Proposals for NORMAN Joint Programme of Activities 2025

Title	**WG-5 Water reuse and policy support**
Type of activity	Working Group activities
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Topic / activities	***Background / Justification for the proposed activity:***
	In response to the escalating problem of water scarcity and waste management, treated wastewater, and sewage sludge are increasingly identified as reliable alternative sources for a range of applications. More recently, interest in the potential use of urban stormwater as a locally derived alternative water source is growing. Although reuse practices are accompanied by a number of benefits, several questions are still open regarding the potential presence of a range of contaminants of emerging concern (CECs). Current open challenges include the occurrence of chemicals and biological contaminants (e.g. viral genetic material including SARS-CoV-2, antibiotic resistance genes and bacteria), the effects that these contaminants may induce on receiving ecosystems and humans exposed via the environment, the identification of technologies that are able to remove such contaminants and means and solutions to overcome these challenges and promote safe reuse practices further.
	
	Description of the proposed activity and expected outcomes for 2025:
	A growing interest for data on biological and chemical CECs linked to reuse practices (i.e., the use of wastewater, stormwater and associated sludge/sediments for different purposes e.g. agriculture, aquifer recharge, support public health decision-making, urban and recreational activities, construction, land restoration) has emerged with the EU circular Economy and the zero-pollution action plans. The adoption of the new EU Regulation on water reuse for agricultural irrigation and the revised EU Directive related to urban wastewater treatment, as well as, the evaluation of the sewage sludge EU Directive all promote reuse as an opportunity to increase water security, with a lack of data on CECs at a local level an identified barrier to a more widespread implementation of reuse practices. In line with the proposed activities built on the WG-5 mandate, two projects related to databases are planned to continue in 2025, with a new activity focused in stormwater reuse proposed.
	
	Task 1: The Antibiotic Resistance Bacteria and Genes Database
	NORMAN ARB&ARG was first launched in 2021 as an open platform for the exchange of ARB&ARG occurrence data and analytical methods following the FAIR (Findable, Accessible, Interoperable, Reusable) principles. The database has been enriched with 3741 data points from 11 countries (415 soil, 958 surface water, 705 groundwater, 1240 wastewater, 43 sewage sludge and 380 'other matrices'). An overview of the database functionalities, data extraction, and the contribution of data to the database has been presented in the publication "Making Waves: The NORMAN Antibiotic Resistant Bacteria and Resistance Genes Database (NORMAN ARB&ARG) – an invitation for collaboration to tackle antibiotic resistance". The ambition to collect enough data to establish baseline ARB&ARG concentration levels in soil, wastewater, sludge, groundwater, and surface water still remains a primary goal. In 2024, 1119 data points were added in the ARB&ARG database. Moreover, protocols for sample preparation, analysis and the sample quantity requirements for monitoring campaigns were collected. The goals for 2025 are to 1) Intensify efforts to collect, harmonize, and upload ARB&ARG data from key scientific publications, 2) Improve functionalities of the database 3) Attempt to initialize monitoring campaigns (e.g., JDS5) for ARB&ARGs and A&TPs to enrich the database with new data, and 4) pursue the incorporation of NGS data into the database.
	
	Task 2: Scoping potential for stormwater reuse
	A key impact of a warming climate is changes in rainfall patterns, with increases in the frequency of both summer droughts and winter rainfall events predicted for much of North western Europe. This is a particular challenge for urban areas, where their largely impermeable surfaces reduce recharge of water bodies (contributing to water scarcity) and enhances surface runoff volumes (exacerbating flood risks and degrading water quality). Hence the same urban areas cam become a hot spot for both floods and droughts, raising the key question: can stormwater be used to meet non-potable water demands? Whilst regulations and policies are in place to facilitate wastewater reuse, the potential to collect, treat and store stormwater at an urban scale has yet to be robustly assessed. This new activity builds on the stormwater reuse component of the reuse article being developed under Task 3 by undertaking a systematic review of current knowledge on stormwater reuse from opportunities and challenges perspectives.
	
	Activities planned for 2025
	• online meeting to discuss stormwater reuse interests and current projects within NORMAN
	• scope interest – and if interest - plan:
	  ○ an international stormwater reuse review article to report on current practices, treatment technologies and future opportunities
	  ○ a pan-European stormwater monitoring campaign
	
	Results obtained in 2024
	• Whilst activities to further develop the SARS-CoV-2 in sewage (SC2S) Database were planned, in practice there was limited appetite to develop the database further due to e.g. activities of the EU Wastewater Observatory for Public Health initiative which many are committed to and limited capacity to share data to further different databases.

	Task 3: Databases for CEC risk characterisation in reused environmental matrices The risks linked to chemicals in reused matrices like water and sewage sludge are mostly unknown and occurrence data as well as quality targets (or threshold values) are needed to characterise and prioritise those risks. Therefore, the WG5 have identified as a new priority the collection and the dissemination of such data to support research projects, policy makers and environmental managers. The opportunity to upgrade the NORMAN existing databases, EMPODAT for occurrence data and Ecotoxicology for quality targets (hazards data), was identified in 2021 as the most relevant approach to collecting data related to chemical contaminants in reused matrices and to characterise their risk according to the WG1 prioritisation framework. In 2024, the following tasks has been performed to reach this objective: - the EMPODAT database has been enriched with 2205 data points paper on reclaimed water from 5 WWTPs in Cyprus reused in agricultural irrigation. - 30 new quality targets in water reused for agricultural irrigation have been collected from Italian, German and UK authorities for risk assessment. - Soil quality targets with various protection targets (soil ecosystem, livestock and humans) were collected for 244 substances. They were converted in quality target in sewage sludge (according to the approach presented in 2023) for the 54 substances matching with the Swedish occurrence dataset provided by SLU. - Peer review publication on the risk characterisation and prioritisation of CECs in on reused waters including stormwater and reclaimed water: A preliminary risk characterisation of stormwater reused in agriculture and water surface recharge has been performed. Based on this exercise, a data collection template has been developed to collect the large occurrence dataset from the different co-authors in order to perform the risk characterisation. The collection of the data is planned to be finalised by the end of 2024. The activities planned for 2025 are the following: - Collection and publication of new occurrence data on stormwater, reclaimed water and sewage sludge in EMPODAT based on literature reviews. - Collection and publication of new quality targets on soil and conversion in quality targets on sewage sludge for agricultural fertilisation in the Ecotoxicology database. - Perform the risk characterisation and prioritisation of CECs in sewage sludge for agricultural fertilisation. - Publish the risk characterisation and prioritisation of CECs in reused waters including stormwater and reclaimed water in a peer-review journal. ***Added value / Link with other NORMAN activities and / or other projects*** • Support the EU with the implementation of the Regulation on minimum requirements for water reuse (2020/741), the Directive on UWWTP and the sewage sludge Directive (86/278EEC) • Contribute to the PARC partnership, the EU Zero Pollution Action Plan and Circular Economy Action Plan and the protection of public health in accordance with the One Health approach. • Link with WG1 Prioritisation activities for the identification of priority contaminants in environmental matrices intended for reuse in different practices and processes. • Link with WG7 for the collection of occurrence data on soils impacted by reuse practices and threshold values to protect the soil ecosystems, the feed and the food. • Identification of the contribution of WWTPs to the environmental spreading of biological hazards • Link with other projects: FORMAS Integrated stormwater and groundwater management; FORMAS *Closing the water cycle to increase Urban Resilience to Extreme Events (CUREE)* and VINOVA *Urban stormwater: from risk to resource*
Participants	WG5 members and partners from SCORE and Water Europe networks
Proposed in-kind contribution	LTU/DERAC/EI: Co-leading WG5. LTU, DERAC, EAWAG, SLU, IDAEA, UFZ, IRSA, University of Cyprus, INERIS, IRCCS, IMDEA, Sapienza University of Rome: Manuscript preparation for the risk characterisation of chemical contaminants in reused waters i.e. stormwater, reclaimed water, WWTP effluents reused for surface water recharge and agricultural practices. LTU/DERAC/EI launch of new activity on stormwater reuse DERAC, SLU, ISSeP: Risk characterisation of chemical contaminants in sewage sludge reused in soil fertilisation. EI, IMDEA: Improve functionalities of the ARB&ARG database, quality check and import of the ARB&ARG DCTs
Contribution needed from NORMAN Association[1]	DERAC (8,500 €) Collection of occurrence data and quality targets for the NORMAN databases and risk characterisation of reused matrices. EI (4,000 €) Person time to collect, harmonize, and upload ARB&ARG data from key scientific publications (see NDS Factsheet)

[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.)