

Proposals for NORMAN Joint Programme of Activities 2022

Title	NORMAN WG-5 Water reuse risk assessment and policy support
Type of activity	Working Group activities
Leader	LTU and DERAC
Topic / activities	<p>Background / Justification for the proposed activity:</p> <p>In response to the escalating problem of water scarcity and waste management, treated wastewater, sewage sludge and other solid matrices are increasingly identified as reliable alternative sources for a range of applications. Although the reuse practice is accompanied by a number of benefits, a number of questions are still open regarding the release of contaminants of emerging concern. Current open challenges include the spread 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 problems and promote safe reuse practices further.</p> <p>Description of the proposed activity and expected outcomes for 2022:</p> <p>A growing interest for data on CECs linked to reuse practices (i.e., the reuse of environmental matrices for different purposes like agriculture, aquifer recharge, urban and recreational activities, construction, land restoration) has emerged with the new Circular Economy Action Plan, the recent adoption of the new EU regulation on water reuse for agricultural irrigation and revision of the EU Directive regulating the reuse of sewage sludge in agricultural fertilisation. In line with the proposed activities built on the revised WG5 mandate (adopted in 2020), three projects, all related to databases, have been developed or continued in 2021 and are planned for 2022.</p> <p>Task 1: The Antibiotic Resistance Bacteria and Genes Database</p> <p>Antibiotic Resistance Bacteria and Genes (ARB&ARGs) released in the environment are able to produce alterations in the microbial communities promoting the acquisition of new resistance factors by pathogens thereby reducing our ability to prevent and treat bacterial infections. Quantifying the pathways and identifying the drivers of transmission of antibiotic resistance, including antimicrobials pollution, are key components to understand and manage this global health challenge. Occurrence of ARB&ARGs in various hotspots (e.g. wastewater, manures...) and their receiving environmental compartments (e.g. ground/surface water, soil, crops) should be made available as no global repository of data on ARB&ARGs already exist. The NORMAN ARB&ARGs database is expected to support (1) automated prioritisation of biological risk factors (2) use of data in models for large scale projections (3) use of data for policy development (4) derivation of transparent science-based emission limit values (ELVs) for the target microcontaminants in matrices intended for reuse.</p> <p><u>Results obtained in 2021:</u> The database (https://www.norman-network.com/nds/bacteria/index.php) was designed based on the data-collection templates (DCTs) that were created in the ANSWER project. The DCTs cover a wide range of matrices (soil, sewage sludge, surface water, wastewater and groundwater). Moreover, the ANSWER consortium and NORMAN members contributed in total 18 ARB&ARG datasets.</p> <p><u>Activities planned for 2022:</u> The improvement and population of the database are the most important goals for 2022. The database will be upgraded to support chemical data on antibiotics and their transformation products (TPs) as well as antimicrobial substances. Moreover, the database will be enriched with advanced visualization options. An effort to bring together chemical and biological data at the largest possible scale (both in quantity and in spatial distribution) will be made. The data that will be contributed is expected to establish baseline concentration levels in wastewater intended for reuse and in other matrices. Once a critical amount of data is contributed, correlations between chemical and biological contaminants will be calculated. A manuscript presenting the database and the contributed data is planned to be prepared and submitted for publication.</p> <p>Task 2: the SARS-CoV-2 in sewage (SC2S) Database (NORMAN SCORE)</p> <p>This voluntary initiative has been developed as an opportunity for researchers to contribute to international efforts to tackle the Covid19 pandemic. The SC2S database is designed to allow (1) access to the latest information on SARS-CoV-2 in sewage across Europe and internationally and (2) identification of gaps in data relating to geographical areas and/or epidemiological data. Since the outbreak of the Covid19 pandemic, wastewater research groups around the world have been collecting influent wastewater samples to analyse the presence of SARS-CoV-2 viral RNA using a variety of methodologies. One approach to reducing uncertainty in developing national and international data sets was to develop a common protocol for sample collection, storage, extraction, analysis and data sharing which research groups can opt to use as – or alongside – their own protocols to support the development of an international comparable data set.</p> <p><u>Results obtained in 2021:</u> the SC2S database has been populated with 556 data sets from 10 countries. An article on the initiative – co-authored by 59 contributors - was published as a Water Research Making Waves article in April 2021 (https://doi.org/10.1016/j.watres.2021.117167). A pilot study involving the use of a 'slimmed down version' of the DCT was held over the summer to assess its use as a mechanism for regular submission of data from volunteers located in as many countries as possible. Following the success of the trial, an invitation to participate has been sent to all NORMAN and SCORE members.</p>

	<p>Activities for 2022: Whilst the database will remain open to all submissions, the focus will be on working with volunteers who can commit to the monthly submission of data from their local WWTPs enabling a longitudinal data set of WW characteristics. SARS-CoV-2 and case numbers to be developed for as many countries/locations as possible. After a period of one year the data will be evaluated to explore relationships between parameters and how this may vary spatially, temporally and in relation to catchment characteristics. A short report will be prepared and – if data permits – a research paper with all contributors as co-authors developed and submitted for publication. A second stream of work will focus on identifying and implementing options to enhance visualisation of data sets.</p> <p>Task 3: Databases for chemicals in reused matrices (NEW) 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. This initiative is supported by the Water Europe association.</p> <p>Results obtained in 2021: Within the NORMAN Database system, EMPODAT and Ecotoxicology have been identified as relevant databases to host chemical occurrence data and quality targets, respectively, but some upgrades are necessary to upload these new data related to reuse practices and to find them easily in the databases. In order to identify the necessary upgrades, a survey on reuse practices has been launched in summer 2021 to WG5 members. Based on the answers provided by the participants, which have been debriefed during a dedicated meeting in November, it has been decided to consider all the identified data on reuse practices (i.e. reclaimed water, stormwater, stormwater pond sediment, sewage sludge, dredged sediment and excavated soil) in the EMPODAT and Ecotoxicology databases.</p> <p>Activities planned for 2022: In order to upgrade the databases with all the data identified, the following tasks will be performed:</p> <ul style="list-style-type: none"> - Modification of the DCTs in EMPODAT and Ecotoxicology DBs to allow the upload of occurrence and quality targets related to reuse practices including reclaimed water, stormwater, sewage sludge, sediment and soil. - A pilot study with occurrence datasets and public quality targets to test the practicality of the modified DCTs for regular submission of data from volunteers of NORMAN and Water Europe. - Upgrade of the “search functions” to allow an easy identification of datasets on reuse practices. <p>Added value / Link with other NORMAN activities and / or other projects</p> <ul style="list-style-type: none"> • Identification of the contribution of WWTPs to the environmental spreading of biological hazards i.e. Antibiotic resistance and Covid. • Support the WG1 Prioritisation activities: identification of priority contaminants in environmental matrices (i.e. water, sewage sludge, pond/dredged sediment and excavated soil) intended for reuse in different practices and processes. • Support the implementation of the EU Regulation on minimum requirements for water reuse (2020/741), Sewage sludge Directive (86/278/EEC) and Circular Economy Action Plan. • Contribute to the PARC partnership, the European Green Deal's Zero Pollution Action Plan and the Chemicals Strategy for Sustainability.
Participants	WG5 members and partners from SCORE and Water Europe networks
Proposed in-kind contribution	<p>LTU: Co-leading WG5, further development of the SC2S database and lead on the analysis of submitted datasets.</p> <p>DERAC: Adaptation of the relevant templates in EMPODAT (i.e. DCTwaste water, DCT sewage sludge, DCT biota, DCT soil) and Ecotoxicology (i.e. DCT PNECs_Literature) databases to host datasets related to reused matrices and practices. Validation with real datasets (pilot test) for all DTCs.</p> <p>EI&LTU&DERAC: Manuscript preparation for the ARB&ARGs database</p>
Contribution needed from NORMAN Association¹	<p>DERAC (4,500 €) Co-leading of WG5</p> <p>DERAC (2,500 €) Activity/cost transferred to WG1 on Prioritisation.</p> <p>Collection and compilation of regulatory threshold values derived by international authorities (e.g. US EPA, CCME, ANZECC and ARMCANZ) for water use in agricultural irrigation. Conversion of PNECsoil into Quality Targets in sewage sludge (and sediment) applied on soil for fertilisation.</p> <p>EI (2,000 €): Programming hours for the increase of the capabilities of the database. Upload and quality check of the DCTs.</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.)