The AWCI Training Workshop on Assessment of Climate Change Impact on a Watershed Hydrology including Hydrological Modeling in Cold Region Basins

(Version 3.1; 9 September 2014)

Held in Islamabad, Pakistan on 15 – 17 September 2014

Organized by the Pakistan Meteorological Department (PMD) in cooperation with the University of Tokyo, Japan supported by the Asia Pacific Network for Global Change Research (APN).

1. Preamble

The Asian Water Cycle Initiative (AWCI) has developed an advanced river management system, which is based on integration of data from earth observation satellites and in-situ networks with other types of data, including numerical weather prediction model outputs, climate model outputs, geographical information, and socio-economic data. The system has been successfully applied to a set of AWCI demonstration basins showing a high potential for practical applications including assessment of climate change impacts on watershed hydrological regimes and hence water resources availability in future.

While AWCI has always aimed at exploitation of available scientific knowledge and technology advancement for addressing the societal needs in the arena of water resources, such efforts on bridging the science at one side and decision making process and operational use at another side have become even more critical now, when AWCI has entered its second phase. Negative consequences of natural hazards are on the rise despite of scientific and technology advancements in relevant fields and thus it is an imperative to implement activities that facilitates implementation of advanced technology and latest scientific knowledge into praxis. This will contribute to building up a resilient society and achieving sustainable development.

Accordingly, AWCI has been now pursuing operational applications of the developed system and, more generally, the established data integration approaches. This requires capacity building activities to assure the system is understood by a large community of experts and practitioners. The planned Training Workshop is one of these capacity building efforts and it is organized as part of the AWCI related projects funded by APN under the CAPaBLE programme, titled: “Impact of Climate Change on Glacier Melting and Water Cycle Variability in Asian River Basins” and led by Dr. Ghulam Rasul, PMD. The Workshop is designed for researchers and practitioners, who are working on assessments of climate change impacts on water resources and also for those with interest in hydrological modeling in snow and glacier basins.

2. Objectives

The objectives of the Training Workshop include:

- Thematic lectures on Climate-Water-Food-Health Nexus and APN and AWCI related activities in Pakistan.
- Introduction, description and demonstration of capabilities of the Water and Energy Budget Distributed Hydrological Model for Snow and glacier basins (WEB-DHM-S), which is a novel and robust tool for cold region hydrological applications.
- In-depth explanation of the techniques for climate change impact assessment studies on water resources that are built in the Data Integration and Analysis System (DIAS) and available on-line (demonstration version).
- Explanation and Hands-on training on the use of these methods that include:
    - selection of suitable GCM outputs for the region of interest,
    - rainfall bias correction of these outputs,
    - downscaling of the GCM outputs for hydrological modeling at the basin scale
    - hydrological runs by WEB-DHM (without the advanced snow and glacier component) – informative lecture on WEB-DHM will be provided but not full training of the model due to time constraints,
    - analyses of the hydrological simulation results to assess possible impacts of climate change with focus on high flows and floods, and
    - dynamical downscaling lectures.

3. Tentative Agenda

DAY 1: Monday 15 September 2014
Venue: Islamabad Hotel

09:30 – 09:55 Registration

10:00 – 11:30 1. Opening and Welcome Remarks (*Chair: TBD*)
Recitation from Holy Quraan
Director General*, Pakistan Meteorological Department*: Welcome Address (10min)
Dr. Ghulam Rasul, *PMD*: APN Project led by PMD (10min)
Dr. Qamar-uz-Zaman Chaudhry, Special Envoy of WMO Secy Gen for Asia-Pacific (10min)
Dr. Amir Muhammad, APN Representative of Pakistan (10min)

Keynote Speech:
Prof. Dr. Toshio Koike, *University of Tokyo*, (30 min)

Remarks by the Chief Guest (10min)

11:30 – 11:40 Group Photo

11:40 – 11:50 BREAK

11:50 – 12:00 2. Training Workshop Outline (Dr. Petra Koudelova*, University of Tokyo*)

12:00 – 12:30 3. Pakistani Contributions to AWCI (*Chair: Dr. Arshad M. Khan*)
20 minutes presentation and 5 min questions/answers
1. Pakistani activities under AWCI – overview of past, present, and future (Dr. Bashir Ahmad*, PARC*)

12:30 – 14:00 LUNCH

14:00 – 14:50 3. Pakistani Contributions to AWCI – continue (*Chair: Dr. Arshad M. Khan*)
2. Indus project – climate and water nexus (Dr. Ghulam Rasul, *PMD*)
3. Indus project – water and food (agriculture) nexus (Prof. Dr. Ashfaq Chatta, *University of Agriculture, Faisalabad*)

14:50 – 16:15 4. Hydrological modeling in cold region watersheds (*Chair: Prof. Dr. Ashfaq Ahmad Chattha*)
20 minutes presentation and 5 min questions/answers
1. UNESCO Flood Project (Mr. Muhammad Riaz*, FFD/PMD*)
2. Disaster Management Plan of Pakistan (Mr. Ahmad Kamal*, NDMA*)
3. Distributed hydrologic modeling in cold region and high elevation watersheds in an integrated approach (Dr. Maheswor Shrestha*, UT*)
4. Discussion (10 min)

16:15 – 16:45 BREAK

16:45 – 18:00 5. Data Integration and Analysis System (DIAS) and Data Support Services (*Chair: Mr. Ahmad Kamal, NDMA*);
20 minutes presentation and 5 min questions/answers
1. Expansion and Linkages of Water Cycle Initiative (Prof. Dr. Toshio Koike)
2. DIAS data upload, quality control and metadata support system (Dr. Petra Koudelova*, UT*)
3. CEOS Water Portal data service (Dr. Petra Koudelova*, UT*)

18:00 Adjourn

20:00 Discussion dinner

DAY 2: Tuesday 16 September 2014
Venue: PMD

Training Workshop on Climate Change Assessment: GCM Bias Correction and Statistical Downscaling, Hydrological Analyses – using a demo case of the Soan Basin, Pakistan

08:00 – 08:30 Registration and Arrangements

08:30 – 12:00 6. Training Part 1.1: GCM Selection
08:30 – 08:50 Introductory Lecture (Dr. Asif M. Bhatti)
08:50 – 10:40 Hands-on: Selection of suitable GCM output for the Soan basin region – using an on-line tool and MS Excel sheet (Dr. Petra Koudelova)

10:40 – 11:00 BREAK

11:00 – 12:00 Hands-on: Selection of suitable GCM output for the Soan basin region – using an on-line tool and MS Excel sheet - continue

12:00 – 13:30 LUNCH & PRAYER

13:30 – 15:00 7. Training Part 1.2: GCM Rainfall Bias Correction, Statistical Downscaling
13:30 – 14:00 Introductory Lecture (Dr. Mohamed Rasmy)
14:00 – 15:00 Hands-on: Correction of the rainfall data of the selected GCMs and downscaling them using an on-line tool; visual inspection and discussion (Dr. Mohamed Rasmy)

15:00 – 15:30 BREAK

15:30 – 17:30 8. Training Part 2: **Hydrological Simulation Preparation and Analyses**
15:30 – 16:00 Introductory Lecture (Dr. Asif M. Bhatti)
16:00 – 17:30 Hands-on: Preparing hydrological simulation, WEB-DHM demonstration, Analysis of results including high and low flows, Discussion (Dr. Asif M. Bhatti)

17:30 Adjourn and Dinner

DAY 3: Wednesday 17 September 2014
Venue: PMD

Training Workshop on Climate Change Assessment: WEB-DHM-S, Dynamical Downscaling

08:00 – 08:30 Registration and Arrangements

08:30 – 09:30 9. Hydrological Modeling in Cold Regions: WEB-DHM-S model – physical and technical details, applicability discussion (Dr. Maheswor Shrestha)

09:30 – 12:00 10. Dynamical Downscaling (Dr. Mohamed Rasmy)
09:30 – 10:30 Methodology Introduction Lecture (Dr. Mohamed Rasmy)

10:30 – 10:50 BREAK

10:50 – 12:00 Case studies presentation, Discussion (Dr. Mohamed Rasmy)

12:00 – 12:30 11. Certificate Ceremony
12:30 – 13:00 12. Closing Remarks

13:00 – 14:00 LUNCH

14:00 – 17:00 EXCURSION (TBD location by PMD)
17:00 Adjourn