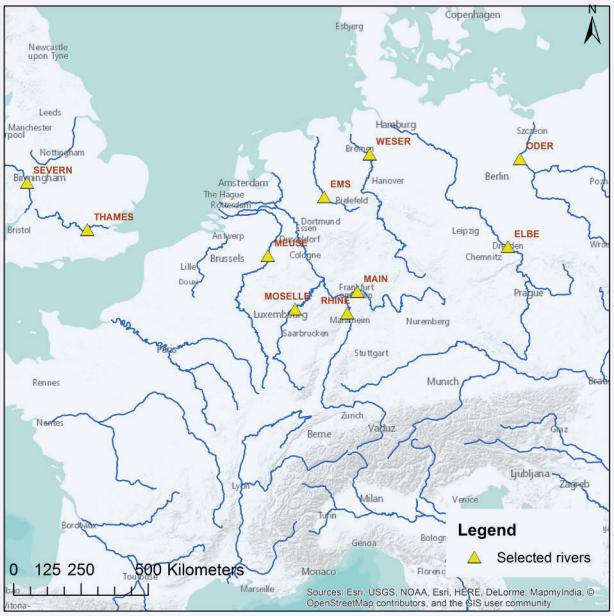
DETECTING TRENDS IN CLIMATE CHANGE

Anticipating the future is important in decision-making, especially when considering long-term processes and consequences. Climate change is one of the factors affecting the long-term environment, which includes issues such as water availability, and the needs of society such as demand for water. It therefore affects decisions about whether and where investments in water infrastructure are needed. However, uncertainties about climate change complicate decision-making. One of the key features of the planning process is the early detection of changes by monitoring developments related to climate change in order to identify the need for action.



The ten rivers and stations taken into consideration

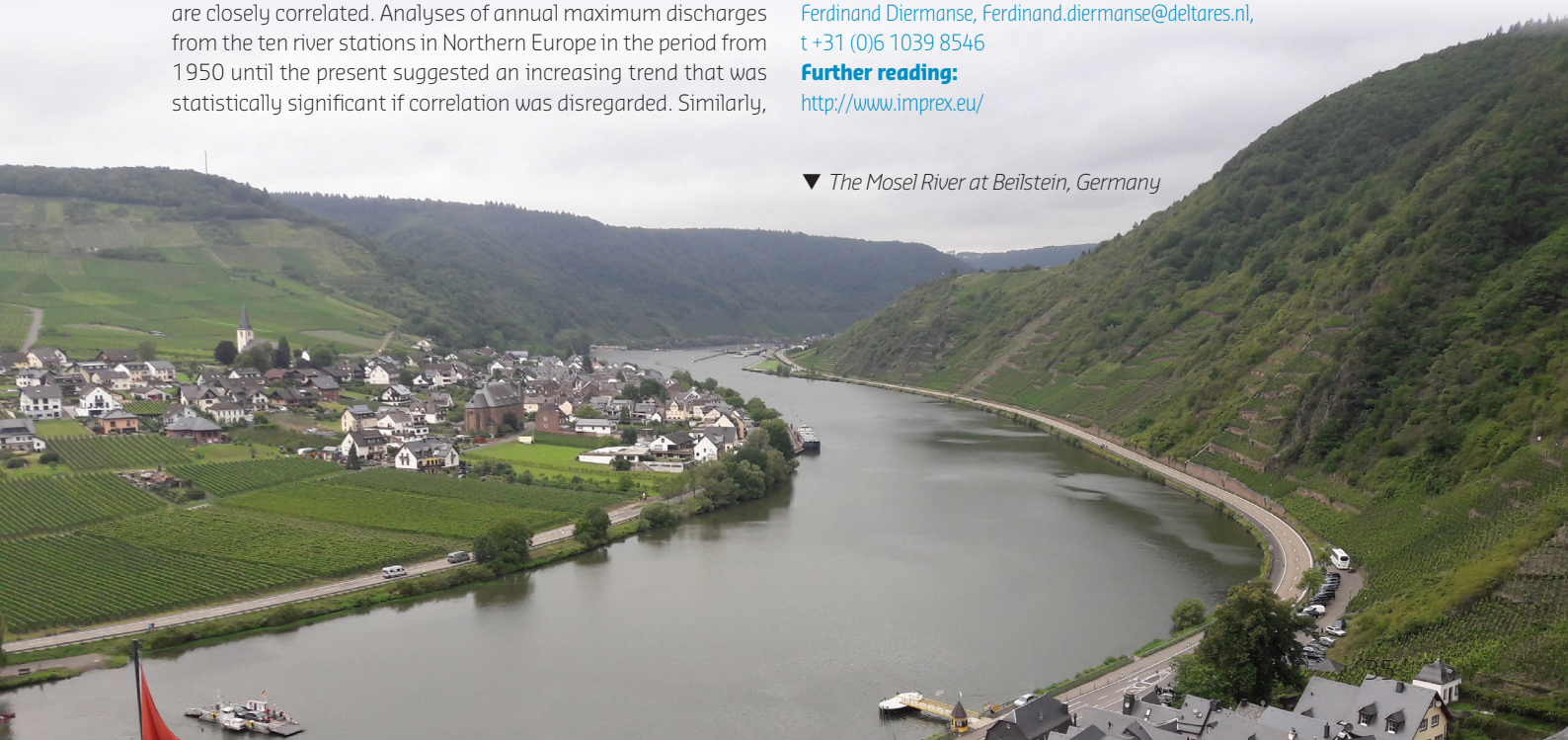
The identification of climate trends has focused mainly on trend developments in measured time series at single stations. In this study, we explored the benefits of combining measurements from multiple stations with the aim of isolating signals using indicators that are more directly relevant for decision-making and therefore more convincing for policymakers. The analyses were conducted on historical time series for the discharges of rivers in Northern Europe: the Elbe, Ems, Main, Meuse, Mosel, Oder, Rhine, Severn, Thames and Weser. Synthetic time series with "controlled" trends were also considered.

The analysis showed that combining the results of the statistical tests of the measurements from each station can be extremely valuable since it may generate stronger signals of the impacts of climate change than statistical information from individual stations. However, the added value of combining tests will be reduced if signals from individual stations are not pointing in the same direction and if the time series from the stations considered are closely correlated. Analyses of annual maximum discharges from the ten river stations in Northern Europe in the period from 1950 until the present suggested an increasing trend that was statistically significant if correlation was disregarded. Similarly, a strong decreasing trend was found for mean discharges in the low-flow summer season. However, if we take correlation into account correctly, the trend is not as strong. Nevertheless, the results of the analyses still suggest that there are trends worth monitoring.

It is possible that, with measurement data obtained in the near future, the signals may become stronger. Furthermore, it could be useful to include more rivers/stations that will preferably be correlated with the other stations as little as possible but which are in the same climate zone. The analyses were conducted as part of the Dutch Delta programme, which was designed to protect the Netherlands against flooding and to secure freshwater supplies.

Contact
Ferdinand Diermanse, Ferdinand.diermanse@deltares.nl,
t +31 (0)6 1039 8546

Further reading:
http://www.imprex.eu/



▼ *The Mosel River at Beilstein, Germany*