

## Minutes

### **of the workshop on the “Algebraic modeling language GAMS as a simulation tool for the tasks of PEER” under PEER project “Transboundary water management adaptation in the Amudarya basin to climate change uncertainties”**

**Tashkent, SIC ICWC, December 29, 2016**

#### Participants of the event:

D.Ziganshina, A.Sorokin, D.Sorokin, G.Solodkiy, Sh.Muminov, I.Beglov, R.Toshpulatov, Sh.Zaitov, T.Kadyrov, A.Degtyaryova, I.Ergashev, I.Belikov, R.Sherkhodjaev, A.Galustyan, R.Khafazov

#### Agenda:

1. Introduction to GAMS through an example of cropping pattern optimization model developed under the PEER project by T.Kadyrov, master’s degree student in the Higher School of Economics.
2. Establishment of an expert group on optimization of cropping pattern scenarios taking into account climatic and environmental conditions in each planning zone.
3. New sources of data for the PEER project, alternative climatic scenarios and their prospective consideration in the project.
4. Operation of planning zone model and cropping pattern optimization model in ASBmm.

#### Performed work and decisions:

Mr. T.Kadyrov made a report on the first item. He briefly presented the algebraic modeling language GAMS, namely the program development model in the GAMS language, data initialization, generation of equations, target functions, and limitations. Major advantages of GAMS were presented and the program of mathematical model in GAMS was illustrated. Data import and export and their formats were considered in details. After presentation, the participants discussed the use of GAMS for optimization of scenarios (the third stage of the PEER project – numerical experiment). GAMS was approved as the basis for modeling of optimization processes under the PEER Project.

On the second item, the participants discussed the ways to conduct additional research on optimization of cropping pattern under the third stage of the research (“Numerical experiment”). This was proposed by the project manager Mr. V.Dukhovniy. As a result, it was decided to establish a group of experts involved in the project. It will be comprised of Sh.Muminov, G.Stulina, G.Solodkiy, T.Kadyrov and R.Toshpulatov. By January 20, the group should develop a methodology for numerical experiments on optimization (target setting, defining optimization criteria, input data and expected outcomes) and select pilot planning zones for testing.

On the third item, Mr. R.Khafazov informed about his business trip to the USA; Mr. Sh.Zaitov presented his overview of open access websites. The need to analyze new climatic scenarios (CORDEX, <http://www.cordex.org/>; NEX \_NASA Earth Exchange, <https://nex.nasa.gov, etc.>) proposed by American partners of the project in addition to the REMO scenario in terms of their acceptability given our conditions and compare them with REMO was underlined. This work should be performed by G.Solodkiy and Sh.Zaitov by January 20, 2017.

Mr. A.Sorokin spoke on the fourth item. He pointed out to the need to continue the work on planning zone model, development and filling of the PEER database, as well as conduction of numerical experiment with the use of planning zone model based on three scenarios and developed by the economists group and water experts (Sh.Muminov, G.Stulina, G.Solodkiy). It is also required to carry out systematic work on integration of all models and database into ASBmm. For this purpose, R.Khafazov and R.Tashpulatov were instructed to develop a work plan on integration of the models and improvement of ASBmm interface. In addition, R.Toshpulatov should work on the PEER database (improvement and filling of missing information on energy, climate, etc., as well as basic indicators of the project outcomes), whereas R.Khafazov should work on testing of planning zone and simulation of planning zone development scenarios by 2050.

Mr. A.Sorokin stressed that one of the main activities in the upcoming year will be development of scientifically grounded recommendations on water resources management in the Amudarya basin context of climate change for policy and decision makers (position 3.2.1). These should consider the results of numerical experiments, as well as scientific results of the project and practical proposals by organizations responsible for water management (first of all, by national offices of BWO Amudarya). In addition to D.Ziganshina, G.Stulina, A. Sorokin and D. Sorokin responsible for this assignment, Sh.Muminov should also be engaged in formulation of these recommendations.

In conclusion, Ms. D.Ziganshina underlined the need to produce outreach materials targeted for policy and decision makers. These materials should incorporate not only research outcomes, but also research methodology and approaches that are innovative per se. It is planned to organize a seminar at the end of March or at the beginning of April to disseminate preliminary project results and get feedback from key stakeholders. There is an intention to conduct this event with National Water Partnership of Uzbekistan. Necessary preparation activities should be done by all involved in the project implementation.