

Consortium
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ACT
AGROECOSYSTEM
AQUA
MATHNUM
MICA
TRANSFORM

INRAE

Bioeconomy for urban areas



ReuseInCities

Network for reuse of treated wastewater in cities



Improve the quality of water and water reuse, increase ecological connectivity, render urban landscapes attractive and provide ecosystem services that contribute to the creation of a circular water economy

Context and challenges

The management and reuse of urban wastewater must go beyond the treatment of water and its recycling in an industrial context or for irrigation on farms. If wastewater is to be incorporated into urban ecosystems, the entire small water cycle needs to be redesigned, from identifying all available resources in a given region to characterising all possible uses and their constraints. In all socio-technical systems that allow water to be treated, transported, stored and (re)distributed. The cities of tomorrow will be home to 70% of the world's population, and cities will be where the majority of wastewater will be produced. Current urban metabolism mobilises production zones most often located in rural areas, far from urban centres. While support for the development of urban farms to make cities more resilient in the face of global shifts (relocation of production and making cities greener) is promising, it has its limits. Re-using wastewater is one important way to face up to the challenges linked to changes that are already underway. Its central location in the water-energy-matter-environment nexus makes water an essential component of the bioeconomy in urban zones.

Goals

The ReuseInCities consortium strives to use this systemic approach under the regulatory, socio-economic, health and environmental constraints the network is designed to overcome. Reuse is inseparable both from the territory involved whose potential for implementing a new form of management of water flows and/or the associated nutrients must be described, and local players who have to be mobilised to co-construct feasibility conditions for a circular water economy in their zone.

Strategies for local, or "short" circuits, must be designed to foster synergies between production facilities (treatment plants, factories), and urban uses, be they conventional or emerging, and for which non-conventional water can be used instead of drinking water (street cleaning, watering green spaces, etc.).



These issues can only be addressed using an integrated approach which involves many of the disciplines studied in INRAE's different divisions: agriculture, agronomy, soil science, human and social sciences, ecology, environment science, process engineering, water savings, digital science, and more...

Project members

INRAE division	Units	Expertise and contributions
ACT	UMR TETIS	Geography, environment, urban, sustainability, land use modelling & hydrological cycles
AGROECOSYSTEM	UR LBE	Modelling and control of bioprocesses and microbial ecosystems, micropollutants, pathogens, physico-chemical health risks – process engineering
	UMR CEREGE	Water treatment – transfer of contaminants in the water use cycle - impact on soil quality and permeability
	UMR EMMAH	Quantification of bio-aerosols, sprinklers, irrigation, transport modelling and risk assessment
AQUA	UMR G-EAU	Irrigation technologies, technical sustainability of irrigation systems, nutrients, risk of soil salinisation, health risks, participatory approaches, governance of REUSE projects
	UR RIVERLY	Urban ecohydrology – water and substance flows
MATHNUM	UMR LISC	Complex systems, dynamic systems, modelling
	UMR MISTEA	Modelling and control of bioprocesses, optimisation and viability for decision-making support, crop modelling
MICA	UR LBE	Modelling and control of bioprocesses and microbial ecosystems
TRANSFORM	UR REVERSAAL	Process engineering and consulting engineering, nature-based solutions for urban water treatment, decentralised management of urban water for resilient cities and the circular water economy
	UMR TBI	Biological and membrane processes, source separation, eco-design and modelling, water quality/use
	UR OPAALE	Sanitary microbiology, nutrient recovery processes and reuse, interactions with energy recovery

Partners	Expertise and contributions
ENPC (France)	Urban challenges of reuse
ENGEES (École Nationale du Génie de l'Eau et de l'Environnement de Strasbourg) / CNRS	Ecological engineering, process engineering, urban ecological infrastructures for water management, membrane technologies for reusing water
INSA Lyon (France)	Management at the source of urban rainwater
OFB (Office français de la biodiversité) (France)	Public strategies
International Union for Conservation of Nature (Switzerland)	Making cities greener