-reviewed Proceedings*

This is defined as manuscripts that went through a panel review process and were published as part of a technical conference.

1

Of this total, number of proceedings published with U.S. PEER Partner.*

0

Proceedings References

Amudarya - the great river on the threshold of signature decisions (Prof. Dukhovniy V.A., Dr. Ziganshina D.R., Sorokin A.G.). Proceedings of the International Water and Climate Summit, 23-25 October 2017 Rome, Italy

Link to Proceedings #1

to be published by the end of the year

Link to Proceedings #2

Peer-reviewed Books/Book Chapters*

0

Of this total, number of books published with U.S. PEER Partner.*

0

Book References

N/A

Other peer-reviewed publications*

2

Other Publication References

1. Collection of selected agreements on water resources management in the Amu Darya River Basin. SIC ICWC, Tashkent 2017, 111 pp.
2. A.G.Sorokin, D.A.Sorokin, I.Ergashev "Approaches to formulation of effective river basin water management strategy in Central Asia" , Stulina G.V., Solodkiy G.F. "Estimation of crop water requirements in irrigated land of the Khorezm oasis in the context of climate change" in the Collection of scientific papers of the Eastern Europe, Caucasus, and Central Asia Network of Water-Management Organizations, Issue 10 "Challenges of river basin management in the context of climate change", Tashkent, SIC ICWC, 2017.-208 pp.

Other Research Outputs

Please describe other research outputs (not peer-reviewed)

This could include white papers, blogs, web platforms, or other tools they are using to disseminate your research.

The PEER project website was designed for project popularization and enhanced visibility. It contains several sections, such as “Home”, “About”, “Database” (water resources, infrastructure), and “Knowledge base” (maps, monographs, papers, reports, references) in Russian and English.

The project website is hosted by the CAWater-Info Portal on: www.cawater-info.net/projects/peer-amudarya.

Technical Research Presentations*

Please list research presentations made at conferences or technical meetings on projects or work funded under your PEER project. After your description, please enter the total number of presentations below. Please include all technical presentations given during the reporting period including those already reported in quarterly reports; provide the title and date for each.

1. 14th International Conference "Europe-INBO 2016", 19 - 22 October 2016, Lourdes, France: Dr. Ziganshina's presentation "Adapting to climate change in the Amudarya basin: dealing with droughts" at Roundtable 3: Adaptation to Climate Change: resources management, scarcity and drought. Please, refer to the project web-site for this presentation: www.cawater-info.net/projects/peer-amudarya/
2. Roundtable «Promoting the effectiveness of international water law in support of security and peace» organized by Geneva Water Hub in the World Meteorological Organization on 26 October 2016 in Geneva,

Switzerland: Dr. Ziganshina's presentation "Looking back at 25 years of transboundary water cooperation in Central Asia: the role of international law".

3. International scientific-practical conference "Challenges and prospects of effective water management against a backdrop of globalization", 11-12 April 2017, Tashkent Institute of Irrigation and Mechanization: Sorokin A., Sorokin D. and Ergashev I. presentation "Approaches to formulation of effective water management strategy in Central Asia".

4. On 18-19 May 2017, the International Conference "Challenges of River Basin Management in the context of Climate Change" was held in premises of the Russian Research Institute of Hydraulic Engineering and Land Reclamation (VNIIGiM) in Moscow. Dukhovniy V.A. (SIC ICWC), Stulina G.V. (SIC ICWC), and Tilyavova G.K. (BWO Amudarya) mentioned the project results in their presentations

5. UNECE Global workshop on water allocation in transboundary basins", 16-17 October 2017, Geneva: Dr. Ziganshina's presentation "Historic water allocation in the Amudarya basin: achievements and challenges". This presentation was included as a lecture into the Distance Learning Course on International Water Law and the Law of Transboundary Aquifers (<https://www.unige.ch/formcont/waterlaw/ipel/>)

6. International Summit "Water and Climate - Meeting of the Great Rivers of the World", 23-25 October 2017, Rome, Italy: Prof. Dukhovniy's presentation "Amudarya - the great river on the threshold of signature decisions" (Prof. Dukhovniy V.A., Dr. Ziganshina D.R., Sorokin A.G.), where he mentioned the PEER Project and its results.

7. International Conference "From Regional Cooperation to Global Peace and Security on the Issues of Ensuring Security and Stability in Central Asia (Samarkand, 10-11 November, 2017), Dr. Ziganshina's presentation included the findings of the PEER project.

Number of technical presentations made*

7

Section 7: Professional Development

Please list new research grants you received in the past year. These are grants where you are the PI or CO-PI. If another member of your research team received a grant to continue the research conducted under the PEER grant, please include that as well.

Research Grant Details

Please list grants received in the past year, including the source and amount.

SIC ICWC:

- continued the project "Support to the Network of Russian-speaking water management organizations and organization of an information water conference" with the support of UNECE, 1.12.2016-31.08.2017, \$ US 21,993;

- since 2015, has been implementing the project "Assessing land value changes and developing a discussion-support-tool for improved land use planning in the irrigated lowlands of Central Asia" (LaVaCCA). 45,350 Euro were used in 2016 for project purposes;

- since 2015, has been implementing the project "CAWA 3 – The Water Use Efficiency Monitor for Central Asia (WUEMoCA)" together with the University of Wurzburg under support of the German Federal Foreign Office; 44,319 Euro were used in 2016 for project purposes;

- "Capacity and needs assessment of institutions responsible for training provision" as part of EU Programme "Sustainable Water Resources Management in rural areas in Uzbekistan", Technical Capacity Building component, 30 June – 30 November 2017, \$ US 55,000;

- since 2017, has been implementing a sub-contract under the EU Project "Promotion dialogue for conflict prevention related to environment, water nexus issues in Central Asia: Central Asia Water-Nexus Cooperation (CAWECOOP)", Euro 65,390.

Please provide the number of new research grants you received in the past year.

Number of new international grants/research funding*

4

Number of new local research grants/research funding*

0

Total Amount Awarded (USD).*

197135

Was your PEER grant helpful in securing this additional funding?* Yes No**If so, please describe how the PEER project contributed.**

N/A

Personal Development*

Please list the awards or other form of public recognition received, professional associations joined, and leadership positions during this reporting period.

Prof. V.Dukhovniy, Director of SIC ICWC was awarded the Breastplate of Honor by the Executive Directorate of IFAS in Kazakhstan for the long-standing contribution to development of interstate water relations during the International Scientific-Practical Conference "Transboundary cooperation in Central Asia - security, stability and wellbeing for the whole region", which was held in Almaty (Kazakhstan) in September 7, 2017

Number of awards/public recognition received.*

1

Number of professional societies joined.*

0

Section 8: Outreach and Potential Development Impacts**Outreach and Collaborations***

Please describe any collaborations, connections, or activities developed with USAID, government agencies, community groups and nongovernmental organizations, or private companies interested in implementing the results of your project.

The project team actively promotes the research results in communication with governmental officials, academicians and development practitioners. There is continuous effort to make available the project results and approaches to the wider audience. For example, information about our PEER project was shared at 11th meeting of the Working Group on Integrated Water Resources Management under the UNECE Water Convention, 18-19 October 2016, Geneva, Switzerland, when Dr Ziganshina made an intervention on item 9 of the agenda Adapting to climate change in transboundary basins to comment draft strategy for future work on climate change adaptation in transboundary basins under the Convention.

A meeting was held in the office of SIC ICWC on the 23rd of February 2017 among the leadership of SIC ICWC and PEER project experts and Dr. Ingrid Verstraeten of the U.S. Geological Survey, Claire Thomas, Second Secretary from the US Embassy in Uzbekistan, Ekaterina Biryukova, Environment, Science, Technology and Health Assistant of the US Embassy in Uzbekistan. The participants of the meeting discussed the possibilities for scientific and technological cooperation in the areas of land reclamation and fishery restoration, drinking water availability in the Amudarya Delta, groundwater issues, geology and minerals, mitigation and adaptation strategies for climate change, development of a gender water network in Central Asia.

A roundtable was held at the U.S. Embassy in Uzbekistan to review implementation of the PEER Program.

- On the 3rd of April 2017, the U.S. Ambassador Pamela Spratlen in her opening remarks has underlined the importance of adaptation in the Aral Sea basin countries to climate change on the basis of cooperation. She has expressed a hope that the current conditions offer wider opportunities for better interactions between the riparian countries. In this context, research activities of local scientists in cooperation with the U.S. peers will

be beneficial. The PEER program grantee-institutions based in the Republic of Uzbekistan (IWMI, SIC ICWC, CAREC, UNCAWR/ICBA) presented the results of work under their projects.

- a meeting held at SIC premises on the 7th of April 2017 between the project executives and Dalal Najib, Senior Program Officer National Academy of Sciences International Affairs and Jason R. Porter, Research Advisor, USAID. Work progress, logistical and financial matters were discussed during the meeting.

- On 9 June 2017, the Presidential Science Envoy and Director of the Tufts Institute of Environment Dr. Linda Abriola made a presentation on “Groundwater Contamination: Progress and Perspectives on Restoration and Risk Reduction”. Then the brief information on the projects implemented under PEER Program was presented by the representatives of IWMI, SIC ICWC, CAREC, and UNCAWR / ICBA. Claire Thomas, Ekaterina Biryukova and Haley Smith from the Embassy also took part in the meeting.

On 8 November 2017, a meeting was held at SIC ICWC with K.Dubrovsky, Chief of Regional ESTH Office in Central Asia, G.Zhumabayeva, Scientific affairs specialist of the Regional ESTH Office in Central Asia, Jonah Schein from Water infrastructure division, US Environmental Protection Agency, and representatives of the US Embassy in Tashkent Mrs. Claire Thomas and Mrs. Ekaterina Biryukova. During the meeting Prof. V.Dukhovniy, Director of SIC ICWC presented the mission, tasks and activity of the Scientific Information Center of ICWC and A.G.Sorokin, Head of division of SIC ICWC presented progress on the PEER Project “Transboundary water management adaptation in the Amudarya basin to climate change uncertainties”, its results and the developed recommendations. During discussion, the parties addressed the matters related to dissemination of the project results and the drafted recommendations.

Please indicate the number of meetings with the following organizations that took place with regard to applications of your research during the reporting period:

Private Companies*

0

Please provide the names of the companies you met with.

N/A

Community Groups or Non-Governmental Organizations*

0

Please provide the names of the organizations you met with.

N/A

Government Agencies*

7

Please provide the names of the government agencies you met with.

U.S. Embassy in Uzbekistan; U.S.Embassy Astana, Regional ESTH Office in Central Asia; US Environmental Protection Agency; U.S. Geological Survey; US National Academy of Sciences; USAID; Tufts Institute of Environment

Local USAID Mission*

1

Potential Development Impacts (Evidence to Action)*

Please describe your progress toward achieving development impacts from your PEER project.

During the reporting period, was your data or research used to inform a policy or program?*

Progress was achieved on all objectives and tasks set by the PEER Project:

- in development of information-analytical tools, including the planning zone model (in the web-based set of models ASBmm), DB and project web-site,
- in numerical experiments – modeling and analysis of basin development scenarios (hydropower, irrigated agriculture, aquatic ecosystems), comprehensive assessment of prospective country development in the context of climate change and growing water scarcity,

- in development of recommendations on adaptation to climate change and on transboundary river water management,

- in dissemination of project results that contributes to building dialogue on transboundary cooperation.

The web-based set of models ASBmm (<http://asbmm.uz>) was enhanced through incorporation into it of a mathematical model for water management in planning zone (PZM) developed within the PEER Project. The planning zone model (<http://cawater-info.net/pzm/basic/web>) was created in line with IDEF family of methods for design of the functions and information models. Planning zones (PZs) are the main units of water planning in the Amu Darya Basin that (partially or fully) coincide with national provinces. The planning zones are characterized by their: crops produced on respective irrigated areas; water resources; trends of water use by sectors (drinking water supply, industry, etc.); innovation trends; population growth; agricultural product prices; etc. The main parameters of PZM are: required water supply to PZ (under which no water scarcity is experienced); water withdrawal from transboundary and local sources; water scarcity; potential irrigated agriculture production; irrigated agriculture product losses under conditions of water scarcity; productivity of irrigated agricultural land and irrigation water; production (in monetary terms) per capita. Climate impact was taken into account when calculating crop water requirements (evapotranspiration, rainfall) and river runoff. Input and output data of the planning zone model is available in the project database (<http://cawater-info.net/peer>). This information can be used by a wide circle of interested parties, starting from students to experts dealing with perspective planning and development scenarios for individual zones, countries, and basin as a whole. Optimization of performance of a Planning zone allows improving productivity to 0.8\$ per cubic meter of water against the current one of 0.3-0.4\$/m³ in this zone, depending on the selected scenario; the comparison, using the model, of indicators of different planning zones will help decision makers to direct investments to more effective water use.

Based on the project research results, recommendations were prepared for regional and national organizations dealing with Amu Darya water management in practice. For assessment of future crop water requirements in the basin, the possibility to use the thermal effects of climate change as the positive impact on more rapid crop development is shown. When developing a future development strategy, consideration of temperature changes in combination with agronomic and soil parameters will allow for more double-season crops and, at the same time, will avoid growth of water requirements. This work should have a follow-up in order to get updated technology for various crops.

The PEER Project results described in reports and policy briefs show potential options for harmonization of national priorities of water management at basin level in the context of climate change.

For example, a new product was developed as a result of your PEER research, a policy document was developed based on your research, your research informed a private sector strategy document or NGO program, or the local USAID mission incorporated activities related to your research into their programming.

Yes

No

Please describe in what way your data or research was used to inform a policy or program.

Example 1: Based on the results of your research, you identified methods for conserving tuna fisheries in your region. An NGO in your region has written a conservation strategy that reflects the findings from your research. In January 2016, the NGO hired a new staff member to oversee the implementation of the fishery conservation recommendations.

Example 2:(Technology)Through your research you have been able to identify the optimal substrates to digest and clean wastewater and create energy, leading to the creation of a very robust bioreactor. Seeing the preliminary results of the bioreactor, the national government, with support from a consortium of palm oil companies, funded you to design a similar reactor for use in the palm oil industry.

Example 3: A new treatment for a disease being implemented with 1,304 girls and 1,255 boys receiving the treatment; 205 community health workers trained to provide treatment.

The project results on adaptation to climate change and transboundary river water management in the Amu Darya basin were demonstrated to stakeholders so that the latter could mitigate (and even benefit from) climate change.

A few policy briefs were prepared for decision makers:

- Towards strategic planning of development in the Amu Darya River Basin – gives the analysis of schemes and methods for grounding of future water development vision in the region and studies prospects for promotion of international experience in the region, particularly of IWRM and strategic planning and management of resources (SPM),
- Assessment of development in the Amu Darya River Basin for 2020-2055 – describes the main project results from numerical experiments; particularly, gives a comprehensive assessment of climate impact on water resources and their use in the basin, shows the effects of various combinations of scenarios (climate, HEPS operation regimes, growing water use by Afghanistan), gives the data on resource scarcity and abundance (water, energy), water and land productivity for 2020-2055, and provides recommendations on adaptation to climate change (for REMO 0406 climate scenario) and water management based on consensus among the countries,
- The adaptation potential of the current water allocation system in the Amudarya River Basin – describes structure and principles of water allocation in the basins and mechanisms of quick response to current changes and provides examples of ICWC actions, as well as recommendations for the enhancement of adaptability of the water allocation system,
- Towards better water management in the Amu Darya River Basin – gives the data on consequences of climate change for water resources and recommendations of regional institutions (BWO Amu Darya, SIC ICWC) for tackling the problem of water accounting, reservoir regulation and regarding the rules of transboundary river water management, setting norms for water losses, and development of a long-term water strategy,
- Planning zone model – gives brief description of the planning zone model (<http://cawater-info.net/pzm/basic/web>), which is included in the set of models ASBmm (<http://asbmm.uz>). The planning zone model was developed in line with the US-developed IDEF family of methods for modeling complex systems. The model can be used by experts dealing with perspective planning and development of irrigated agriculture in individual country zones in the basin,
- Database – brief description of DB and the interface that ensures access to a part of project data; the user may see, via scenarios and options, the future development in the Amu Darya Basin (for 2020-2055) against the situation in 2010-2015 (<http://cawater-info.net/projects/peer-amudarya/knowledgebase.htm>).

The project implementation contributed to capacities of the riparian countries in the Amu Darya Basin for effective water resources management and establishment of a platform for scientific collaboration as a means of trust-building in the region.

*Please indicate at what level the program or policy change is being made.**

- Village or community level
- Local or municipal level
- Regional level
- National level
- Not Applicable

Supplemental Grant Summary

If you received a supplement, please provide a summary on the progress towards achieving the proposed activities.

N/A

Section 9: Additional Information

Problems Encountered

Please provide information on any problems you may have encountered in making progress on your project objectives and describe steps you are taking to resolve the problems.

One of the problems encountered was the gap in input data on hydrology, hydrogeology, soil, water industry, and economy of Turkmenistan over the last 5-10 years and the absence of information on agrarian development plans in Turkmenistan for a period after 2020. There were no measurements on the Pyanj River and no official information on hydropower development in Tajikistan after 2020. Difficulties were encountered when determining agrarian development trends in Tajikistan.

The data gaps were filled partially with the open source data (country periodicals, international publications) and partially with expert data. Special efforts were undertaken to reconstruct missing data on flow in the rivers of Tajikistan, Turkmenistan, and Afghanistan; hydrological runoff series for small Amu Darya basin were reconstructed since 2000 till present time (the hydrological data until 2000 were taken from SIC's DB). This allowed modeling the series for the period 2020-2050. Some data and functions that raised doubts were checked for accuracy and refined through the planning zone model.

Plans for Activities during the Coming Year*

Please provide details on project activities during the next year, including planned exchange visits, training events, and ongoing research efforts.

Project activities during the coming months will focus on the finalization of the final report, recommendations and dissemination of the project findings. In particular, it is planned to:

- hold the final conference/workshop to bring together all project participants, partners and stakeholders and disseminate the project results (In the framework of the Central Asian International Scientific-Practical Conference "The 25 years of Water Cooperation in Central Asia: Lessons Learnt and Future Outlook" that will be organized in Tashkent, Uzbekistan from 23 to 24 November 2017);
- complete the final report and recommendations on legal and institutional improvement;
- present the project results at the 8th World Water Forum to be held in Brazil on March 2018. We've already formally expressed our interest to speak at water and climate related sessions;
- prepare journal articles and other publications.

Additional Comments

Please note any other comments you have regarding your PEERproject or the PEER program itself.

The project showed that the existing agreements cover not all the aspects of shared water management in the Amu Darya Basin. For instance, inflow to the Aral Sea is not guaranteed. It is necessary to lay the basis for negotiation of a future agreement on water allocation with Afghanistan, on setting of norms for losses in open channels, regulation of drainage flow, and maintenance of lake ecosystems in the basin.

A certain conflict between hydropower and irrigation demands for basin's river regimes exists and will remain in the future. This could be solved through sound management of large reservoir hydroschemes in line with mutually agreed principles and operation rules, while aiming at resource saving and consensus.

For putting the concept of cooperation in basin practices, it is important to form public opinion in the riparian countries and promote the democratic principles of water resources management that involves all stakeholders and transfers responsibility to lower levels of water hierarchy.

The effectiveness of adaptation measures will depend on governance policies – activity of state in interstate and external relations that determine interests and priorities of economic development, including hydropower, irrigated agriculture, and aquatic ecosystems.

Supplementary Information

If applicable for this reporting period, please attach copies of project-related workshop or conference agendas, course curricula developed, summaries of research data collected, or articles about the project appearing in newspapers, journals, or web sites.

Save Follow Up