

IC4WATER RDI FUNDED PROJECTS BOOKLET

Project: MICRO AND NANOPLASTICS AS CARRIERS FOR THE SPREAD OF CHEMICALS AND ANTIBIOTIC RESISTANCE IN THE AQUATIC ENVIRONMENT

Acronym and LOGO: NANO-CARRIERS

Outcomes and expected impact:

NANO-CARRIERS identifies and evaluates a currently unrecognised research priority that needs to be addressed at international level. The risk from the export of MNP-associated chemical additives, CECs and ARGs with treated and untreated urban wastewater effluents has received little attention despite the potential hazard to humans and the environment. As such, our research will provide impacts in the scientific, socio-economic and policy domains. Results from this project are expected to directly influence urban and wastewater management and more precisely identify the possible need for development of mitigation strategies and adoption of additional, new or alternative wastewater treatment options, or whether existing treatment procedures are sufficient.

The transnational added value of the NANO-CARRIERS collaboration is related to the differing geographical/climatic, environmental and socio-economic factors that are evidently described in the proposed scenarios of this project set in South Africa, the tropics, the Mediterranean, Northern Europe or the Arctic. Obviously, the risk and resulting need for and type of management and mitigation strategies will differ for the different geographical locations and this is tackled in our project. NANO-CARRIERS will evaluate exposure and risk to human health and the environment and propose mitigating actions and specifically focussed on wastewater treatment and thereby provide society with information, tools and options for the efficient management of MNP in urban wastewater streams. The involvement of stakeholders with direct need for the data and knowledge gathered during this project will ensure and facilitate (i) rapid implementation of mitigation initiatives, (ii) adequate lobbying and raising awareness (of whether a risk is identified or not) and (iii) interaction with governmental institutions with the aim to influence legislation and contribute knowledge toward regulatory measures.

List of deliverables expected:

Scientific publications and presentations at international conferences (e.g. SETAC Europe); reports, specialist and general magazine articles, setting up a project website

Expected research results to communicate and disseminate (in very general terms)

1. Protocol of preparation of MNPs from natural matrices (UWTP): standard operating procedure; Dataset on MNPs distribution/characterisation in UWTP emission

Target groups for communication and dissemination activities:

Environmental scientists; Norman association members, environmental agencies

2. Artificial MNP preparation and extraction methodology; Dataset on mass loads of MNP-associated chemicals from effluents.	Environmental scientists; Norman association members, managers of sewage treatment plants, policy makers; environmental agencies
3. Protocol for quantifying DNA sorption onto plastic and its application to main types of plastics and at a range of particle sizes; identification of DNA sorbed onto MNPs in wastewater effluents	Environmental scientists; Norman association members, environmental agencies
4. Report on wastewater treatment, risk management options and technological solutions for the minimization of MNP-sorbed chemicals and ARGs in UWTPs	Managers of sewage treatment plants, environmental scientists, Norman association members, policy makers
Experiments / Case studies (if any): location, type of experiments:	<p>Measurements in effluents:</p> <ul style="list-style-type: none"> -Wastewater effluents in Oslo and Svalbard -Wastewater effluent in Cyprus and receiving soils during irrigation -Landfill effluent in French West Indies -Wastewater effluent in Durban/South Africa
Water Policy context / project contribution to policies (National, European, International – UN SDGs):	<p>The project addresses SDG 6 through contribution to understanding and reducing pollution and increased safe wastewater reuse (6.3). WP1-3 contribute knowledge directly relevant to the assessment of environmental quality and WP4 to the protection of environmental quality and human health.</p> <p>Specifically, NANO-CARRIERS' objectives actively contribute towards safeguarding of water resources and aquatic ecosystems, the subject of target 6.6. Our project is in line with SDG 3 related to good health and well-being, particularly regarding illness and deaths related to hazardous chemicals and environmental pollution and contamination (target 3.9) and with SDG 11 related to sustainable cities with a target focusing on waste management.</p>