

**Eleventh Session of the RA VI Working Group on Hydrology  
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**Report of the Rapporteur on Extreme Potential Floods,  
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**1. Introduction - Background**

At the 14<sup>th</sup> session of WMO Regional Association VI for Europe in Heidelberg, 5-15 September 2005 it was agreed that the Working Group on Hydrology should designate the Rapporteur on Extreme Potential Floods during the following inter-sessional period with the Terms of Reference (TOR) as follows:

**v. Potential Extreme Floods**

Considering the importance of hydrological design data for the safety of people and security of hydraulic structures (e.g. dams and bridges):

- (a) To update a literature review of research carried out on hydrological design data for extreme floods occurrences;
- (b) To continue a survey on best available practices and standards in estimation of hydrological design data for extreme floods occurrences, even in ungauged basins
- (c) To carry out an investigation of methods of PMP/PMF derivation and other methods for extreme flood estimation;
- (d) To liaise with experts and programmes on climate change and water with respect to their results concerning potential impacts on floods.

With the aim of meeting the above requirements, the Rapporteur on Potential Extreme Floods with coordination and cooperation of Mr Jan Kubat, Chairperson of the Working Group on Hydrology, contacted the experts from various countries of Europe who were willing to serve as other members of the Group in the field of Extreme Potential Floods. The following experts served the subgroup (in alphabetical order): V. Cabrihna (Portugal), F.O. Kocyigit (Turkey), B. Kulasova (Czech Republic), R.P. Mic (Romania), L. Nikiforova (Kazakhstan), H. Ozguler (Turkey) and D. Trninic (Croatia). All experts constituted the substantial input to the work of subgroup on Extreme Potential Floods.

**2. Estimation hydrological design data for extreme floods occurrences, even in ungauged basins (item (a) and (b) of TOR).**

On the basis of undertaken literature review of research carried out on hydrological design data as well as an international survey on best available practices and on national standards in estimation of hydrological design data for extreme floods occurrences, following reports are being prepared:

*THE GRADEX-KC AND GRADEX-ZN METHODS FOR COMPUTING THE MAXIMUM DISCHARGES WITH GIVEN PROBABILITY OF EXCEEDENCE WHERE DISCHARGE MEASUREMENT DATA ARE INCOMPLETE – English version in revision*

The modified Gradex-KC method enables estimation of annual maximum floods with T-year return period on the basis of short, say 10 to 15 years, series of annual maximum river discharge and long i.e. 40 or more years annual maximum precipitation series. The method can be used for relatively small basin areas i.e. up to 500 km<sup>2</sup>. The Gradex-ZN method is based on theoretical assumptions adopted in the Gradex-KC method introducing changes in parameters estimation taking into account requirements of ungauged basin.

*METHODS OF RIVER DISCHARGE CHARACTERISTICS ESTIMATION – BEST PRACTICE HANDBOOK – in preparation*

The Handbook consists of set of currently used methods that are recommended to best practice in hydrological calculations for water management structures planning, designing and exploitation. Modern engineering practice beside methods that are recognized and used up to date, must also employ state-of-the-art methods of applied hydrology. Therefore, there are various methods in the Handbook with different complexity of mathematical description and different degree of difficulty of their usage, beginning from simple and easy to use empirical formulas and ending to very complex in their structure mathematical models describing physical features of hydrological processes occurring in the catchment.

**3. Investigation of methods of PMP/PMF derivation and other methods for extreme flood estimation (items (c) of TOR).**

To satisfy the requirements mentioned in items (c) of TOR, an review of literature concerning research on PMP/PMF derivation has been undertaken taking into account internationally recognised methods of PMP/PMF estimation and its applications through out the world, i. e. in Australia, Canada, China, India, New Zealand, United Kingdom and United States. On the basis of acquired knowledge and experience it has been made an attempt to develop the method of PMP/PMF estimation for small river basins in Poland. The research report on *RIVER-FLOODING POTENTIAL IN TERMS OF SAFETY OF WATER MANAGEMENT STRUCTURES AND FLOOD RISK – INTRODUCTION TO METHODOLOGY*, which English version is now in revision, was worked out in the Institute of Meteorology and Water Management (IMGW). The new approach so-called Maximum Credible Precipitation (MWO) and Maximum Credible Flood (MWW) model is presented in the above-said report.

**4. A liaison with and provision advice to the expert on climate and water with respect to their results concerning potential impacts on floods (item (d) of TOR).**

In order to advice on climate and water with respect to results concerning potential impacts on floods an expert review of report on *CLIMATE CHANGE 2007: CLIMATE CHANGE IMPACTS, ADAPTATION AND VULNERABILITY - SUMMARY prepared by IPCC WGII* was done in 2006 year.

Contribution to the internet survey on user opinions about a decision support tool that presents predicted climate change impacts in Europe for Climate and Water rapporteur of WGH.

**5. Other activities**

- Active participation in the Network for contributions to the Water Framework Directive
  - Contribution to works of European Environment Agency (EEA)*
  - Contribution to Survey related to the standards used by RA VI hydrological services*
  - Contribution to Survey on Flood Forecasting and Warning in RAVI*
  - Participation in the 1 session of Network for Contributions to the Water Framework Directive, Geneva, Switzerland, October 2006*
  
- Cooperation with EC CIS Working Group on Floods
  - Contribution to the works of the Group during meetings in Brussels*
  - Planned participation in WG F Thematic Workshop in Brno, Czech Republic, May 2009*
  
- Cooperation with EFAS
  - Contribution to ETN-R project – providing discharge data and metadata for EFAS initiative*
  
- Active participation in WMO/GWP Associated Programme on Flood Management – Pilot Project in Central and Eastern Europe on Forward Integration of Flood Warning in Areas Prone to Flash Floods
  - APFM PROJECT—MEETING, Kłodzko Valley (Kłodzko, Gorzanów), Poland, April 2006*
  - International Workshop on Community preparedness and public participation for Flash Flood Management in Europe, Krakow, Poland, October 2007*
  - Preparation of Guidance on Flash Flood Management – Recent Experiences from Central and Eastern Europe, 2008*
  - Starting 2-year project on Recommendation on best practices for flood monitoring, early warning and protection systems on local, national and international level*
  
- Contribution to European Expert Meeting on Enhanced Floods Forecasting, Bratislava, Slovakia, December 2005
  
- Contribution to XIII session of Commission for Hydrology, Geneva, Switzerland, November 2008