Proposals for NORMAN Joint Programme of Activities 2026

Title	**From theory to practice: Testing a NORMAN roadmap on chemicals and biodiversity**
Type of activity	Online and (opportunistic) in-person work meetings, joint publications, dissemination, and research project
Leader	Activity coordinated by GUF (Francisco Sylvester, Jonas Jourdan), with UFZ (Jana Schor), RWTH (Pedro A. Inostroza), and BfG (Liza-Marie Beckers)
Topic / activities	***Background / Justification for the proposed activity:*** Chemical pollution is one of the major drivers of global biodiversity change (IPBES 2019). In recent years, regulatory and management instruments have expanded significantly in response to accelerating ecosystem degradation. These instruments include the European Water Package (the suite of laws governing water management, quality, pollution control, wastewater treatment, groundwater protection, and aquatic ecosystem protection—most notably the Water Framework Directive and the 2025 European Water Resilience Strategy), the Zero Pollution Action Plan, the European Central Bank research programmes (e.g. visit here), and the European Sustainability Reporting Standards (ESRS) under the Corporate Sustainability Reporting Directive (CSRD), now under revision through the Omnibus package. Although policy developments have advanced rapidly, scientific research—despite notable exceptions (e.g., Brack et al. 2018, 2019)—remains predominantly technical and often poorly aligned with practical regulatory and management needs (Sylvester et al., in prep. a). Biodiversity change and chemical pollution are still frequently studied in isolation within separate scientific subdisciplines (Sylvester et al. 2023), resulting in limited policy-relevant evidence linking chemical pressures to ecological outcomes. A growing body of conceptual and empirical work has begun to connect chemical exposures to ecological impacts (Oginah et al. 2023, 2025). Within NORMAN, recent initiatives—such as the Workshop on Biodiversity Loss and Chemical Pollution (Hollert, Sylvester, Johann, Koschorreck, Dulio; *JPA Biodiversity Workshop*) and the Blueprint for Linking Ecotoxicity to Biodiversity Damage (Fantke, Posthuma, Treu, Hollert; *JPA Blueprint*)—have advanced understanding of the European research landscape (Sylvester et al., in prep. b) and strengthened conceptual and quantitative links between chemical pollution and biodiversity change. However, the translation of scientific knowledge into applied regulatory or corporate contexts remains insufficient. Key gaps include lack of workflows to connect biodiversity change and chemical exposures to specific activity company variables, limited understanding of transmission mechanisms linking chemical exposures to ecological impacts, insufficient integrated databases combining chemical and biological information, and lack of systematic analyses of current research limitations hindering practical guidance. The proposed JPA builds upon previous NORMAN work at the interface of chemical pollution and biodiversity change, advancing the network's strategic development in this domain. Specifically, it will: • move beyond the characterization of European research networks conducted in the *JPA Biodiversity Workshop* to identify concrete research gaps relevant for policy and regulation, • extend the scope of the *JPA Blueprint* by not only addressing missing links between chemical pressures and biodiversity damage but also identifying broader structural causes behind the misalignment between science and policy, • using the experience gained through *JPA Blueprint* develop a tailored case-study database to test hypotheses, assess monitoring strategies, and provide a proof of concept for improved regulatory and research workflows. ***Description of the proposed activity and expected outcomes for 2026:*** ***General objective:*** The present project aims to use NORMAN's unique interdisciplinary expertise to (i) identify critical research gaps that need to be addressed to better inform policy, (ii) contribute to a NORMAN research roadmap on chemicals and biodiversity, and (iii) develop a pilot case-study database for hypothesis testing and methodological improvement at the science–policy interface. **Task 1. Identification of key challenges and research needs** We will build upon the activities and discussions of Breakout Group 2 ("How to link chemicals and biodiversity loss") from the hybrid 2025 NORMAN WG2 Meeting (Frankfurt, 12–13 November) to identify the main challenges and research needs faced by public policies addressing chemical pollution and biodiversity. **Methods:** We will make online secondments of the 2025 NORMAN WG2 Meeting to arrive to a consolidated assessment. We will invite the original participants of Breakout Group 2 but will not be limited to them as there is within NORMAN considerable expertise relevant to the topic. We will make a broad call for participation to complement the expertise and had a view as broad and comprehensive as possible. **Task 2. Assessment of how scientific research and existing databases meet these needs** This task will systematically search for evidence supporting or modifying the assessment obtained in task 1. **Methods:** We will conduct literature searches (e.g., Web of Science, SCOPUS) to characterize past and

	current research focus areas at the interface of chemical pollution and biodiversity, combined with a screening of open databases to identify common limitations in chemical, ecotoxicological and biodiversity data that constrain effective monitoring, assessment, and policy implementation. To obtain a grasp on the perspective of the stakeholders receiving policy and regulations decisions–companies–, we will analyze the landscape of regulatory and reporting obligations affecting companies, the current reporting practices (we will start by a selection of DAX-40 companies, primarily affected by regulations), existing information workflows and missing tools or datasets, and opportunities for scientific research to bridge identified gaps. **Task 3. Case study: Demonstrating the power of joint chemical and biological monitoring** We will couple monitoring efforts by the Hessian Agency for Nature Conservation, Environment and Geology (HLNUG) with NORMAN capabilities to obtain a unique integrated database of biodiversity and chemical exposure for freshwater habitats across Hessen. Taking decisive action, this initiative will demonstrate in practice how comprehensive chemical monitoring—systematically paired with the extensive biological monitoring already in place—can generate a robust, statistically powerful database capable of directly linking chemical exposures with the actual occurrence of species (macrozoobenthos, fish, macrophytes, algae). This proof-of-concept study marks the launch of a pioneering evidence base that will reveal the true potential of integrated monitoring to uncover chemical–biodiversity relationships. **Methods:** We enhance regular WFD monitoring by integrating comprehensive chemical analyses. This is enabled through close cooperation with HLNUG and the Federal Institute of Hydrology (BfG), alongside state-of-the-art toxicity assessments—including in vitro sediment tests—conducted in parallel at the same sites and analyzed at GU Frankfurt. If JPA participants can support this we will also consider complementing HLNUG sampling with eDNA sampling. With the involvement of other participating institutions (see below), advanced analytical and computational approaches will be applied to evaluate the data—demonstrating the substantial benefits that arise from comprehensive, well-coordinated monitoring and showing how this integrated dataset can generate research, monitoring, and regulatory guidance. **Expected outcomes** • A joint perspective publication of broad NORMAN authorship (end of 2026). • A NORMAN presentation or policy-oriented report synthesizing conclusions for regulators and policymakers (end of 2026) • A joint scientific publication reporting the results of the case study (during 2027) ***Added value / Link with other NORMAN activities and / or other projects*** • This JPA capitalizes discussions from 2025 NORMAN WG2 hybrid meeting (Frankfurt). • Leverages and extends insights from the *JPA Biodiversity Workshop* and *JPA Blueprint*, and puts them into practice • It will foster broad collaboration and participation across NORMAN member institutions. • Stays low-budget via online collaboration, with in-person meetings only when feasible.
Participants	Confirmed and prospective participant organizations (confirmed participants in brackets) include GUF (Henner Hollert, Peter Fantke, Eberhard von Alten, Luisa Orsini, Florencia Liquin, and Alischa Becker), RWTH (Thomas Backhaus), UBA (Gabriele Treu), IMDEA Water Institute (Andreu Rico), UFZ, INERIS, UV, as well as additional NORMAN and PARC members. This list of participant organizations has been drafted given their expertise related to the proposed methods, but all NORMAN members are kindly invited to join if interested in contributing.
Proposed in-kind contribution	The project brings together a diverse with multidisciplinary expertise and technical capabilities spanning chemical pollution, biodiversity research, applied stress ecology, ecotoxic-omics, and data science. The collaboration is emerging yet well-coordinated, with previous successful joint initiatives. The JPA is entirely led by early- to mid-career researchers, bringing fresh perspectives and new contributions to NORMAN. We will seek private sector funding to extend and disseminate applied outputs.
Contribution needed from NORMAN Association[1]	Total request: €10,000, consisting of: • €4,000 for sampling activities, toxicity and chemical assessments, computational resources, and associated expenses; • €6,000 to support the working hours of an advanced student or postdoc responsible for literature searches, database screening, information extraction, and data management.

References

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IPBES. Global Assessment Report on Biodiversity and Ecosystem Services: Summary for Policymakers (IPBES secretariat, 2019).

[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.)

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