Session DD 1.4: Precipitation, discharge and flooding (part 2)

Chair	Prof.dr. Wilco Hazeleger, Royal Netherlands Meteorological Institute, KNMI, the Netherlands
Keynote speaker	Dr. Klaus Görgen, CRP – Gabriel Lippmann, Luxembourg
Speakers	Otto de Keizer, Deltares, the Netherlands Alexander Bakker, Royal Netherlands Meterological Institute, the Netherlands Dr. Elena Dolgopolova, Institute of Water Problems , Russian Academy of Sciences, Russian Federation Miga Julian, Institut Teknologi Bandung, Indonesia Herbert ter Maat, Alterra, Wageningen UR, the Netherlands
Rapporteur	Renée de Bruijn, Knowledge for Climate, the Netherlands

Key note speaker Klaas Görgen presents the Reinblick2050 project, in which an assessment of climate change impact on the Rhine river basin is made. An ensemble is composed, in which different projections are combined in order to develop a common, consistent research framework and compile heterogeneous information from different models into applicable knowledge. Whereas among the individual models the variation in outcome was large, now, according to Rheinblick2050, a general tendency can be observed. The relative change in mean discharge resulting from this ensemble is as follows: in the near (until 2050) and far future (until 2100), an increase in precipitation is expected, and while winter discharge is predicted to increase, summer discharge might decrease because of future climate change. Of course a certain band width needs to be considered.

In predicting the influence of climate change on river regimes, it is often assumed that the relative change in mean discharge can be extrapolated to determine the change in extreme peak discharge. However, this assumption might be incorrect. In his study Otto de Keizer (Deltares) analyses these extremes by running an ensemble of regional climate models for the Rhine basin. Series of precipitation and temperature have been generated within the Rheinblick2050 project. The results showed a general tendency in discharge increase, in particular in the far future. Of course uncertainties become larger towards the far future and towards more extreme discharge. An active discussion about bias correction arises from the audience.

Alexander Bakker (Royal Netherlands Meteorological Institute) presents different ways to cope with biases in a model. He explains what the possibilities are: corrections can be made to the model output, and observed climate data and/or a stochastic weather generator can be transformed according to a climate change scenario (A1B). No firm conclusion is drawn about whether one of these methods is the best; in directly correcting output, hidden biases will remain and statistic properties can be biased. Correcting for one bias can thus give raise to another. The same accounts for transformation of observed data, although it is said that generally this contains fewer biases than the previous method. Weather generators are very flexible and can easily be adapted to new climate conditions. However, more complex relations in weather systems are hard to include. A preferable solution on how to deal with biases in a model thus has not been found.

Elena Dolgopolova takes the audience on a small excursion away from the Rhine basin to climate influence in a totally different river setting: what is the influence of global climate change on the river mouths of the Arctic rivers of Russia? Briefly the factors controlling the Arctic rivers are discussed. Based on this we learn that warmed water brought from up stream could cause the permafrost to partly melt, destabilising the river beds. Although at the moment a large change in air temperature has not been observed, but still, further warming is expected to have a large effect on the Arctic river regime in the future. A suggestion from the audience: hydropower dams should be built in the rivers in order to regulate river discharge and keep the river beds as stable as possible.

Finally, another model study is presented by Herbert ter Maat (KNMI), in which the influence of changes in sea surface temperatures on precipitation is simulated. However, when running for the current situation, the model shows a constraint: especially in the summer months, during which precipitation consists mainly of convective showers, the amount of precipitation is underestimated.
It is discussed whether higher resolution modelling will contribute to better results in simulating the amount of summer rainfall in the Netherlands. Downscaling by using finer grid cells should capture these convective showers. However, although the model has been downscaled using several methods and some results are more consistent with reality then others, a very good match to current precipitation in the Netherlands has not been simulated yet.

As chair man Wilco Hazeleger points out, a returning subject in several presentations during this session seems to be that bias is obscuring the model results. In stead of refining models by adding processes which influence the climate, more attention should be paid to removing those biases in order to make our models applicable. Therefore a complicated and challenging task lies ahead of us.