

## Workshop 1 : The many faces of the Meuse

Moderated by :Gerd DEMNY

Introduction :

- *Frederiek Sperna-Weiland, Deltares, coordinator of the 'Vue de Meuse' project*

The introducer remembered the activities performed by Deltares on the Meuse Basin, between development of hydraulic models and sharing of knowledge. They are involved in several actions described below:

- Real-time Flood Early Warning
- Extreme discharge estimation for dike safety using
- Generator of Rainfall and Discharge Extremes
- Dutch Deltamodel - used for policy analysis in the framework of the Dutch Delta program
- Facilitation of policy-science interaction
- Climate impact analysis

In the AMICE framework, Deltares was involved in the climate projections. Based on country specific climate projections and a limited set of scenarios and models, they insured:

- The design of consistent hydrological climate projections for the Meuse basin as a whole:
- The increasing of the intercomparability between countries
- The quantitatively correct combination of results
- The correct representation of upstream-downstream interactions
- A taking into account of the changes in extremes, of the variability of flood and low-flow patterns across the year and of the frequency of extreme events.
- A taking into account uncertainties / probabilities in the future projections to improve adaptation and mitigation strategies

The "Vue de Meuse" project aims to

- Share down-scaled climate projections for the Meuse basin
- Have an overview of expected hydrological consequences (including extremes) of climate change and their uncertainties
- Design one (or more) common hydrological models for the Meuse river basin

### Aim of the Workshop 1:

The aim of the workshop 1 entitled "the many faces of the Meuse" was to develop ideas, methods, roadmaps, networks or even project proposals to close the remaining gaps in terms of **water management and climate adaptation to advanced climate research, other river-related research fields, research cooperation, etc...** The achievements of AMICE will be point of departure, so that the workshops can lead to specific recommendations (who does what at which moment)?

The workshop started with a brainstorming of all workshop members about which topics should be discussed. Then a voting was carried out to figure out, which four suggestions should be analyzed in detail. Then a market place discussion was performed: The four subjects were discussed in the four corners of the meeting room, the participants were split into four groups who moved from one corner to another to discuss the topics. Each group pointed out their relevant arguments to the four topics by writing it on a flip chart. In the end the moderator assembled all arguments to a priority list with the help of the workshop members. This list was then handed over to the organizing committee for the final presentation of the workshops.

### Background:

Results demonstrated by the AMICE project (in relation with this topic):

- *Cf written contribution by Benjamin Dewals.*
- Several climate models, on a worldwide scale or for a specific region are in use by the different Partners of the AMICE project. Finally, we agreed on common trends for the whole catchment.
- The increase in water temperature could reach 2,5 to 5°C. Precipitation will decrease in summer by about 40% and could increase up to 25 % in winter.
- Flood discharges : an increase in Q<sub>hx100</sub> (centennial hourly flood peak) of +15% for 2021-2050 and +30% for 2071-2100.
- Low-flows discharges : a decrease in MAM7 (Mean Annual Minimum 7-days discharge values) of -10% for 2021-2050 and -40% for 2071-2100.

- The connection of the 4 hydraulic models in use on the Meuse basin to produce a full modeling of the river from spring to mouth.
- The delivery of new flood maps along the whole course of river Meuse, accounting for the hydrological impact of climate change. These have revealed a significantly higher impact of climate change on water depth in the central part of the basin (max. 130cm over the centennial flood) compared to the upper and lower parts (max 70cm over the centennial flood).
- Models are set-up to assess the hydrological and hydraulic system in the entire Rurand Vesdrebasins as well.
- Low flow results indicate a clear direction whereas flood results are more uncertain.
- We achieved a shared working language for hydrological boundary conditions in exploring the effects of climate change.

Lessons learnt by the AMICE Partners :

- Climate change does not stop at the countries' borders
- There are huge uncertainties in scenarios of climate change. What if the models are wrong? Posing this question is a lesson that should be conveyed to all water managers dealing with climate change.
- The physical output of AMICE consists of technical building blocks that can be used by many stakeholders to develop an adaptation strategy.
- The soft output relates to the network of scientific institutes.
- Keep taking the effects of climate change seriously, especially low-flows and droughts.
- Flood maps are a powerful tool but projected flood maps and future risk maps need be explained carefully, especially regarding uncertainties and hypothesis.

Gaps not covered by AMICE, potential subjects for new cooperation :

- A unique model at the MeuseBasinscale ?or a compatibility of tools and methods ?
- Population development and its consequences on vulnerability to floods and low-flows.
- Hydrological and hydraulic modelling on the tributaries.
- Variability of flood and low-flow patterns across the year.
- (Increased ?) Frequency of extreme events.
- A scientific research group in the Meuse Commission ? A fund for research cooperation on the Meusebasin ?

### **Achievements of the workshop 1 "The many faces of the Meuse":**

Participants of the workshop 1 underlined several points in order to adaptate the Meuse catchment to the climate change. The importance of a more integrated approach seems to be the main point which would permit an efficient mitigation and adaptation of human societies to climate change. The preservation of water, whatever the uses or the physical parameters, must be a thorough axis of reflection. These objectives are likely to be reached by the improvement of cross-border exchanges through the establishment of databases, experts groups or thematic meetings permitting to solve problems together.

An international team of flood forecasting was also pointed as a possibility to improve the adaptation processes.