

Proposals for NORMAN Joint Programme of Activities 2022

Title	Remobilisation of pollutants during extreme flood events – International ring study for a comprehensive effect-based and chemical profiling of the extreme flood events in Germany
Type of activity	Pilot study
Leader	Goethe University Frankfurt
Topic / activities	<p>Background / Justification for the proposed activity:</p> <p>For several European river basins, including the Neckar, Rhine and Elbe, legacy contaminants found in historic sediment layers can be described as “potential chemical time bombs”. Sediments have to be taken into account to reach the good environmental status in European catchment areas and have been classified as a crucial element in River Management Plans. Stronger floods in many parts of the world, expected with future climate change scenarios, will likely remobilise contaminants through the resuspension of sediments. The forecasted increase in frequency and magnitude of floods and flood-generating events underscores the importance of developing profound knowledge of flood-related contamination. Data on contamination of flood-mobilised sediments are extremely scarce and lacking as a basis for decision-making in Europe. Via this JPA, NORMAN is in the position to provide first data on the contamination and potential effects of real-world flood samples and make them available through the NORMAN database.</p> <p>The ecotoxicological implications of such extreme flood events will be evaluated by chemical sediment analyses and bioanalytical tools and overcome the existing knowledge gaps on ecotoxicological risks of contaminants from sediment remobilisation and distribution from flood events. Some of these limitations are related to the difficulty in predicting future flood events, which restrict baseline monitoring of environmental health prior to a flood event and are further hindered by the logistics of last-minute sampling and assessment during and shortly after a flood (Crawford et al. 2021, J Haz M (https://doi.org/10.1016/j.jhazmat.2021.126691)).</p> <p>The floods that ravaged several areas of Germany in the summer of 2021 are extreme events with a very low recurrence probability (estimated ~10,000 years). Those extreme events dramatically showed the potential effects of climate change, which is expected to render them increasingly severe and frequent. Climate change can interact strongly with other anthropogenic stressors of nature. Thus, a frequently underestimated hazard of extreme flood events is the mobilisation or remobilisation of various contaminants. Pollutants released directly into the water from affected and damaged infrastructures as well as pollutants previously bound in sediments and remobilised by the water force during flooding can affect aquatic ecosystems and adjacent terrestrial ecosystems associated with them. Benefiting from strategic location and partnerships, the Goethe University was able to collect samples from a number of German locations during the 2021 flooding events. In this JPA, 10 selected sediment and suspended sediment samples of the flood collected in the Eifel region in the summer 2021 will be tested in a joint ring study in order to investigate the influence of such rare extreme flood events in low mountain ranges and to provide first data through the NORMAN database.</p> <p>Several effect-based methods (EBMs) from the proposed NORMAN battery, additional bioassays on neurotoxicity and chemical analyses will be used to obtain comprehensive insights to the impact of such an extreme flood event in respect to the goals of the European Water Framework Directive (WFD).</p> <p>Description of the proposed activity and expected outcomes for 2022 (and beyond):</p> <p><i>Activity 1:</i> Extraction of sediment and SPM samples in the Goethe University.</p> <p><i>Activity 2:</i> Mailing of extracted samples to NORMAN members for analyses using EBMs and Chemical analysis.</p> <p><i>Activity 3:</i> Workshop for the evaluation of results and identification of the impact of such flood events for the objectives of the WFD</p> <p><i>Activity 4:</i> Joint paper on the interlab test and the impact of extreme flood events in respect to the goals of the WFD.</p> <p><i>Activity 5:</i> Feeding chemical and effect-based monitoring data into the NORMAN database system</p> <p>Added value / Link with other NORMAN activities and / or other projects</p> <p>The project provides unique data on chemical contamination and toxic risks mobilised by increasingly occurring extreme events complementing the NORMAN set of European monitoring data with a specific focus on (particularly scarce) data from effect-based monitoring complemented with corresponding chemical data. It combines several unique capabilities of the NORMAN network to produce information hardly achievable by isolated individual efforts. These include the expertise and geographical spread of the network, which allowed fast response and sampling in the event of unforeseen events, and being able to swiftly coordinate the conduction of a high number EBM and chemical analyses. These unique collective capabilities will provide response to pressing environmental questions related to chemical pollution and environmental monitoring of aquatic ecosystems.</p> <p>Overarching this JPA will involve Working Groups 2 and 3 and generate important input regarding the importance of extreme floods to achieving good chemical status in the WFD and to develop a toolkit for a fast evaluation of such flood events. The findings will also be implemented into the NORMAN databases and presented to European science policy bodies, such as the WG on Chemicals.</p>

Participants	<p>Lead: Goethe University Frankfurt (Henner Hollert, Sarah Johann, Sabrina Schiwy, Andreas Schiwy, Sarah Crawford & Fransisco Sylvester)</p> <p>Partner with commitment or requested:</p> <p>UFZ (Beate Escher, Werner Brack, Eberhard Küster., Riccardo Massei)</p> <p>BFG (Sebastian Buchinger, Martina Fenske)</p> <p>ORU (Steffen Keiter, Magnus Engwall)</p> <p>SLU (Lutz Arends, Johan Lundvist)</p> <p>RECETOX (Klara Hilscherova)</p> <p>HET Waterlaboratorium (Corine Houtman)</p> <p>INERIS (Selim AitAissa, Francois Brion, Valeria Dulio)</p> <p>Eawag (Juliane Hollender, Sarah Könnemann)</p> <p>Centre Ecotox (Etienne Vermeirssen)</p> <p>ISSEP (Yves Marneffe)</p> <p>Stockholm University (Magnus Breitholtz)</p> <p>University of Saskatchewan, Canada (Markus Hcker, Markus Brinkmann)</p> <p>University of the Basque Country Plentzia Marine Station (Manuu Soto, Ifremer (Xavier Cousin)</p> <p>IWW (Gehard Schertzinger)</p> <p>KWR (Stefan Kools)</p> <p>VU (Jessica Legradi, Marja Lamoree)</p> <p>INRAE (Cecil Miede)</p> <p>Who else is interested? partners to join?</p>
Proposed in-kind contribution	Almost all the practical work is based on in-kind contributions including samples (already available), biotesting and chemical analyses.
Contribution needed from NORMAN Association¹	<p>Total: 9000 k€</p> <p>Support is needed for the shipping of samples among network members, student assistance in processing samples, compiling the data, writing a draft of a manuscript, open access fee and conducting a workshop in Frankfurt.</p>

¹ Please, provide here a transparent justification of the requested resources and of the in-kind contribution, thereby distinguishing between the costs associated with “person-months” for the organisation, the “travelling costs” for invited speakers and the costs for the logistics (e.g. meals, room rental etc.)