

## CAWa Central Asian Water

### Training Course

## Climate change impact assessment and hydrological modelling

### 1 Place & Time

Place to hold the workshop:

Helmholtz Centre Potsdam – GFZ German Research Center for Geosciences, Germany - GeoLab

Arrival: 11<sup>th</sup> December 2011

Workshop: 12<sup>th</sup> – 16<sup>th</sup> December 2011

Departure: 17<sup>th</sup> December 2011

### 2 Description of the Workshop

General Circulation Models (GCM) and Regional Climate Models (RCM) became indispensable scientific tools for studying the Earth's climate system and its response to natural and anthropogenic triggers. The projections of greenhouse gas concentrations are being routinely investigated by means of climate model cascades, which finally provide regionally downscaled scenarios of meteorological characteristics. This information can be widely used to study the impacts of climate variations onto the hydrological system, but also onto agricultural, health, and other economic sectors. The response of water budget and its components such as precipitation, evapotranspiration, snow and glacier storages can be comprehensively analysed with the help of hydrological models. The projections of hydrological changes can be used as a background for discussions on the appropriate management strategies in the water sector.

The workshop is application-oriented and teaches the participants the general understanding of the techniques for climate and hydrological modelling. A special focus is set on processing of climate model data, setup and calibration of two hydrological models: a distributed hydrological model WASA (GFZ, Uni Potsdam) and a hydrological model AI SHF (Uzbek Hydromet Service), and assessment of climate change scenarios. The course will also include statistical methods for data analysis and interpretation. The workshop will transfer knowledge and experience of the CAWa project partners to the experts in hydrology and water management in Central Asia. The ultimate goal of the workshop is to present and transfer to Central Asian colleagues a consistent methodological approach for assessment of hydrological changes and facilitate a unified climate change impact assessment in the region.

#### Course characteristics:

- The course program is planned as full-day lessons for 5 days. The lessons start at 9.30 a.m. and end at 4.00 (or 4.30) p.m. Each lesson is subdivided into 2 parts of problem presentation and demonstration by the lecturer, and practical work by the participants.
- The aim of the course is to train the participants in understanding the methodologies of climate change impact assessment, in a confident use of climate data processing techniques and hydrological models. The thematic focus is laid on the use of a weather generator, hydrological models and techniques for model calibration and results interpretation.

**Language:** Lectures are given in English with translation to Russian. The English/Russian user interface is used for the software and models

**Workshop Leaders**

- Doris DÜthmann, Dr. Abror Gafurov, David Kriegel, Dr. Sergiy Vorogushyn, Dr. Andreas Güntner, Section 5.4: Hydrology, GFZ Potsdam
- Dr. Natalya Agaltseva, United Nations Development Program (UNDP)
- Dr. Alexandr Merkuskin, Uzbek Hydrometeorological Service
- Prof. Dr. Heiko Paeth, University of Würzburg

**Organizers**

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GFZ German Research Centre for Geosciences

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**In Cooperation with:**

United Nations Development Program (UNDP)  
Central Asia Climate Risk and Mitigation Programme  
Tashkent & Almaty



Uzbek Hydrometeorological Service  
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### 3 Participants and Funding

Target group are climatologists, hydrologists and water resources managers from the hydrometeorological services, research institutions, water management organisations and universities in Central Asia.

Participants are expected to have basic knowledge of hydrological processes and modeling and possess some experience in geographical information systems (GIS).

The training course is funded by the German Federal Foreign Office in the frame of the CAWA project. The CAWA project provides funding for travel (economy flight from Central Asia to Germany) and accommodation expenses for up to three participants from each Central Asian country. Accommodation will be organized by CAWA course coordination.

### 4 Application

Potential participants are expected to fill in the application form and submit an abstract of 400 words, either in English or Russian, on their climate change/hydrological modelling projects and practical relevance in their daily work.

#### Deadlines

Submission of application form and abstract:	10 <sup>th</sup> November 2011
Notification of acceptance:	11 <sup>th</sup> November 2011
Issue of invitations for visa application:	14 <sup>th</sup> November 2011

## 5 Preliminary Course Program

<b>Climate change impact assessment and hydrological modelling</b>
<b>Monday, 12<sup>th</sup> December 2011</b>
Introduction into the Earth's climate system and climate change scenarios
Overview of General Circulation Models (GCMs) and Regional Climate Models (RCM)
Statistical Downscaling techniques
Practical exercise with the Weather Generator and post-processing of the RCM output
The aim is the processing and interpolation of the climate model output
<b>Tuesday, 13<sup>th</sup> December 2011</b>
Introduction to the hydrological modelling and processes described in the WASA and AISHF models with highlighting the AISHF capability of use for climate risk management needs.
Representation of glacier dynamics in hydrological models
Exercise on pre-processing of input data for WASA and AISHF
Test model runs for a selected catchment and discussion of results
The aim is to learn model structures, understand process parameterization and output results
<b>Wednesday, 14<sup>th</sup> December 2011</b>
Introduction to model calibration algorithms and performance metrics
Processing of data used in model calibration: processing of MODIS snow cover data
Analysis of AVHRR snow cover information
The aim is to learn different calibration techniques, process data for model calibration
Practice exercises in the framework of AISHF for different tasks
The capacity of AISHF as a tool of climate risk management (drought, flood)
<b>Thursday, 15<sup>th</sup> December 2011</b>
Analysis and comparison of several climate scenarios from the ECHAM5-REMO model
Simulation of hydrological response in different climate scenarios using WASA and AISHF
Discussion of results
<b>Friday, 16<sup>th</sup> December 2011</b>
Visit of the German Climate Computing Centre in Hamburg

*Changes stay under reservation.*