

# **Risk-based flood forecasting in Norway – the way(s) forwards**

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## **ABSTRACT**

Impact based forecasting is identified as a major challenge for hydrometeorological services by WMO. Impact based flood forecasting aims to close the gap from forecasting how high the streamflow might be in the coming days to forecasting what the high flows might do. The target audience for impact based flood forecasts can be both the population at large and are the authorities responsible for civil protection and emergency management at national, regional and local levels. Several national hydrometeorological warning services, e.g. in Sweden, England and Scotland, are currently running impact based flood-forecasting services.

Since 1989 The Norwegian Water Resources and Energy Directorate is running the national services for forecasting floods and issue warnings for regions and municipalities. Precipitation-runoff models for almost 160 catchment distributed all over Norway are used to forecast streamflow. Flood warnings are then mainly issued based on predefined thresholds for streamflows (mean flood, 5- and 50 years floods) whereas the warnings mention typical impacts of the expected floods.

NVE aims to provide impact based flood forecasts for Norway and have started a 4 year pilot for four selected catchments in Norway to assess the information, models and tools needed to achieve this aim. A first challenge is that the hydrological models need to provide forecasts where the flood might have an impact, which signifies that the hydrological models will be applied in ungagged locations. The models used to assess impacts need to represent the relevant processes. In a first step we focus on riverine floodings where hydraulic models can be used to estimate water depths in exposed areas. These water depths are subsequently used to estimate impacts based on the buildings and infrastructure potentially affected by the flood. Floods in small and steep catchments would require models that also take into account erosion. Important challenges when applying these models on a national level is to well represent all processes, including human influence and reservoirs, and have data needs that allow them to be upscaled to all Norway.

**Keywords: flood forecasting, impact based forecasting, risk based forecasting**