Building Resilience to Disasters in Western Balkans and Turkey

Regional Workshop
on historic hydro-meteorological data management
22-26 April 2013, Skopje

WORKSHOP REPORT

1. Introduction

In the framework of the IPA/2012/290552 multi-beneficiary project "Building Resilience to Disasters in Western Balkans and Turkey", a workshop on historic hydro-meteorological data management was organized on 22-26 April 2013 in Skopje, the former Yugoslav Republic of Macedonia. The overall objective of the project is to reduce vulnerability of IPA beneficiary countries to disasters caused by natural hazards in line with the Hyogo Framework for Action and increase their resilience to climate change. The direct beneficiaries are the national authorities in charge for the disaster risk reduction and disaster risk management and the National Meteorological and Hydrological Services (NMHSs) of Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Kosovo*, the former Yugoslav Republic of Macedonia and Turkey.

The project activities are grouped in eight tasks, of which four are implemented under WMO management. Among others, major efforts will be undertaken to strengthen the capacities of the NMHSs regarding the historic meteorological and hydrological data management including the

improvement of the data bases, the data rescue activities, the homogenization, and the quality control of data in accordance with the international standards. These activities aim at the improvement of the beneficiaries' capacities in the development and the implementation of the tools and the methodologies for the production of the risk assessment and mapping of hazards at the national and regional level. The workshop concentrated on hydro-meteorological data management with specific modules for data quality control and homogenization. The topics covered by the workshop agenda included data rescue, calculating high quality climate- and hydrological oriented extreme indices, climate time series homogenization and temperature and precipitation time series quality control (agenda attached as Annex 1). The workshop included theoretical sessions with the presentations of the leading meteorological and hydrological data management experts from the WMO Secretariat and the Spanish Centre of Climate Change of University Rovira i Virgili, as well as practical hands-on sessions, where the participants utilized the methods learned to improve the quality and harmonize and standardize the historic data of their own institutions. Prior to the workshop the participants were asked to prepare datasets with specific formatting and to install the required software for its use during the practical training sessions.

The workshop was hosted by the Hydrometeorological Service and was attended by 21 experts from the project beneficiaries as well as 2 experts from Lebanon and one from Jordan (participant list is attached as the Annex 2).

2. Activities

The opening session was devoted to present the scientific and institutional background of hydro-meteorological data management and the relations to other global and regional WMO activities. In his introductory speech, Scientific Officer of the WMO secretariat, Peer Hechler gave an account of the programs and activities of the WMO, which aim specifically at the enhanced assistance of beneficiaries of National Meteorological and Hydrological Services. WMO project coordinator Sari Lappi presented the main activities of the project ''Building Resilience to Disasters in Western Balkans and Turkey' and their connections to the hydrological data management. Peer Hechler introduced the WMO guidelines on data rescue. He emphasized that it is essentially important to rescue and maintain climate data of sufficient completeness and quality in every country around the world as the basis for applications and services. Thereafter Manola Brunet, the Director of the Centre for Climate Change at the University Rovira i Virgili (C3, URV) gave an account of the recent activities and presented the status of the MEDARE initiative. MEDARE intends to foster the regionally concerted climate data treatment from data rescue and data archiving through data quality control and homogenization until the regional examinations of climatic variability.

After the opening session, the participants of the workshop gave accounts of the present data management activities in their national hydrological and meteorological services.

The further program of the workshop consisted of theoretical presentations and practical trainings of data quality control, time series homogenization and extreme index calculations. Lectures were given by Manola Brunet, Peter Domonkos senior researcher of C3 URV and Joan Ramon Coll PhD student of C3 URV. The lectures aimed at transmitting up-to-date knowledge to the participants about the scientific bases and practical ways of quality control, homogenization and extreme index calculation. In the practical trainings the participants learned to use the statistical tools, which were provided by the trainers. The trainings were led by Peter Domonkos and Joan Ramon Coll. With

the assistance of the trainers, the participants performed quality control, homogenization and extreme index calculations on their own climatic datasets.

Problems arisen during the trainings or in connection with the content of the lectures were discussed together.

3. Major issues and outcomes

The participants of the workshop understood in a higher level the benefits of data rescue, data quality control, time series homogenization and extreme index calculation. They learnt that the confidence and accuracy of climate variability assessments have substantial dependence on the amount, completeness and quality of the input data, therefore data rescue, data quality control and time series homogenization are important parts of the climate variability assessments. They understood that the benefit of quality control and time series homogenization depends on the accuracy of input data preparation for using software and on the statistical methods selected. The chosen statistical methods must reflect both the up-to-date knowledge on the relevant field of applied statistics and the needs that arouse from the characteristics of the observational dataset. The trainers suggested the use of ExtraQC for data quality control, ACMANT for time series homogenization, as well as RClimdex and three kinds of drought-index calculations for extreme index calculations. The selected softwares are widely applicable for datasets of various characteristics, their performance is characterized by high confidence and accuracy and their use is relatively simple. The participants learnt the use of the proposed softwares and they applied them successfully on their own datasets. While the trainers assured the trainees of their remote support and collaboration in case of specific questions and comments, the participants were strongly encouraged to share experiences, information and advise among each other in order to establish sustained national data management procedures. Moreover, the trainees were invited to consider the elaboration of a scientific paper on climate indices analyses and findings.

4. Problems encountered

- Each software has specific expectation in input data preparation, and as six softwares were proposed to use, it means six kinds of data preparations for a specific dataset. It makes it necessary tremendous work for large datasets.
- Although the operation of each of the recommended softwares is fully automatic, certain steps of data quality control and data homogenization cannot be treated in automatic mode. It is a delicate point, since the subjective steps of data quality control and homogenization need expertise and lot of working time. For this reason, it needs lot of effort and working time from the participant to complete data quality, homogenization and climate index calculation on their entire observed climatic datasets.

5. Conclusions and recommendations

- Science-based climate variability assessments need the careful treatment of observed climatic data and consequent development of observational datasets. The data management must include the necessary steps of data rescue, data archiving, data quality control and time series homogenization.

- Working with large datasets needs the application of automatic or semi-automatic softwares. The lecturers and trainers of the workshop proposed the use of automatic softwares, a) which based on the up-to-date knowledge on the relevant field of applied statistics, b) whose application can be characterized by high confidence and accuracy, c) which contribute optimally to the final goal, namely to obtain the realistic characterization of climate variability, d) which are easy-to-use.
- The joint application of ExtraQC, ACMANT, RClimdex and drought index calculation sofwares is generally recommendable for climate variability examinations.
- The time demand of input data preparation could be reduced in the future with further concert between the recommended softwares, it is a task ahead the software developers.
- Some steps of the data quality control and time series homogenization cannot be automated, and the application of such steps requires a certain level of expertise. Therefore further trainings would be useful for the users of ExtraQC and ACMANT.

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence

ANNEX 1

AGENDA

08:30-16:00	**DAY One, Monday, 22 April, 2013**
08:30	*Registration*
09:00-10:30	***SESSION I: Opening***
09:00-09:20	*Welcome addresses* **Vanco Dimitriev**, Director of Republic Hydrometeorological Service, FYR of Macedonia **Peer Hechler,** Scientific Officer, WMO Secretariat
09:20-09:30	*Introduction of resource persons and scope of the workshop –* **Sari Lappi**, WMO Project Coordinator in Skopje
09:30-10:15	*WMO programmes and activities to assist the beneficiaries –* **Peer Hechler**, Scientific Officer, WMO Secretariat
10:15-10:30	*Presentation of the IPA Project 'Building Resilience to Disasters in Western Balkans and Turkey'* **Sari Lappi**, WMO Project Coordinator in Skopje
10:30-15:30	**SESSION II: Introduction and data rescue**
10:30-10:50	*WMO Guidelines on Data Rescue* - **Peer Hechler**, WMO Secretariat
10:50-11:45	*MEDARE - context and current status* - **Manola Brunet,** Director, Centre for Climate Change, University Rovira i Virgili, Spain
11:45-12:00	*Discussion*
12:00-13:00	***Lunch***
13:00-14:40	*Data rescue activities of the beneficiaries (10 min. presentation per each)* **Representatives from Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Kosovo*, the former Yugoslav Republic of Macedonia, Turkey, Jordan and Lebanon**
14:40-15:00	***Coffee***
15:00-15:30	*Discussion*
15:30-16:00	*Wrap up of the Day I and Preparation for the next days´ practical sessions*

09:00-16:30	**Day Two, Tuesday, 23 April, 2013**
09:00-10:15	**SESSION III: Calculating high-quality Climate- and Hydrological-oriented Extreme Indices & Quality control of the temperature and precipitation time series**
09:00-09:30	*Introduction to develop high-quality indices* **Manola Brunet**
09:30-09:45	*Rationale for time series Quality Control* **Manola Brunet**
09:45-10:15	*Application of the RClimDex and the extra-QC software to QC temperature and precipitation data at the daily scale* - **Joan Ramon Coll,** University Rovira i Virgili
10:15-12:00	***Practical Hands-on Training Session I***
	Application of the RClimDex and extra-QC to the time-series, brought by the participants
12:00-13:00	**Lunch**
13:00-16:00	***Practical Session I (****continuation)*
13:00-14:30	*Application of the RClimDex and extra-QC to the time-series, brought by the participants*
14:30-14:45	***Coffee***
14:45-16:00	***Practical Session I (****continuation)*
14:45-16:00	*Application of the RClimDex and extra-QC to the time-series, brought by the participants*
16:00-16:30	*Wrap up of the Day Two - Discussions*

09:00-16:30	**Day Three, Wednesday, 24 April, 2013**
09:00-12:00	***Practical Session I (****continuation)*
09:00-12:00	*Application of the RClimDex and extra-QC to the time-series, brought by the participants*
12:00-13:00	***Lunch***
13:30-15:00	**SESSION IV: Climate time-series homogenization**
13:30-14:15	*The need of time-series homogenization: the rationale and basic concepts for homogeneity testing and homogenization* **Peter Domonkos,** University Rovira i Virgili
14:15-14:35	*Homogenizing monthly temperature and precipitation series: peculiarities in the appearance of inhomogeneities and the possible ways for their elimination* - **Peter Domonkos**
14:35-15:00	*Statistical tools in homogenizing temperature and precipitation series with emphasis on the main properties of ACMANT and Craddock-test* - **Peter Domonkos**

15:00-16:00	***Practical Hands-on Training session II***
15:00-15:30	*ApplyingACMANT to homogenize temperature series at the monthly scale* **Participants with the support of the trainers**
15:30-15:45	*Coffee*
15:45-16:00	***Practical session II (****continuation)*
15:45-16:00	*Applying ACMANT to homogenize temperature series at the monthly scale*
16:00-16:30	*Wrap up of the Day Three-Discussions*

09:00-16:30	**Day Four, Thursday, 25 April, 2013**
09:00-12:00	***Practical session II (****continuation)*
09:00-12:00	*Applying ACMANT to homogenize temperature series at the monthly scale*
12:00-13:00	***Lunch***
13:00-13:45	**SESSION IV: Climate time-series homogenization (continuation)**
13:00-13:45	*Downscaling of monthly adjustments to daily climatic data* **Peter Domonkos**
13:45-15:00	***Practical Hands-on Training Session III***
13:45-15:00	*Guided application of the adjustments at the daily scale* **Participants with the support of the trainers**
15:00-15:15	*Coffee*
15:15-16:00	***Practical session III*** *(continuation)*
15:15-16:00	*Guided application of the adjustments at the daily scale* **Participants with the support of the trainers**
16:00-16:30	*Wrap up of the Day Four - Discussions*

09:00-16:30	**Day Five, Friday, 26 April, 2013**
09:00-12:00	**SESSION V: Climate and Hydrological-oriented extreme indices calculation**
09:00-09:30	*The ETCCDI's Extreme Indices: their meaning and applications* **Manola Brunet**
09:30-10:00	*Calculation of the extreme indices by using daily adjusted data and RClimDex* **Joan Ramon Coll**
10:00-12:00	***Practical Hands-on Training Session IV***

10:00-12:00	*Calculating extreme indices with RClimDex* **By trainees with the support and guidance of the trainers**
12:00-13:00	*Lunch*
13:00-14:00	**SESSION V: Climate and Hydrological-oriented extreme indices calculation** (continuation)
13:00-13:30	*SPI , SPEI and PDSI indices: fundamentals and applications* **Joan Ramon Coll, University Rovira i Virgili**
13:30-14:00	*Application of the SPI, SPEI and PDSI software* **Joan Ramon Coll**
14:00-16:00	***Practical Hands-on Training Session V***
14:00-16:00	*PDSI, SPI and SPEI estimation from the adjusted temperature and precipitation data* **By trainees with the support and guidance of the trainers**
16:00-16:30	***SESSION VI: Closing Discussions and wrap up of the workshop***

ANNEX 2

LIST OF PARTICIPANTS

ALBANIA	**Mr. Metodi Marku** Institute of Geosciences, Energy, Water and Environment (IGEWE) Rr. Don Bosko Nr.60 Tirana Albania Email: metodi.marku@yahoo.com	**Ms. Liljana Lata** Institute of GeoSciences, Energy, Water and Environment (IGEWE) Rr. Don Bosko Nr.60 Tirana Albania Email: lataliljana@gmail.com
	Mr. Denis Saatciu (not supported by the project) Tetra Solutions Email: denis.saatciu@gmail.com	**Mr. Rezarta Osmani** (not supported by the project) Tetra Solutions Email: rosmani@tetra.al
BOSNIA AND HERZEGOVINA	**Ms. Eksena Kupusovic** Federal Hydrometeorological Institute Bardakcije 12 71 000 Sarajevo Bosnia and Herzegovina Tel: +387 33 276 710 Fax: +387 33 276 701 Email: kupusovic.e@fhmzbih.gov.ba	**Ms. Milica Djordjević** Republic Hydrometeorological Services RS Put Banjaluckog odreda b.b. 78000 Banja Luka Bosnia and Herzegovina Tel: +387 51 349 460 Fax: +387 51 433 521 Email: m.djordjevic@rhmzrs.com
CROATIA	**Ms. Gordana Buselic** Meteorological and Hydrological Service Gric 3 HR-1000 Zagreb Croatia Tel: +385 1 4882 885 Fax:+385 1 48 51 901 Email: buselic@cirus.dhz.hr	**Ms. Dubravska Rasol** Meteorological and Hydrological Service Gric 3 HR-1000 Zagreb Croatia Tel: +385 1 45 65 711 Fax:+385 1 48 51 901 Email: rasol@cirus.dhz.hr
MONTENEGRO	**Ms. Vera Andrijasevic** IV Proleterska 19 81000 Podgorica Montenegro Tel: +382 206 554 19 Fax: +382 206 551 97 Email: vera.andrijasevic@meteo.co.me	**Mr. Golub Culafic** Avda Mededovica br. 58 Podgorica Montenegro Tel: +382 20 655 185 Fax: +382 20 655 183 Email: golub.culafic@meteo.co.me
JORDAN	**Mr. Feras Al-Hazaimeh** (not supported by the project) PO. Box 341011 Amman 11134 Jordan	

	Tel: +962 6 48 92 408 Fax: +962 6 48 944 09 Email: h_firas11@yahoo.com	
KOSOVO (under UN Security Council Resolution 1244/99)	**Mr. Bashkim Kastrati** Hydrometeorological Institute Bill Clinton Str nr 86 Pristine 1000 Tel: +381 38 603 842 Email: bashkimkastrati@gmail.com	
SERBIA	**Mr. Dejan Petkovic** Republic Hydrometeorological Service of Serbia Kneza Viseslava 66 11000 Belgrade, Serbia Tel: +381 11 30 50 864 Email: dejan.petkovic@hidmet.gov.rs	**Ms. Gordana Simic** Republic Hydrometeorological Service of Serbia Kneza Viseslava 66 11000 Belgrade, Serbia Tel: +381 11 30 50 864 Email: gordana.simic@hidmet.gov.rs
	Ms. Ivana Kordic (not supported by the project) Republic Hydrometeorological Service of Serbia Kneza Viseslava 66 11000 Belgrade, Serbia Tel: +381 11 30 50 864 Email: ivana.kordic@hidmet.gov.rs	
THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA	**Mr. Aleksander Karanfilovski** Hydrometeorological Service Ul. Skupi 28 1000 Skopje Tel: +389 2 3097 004 Email: akaranfilovski@meteo.gov.mk	**Ms. Aleksandra Stevkov** Hydrometeorological Service Ul. Skupi 28 Tel: +389 2 3097 004 1000 Skopje Email: saska@meteo.gov.mk
	Mr. Vasko Stojov (not supported by the project) Hydrologist Hydrometeorological Service Ul. Skupi 28 1000 Skopje Tel: +389 2 3097 004 Email: vasko@meteo.gov.mk	**Mr. Aleksandar Prodanov** (not supported by the project) Meteorologist Hydrometeorological Service Ul. Skupi 28 1000 Skopje Tel: +389 2 3097 004 Email: aprodanov@meteo.gov.mk
	Mrs. Suzana Monevska (not supported by the project) meteorologist	

	Hydrometeorological Service Ul. Skupi 28 1000 Skopje Tel: +389 2 3097 004 Email: smonevska@meteo.gov.mk	
TURKEY	**Mr. Bahattin AYDIN** Turkish State Meteorological Service Hydrometeorology Division Email: bahattinaydin@mgm.gov.tr	**Mr. Alaattin UĞURLU** Turkish State Meteorological Service Hydrometeorology Division Email: augurlu@mgm.gov.tr
LEBANON	**Mr. Abbas Obeid** (not supported by the project) Lebanese Meteorological Department Tel: +961 3 747522 Email: obeidabbas@hotmail.com	**Mr. Wissam Abou Khouchfeh** (not supported by the project) Lebanese Meteorological Department Tel: +961 3 747522 Email: wsws1171@gmail.com
WMO	**Mr. Peer Hechler** Scientific Officer World Meteorological Organization Switzerland Tel: +41 22 730 8224 Email: phechler@wmo.int	**Ms. Sari Lappi** Project Coordinator IPA 2012/290-552 Project: Building Resilience to Disasters in Western Balkans and Turkey WMO/FMI Project Office, Skopje Email: sari.lappi@fmi.fi
	Mr. Dejan Stojanov Project Assistant IPA 2012/290-552 Project: Building Resilience to Disasters in Western Balkans and Turkey WMO/FMI Project Office, Skopje Email: dejan.stojanov@fmi.fi	
University Rovira i Virgili	**Ms. Manola Brunet-India** Director Centre for Climate Change University Rovira I Virgili Spain Tel: +34 977559583 Email: manola.brunet@urv.cat	**Mr. Peter Domonkos** University Rovira i Virgili Centre for Climate Change (C3) tel: +34 977464047 e-mail: peter.domonkos@urv.cat
	Mr. Joan Ramon Coll Benages University Rovira i Virgili Centre for Climate Change (C3) Tel: +977464048 Email: joanramon.coll@urv.cat	