



MAWAC-ENA WORKSHOP

PARIS

November
2025



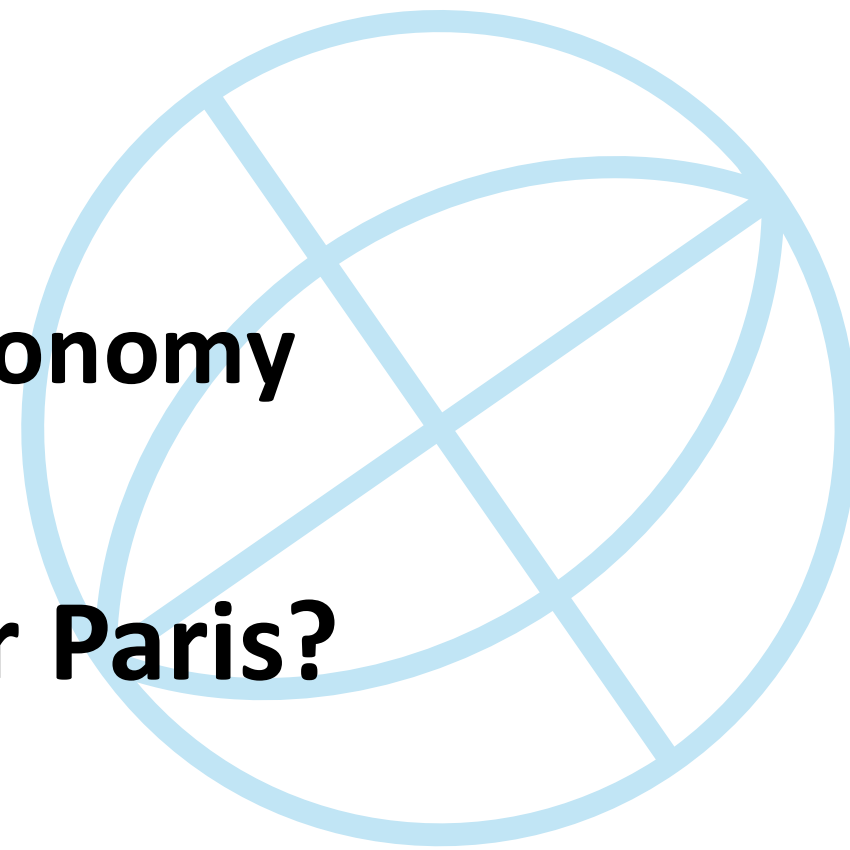
Research Project - Water Circular Economy

What's happening in the Greater Paris?

José-Frédéric Deroubaix - Laboratoire Eau, Environnement et Systèmes Urbains

Ecole Nationale des Ponts et Chaussées - Institut Polytechnique de Paris

Université Paris-Est Créteil



The national background

- The governmental «Plan national pour l'eau» - March 2023

--> 53 actions to prevent crisis situations & ensure an equitable distribution of high-quality water resources

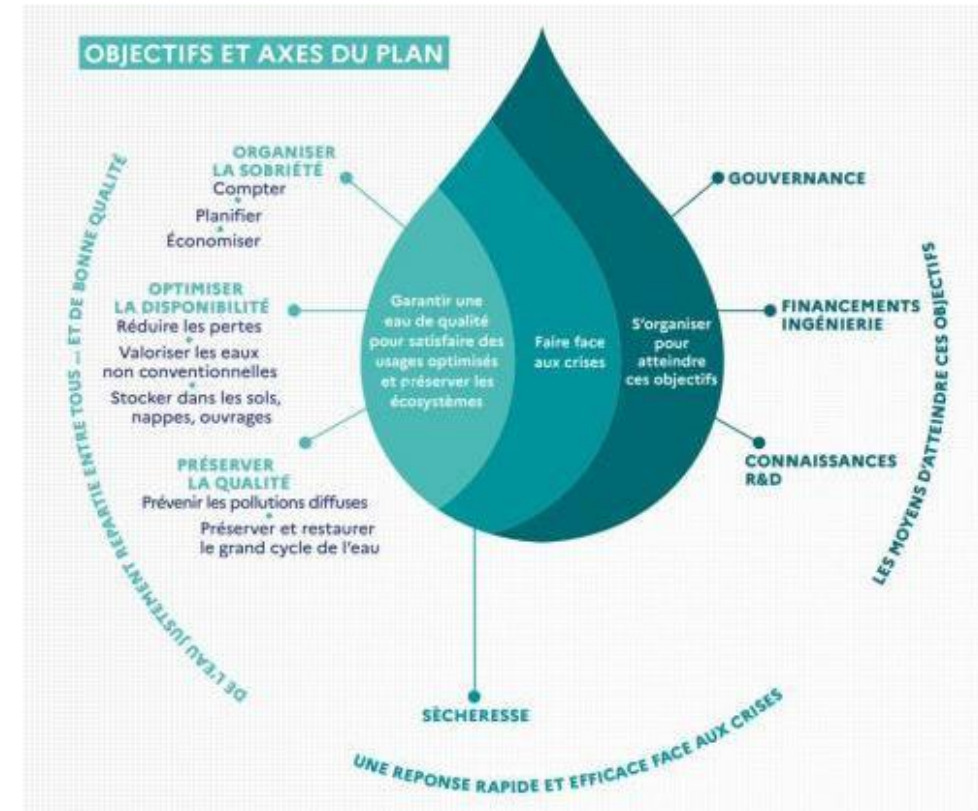
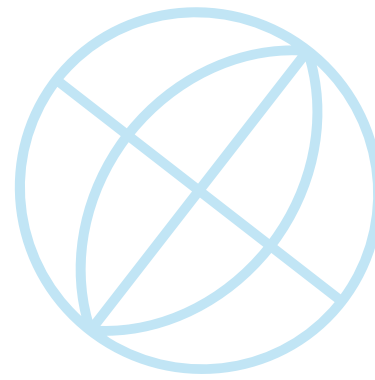
- ✓ favoring sobriety (data, planing, saving)
- ✓ opitmizing the disponibility (reduce losses, (re)use of unconventionaln waters, water stockage in aquifers / reservoirs)
- ✓ preserve the quality (diffuse pollutions, restore water cycle)

- Review of implemented measures (UW)

--> No less than 11 regulatory texts adopted / valorization of unconventionaln waters

--> The call for proposals INNOV'EAU - 100 m. €

- ✓ Upstream technics and strategies for natural resource management / climate-change context
Sobriety, NBS, stormwater source control
- ✓ **Reducing hydric losses / addressing patterns of water use**
Networks maintenance, tools that foster water efficiency in households, industry, and agriculture e.g., reuse of treated wastewater, process changes, etc.
- ✓ Treatment processes to improve water quality and ecosystem conditions
Innovations in the treatment of domestic and industrial wastewater, phytoremediation solutions, etc.
- ✓ Developing data systems for the management of water volumes and quality
Tools for monitoring and controlling water consumption



Source: Ministère de la Transition Ecologique

Main objective of the National Plan for Water: 1000 treated waste water reuse projects - up to 10% average TWWR by 20230

Experimentations in the Ile-de-France Region



- **Separation and valorization at source (urine/fèces/grey water)**

✓ **Main «knowledge hubs» in the Region:** **OCAPI** – Observatoire des usages, de l'assainissement et des pratiques innovantes / **OPUR** - Observatoire des Polluants Urbains Parisiens (École des Ponts ParisTech)

- Implementation of pilot projects for urine-diverting toilets, experiments on decentralized collection and converting of urine into fertiliser, demonstrators for grey water reuse
- Assistance to projects/programs carried out by city stakeholders (public authorities/private operators)
 - optimise the design,
 - assess the quality of the reclaimed water, the environmental and agronomic performances of fertilisers, the social and economic acceptability of projects.



Grey water reuse in the Saint-Denis fire station © J.F. Deroubaix

✓ **Main operations**

- Collective housing buildings in eco-neighbourhoods (ZAC Saint-Vincent de Paul, 600 housing units - 1,200 inhabitants),
- Demonstrators on public & private buildings (ENPC, Saint-Denis fire station for recycling water from firefighters' showers and sinks for flushing toilets, watering green spaces and washing equipment),
- Experimental urban planning projects (urine recovery as part of the urbanisation of the "plateau de Saclay")



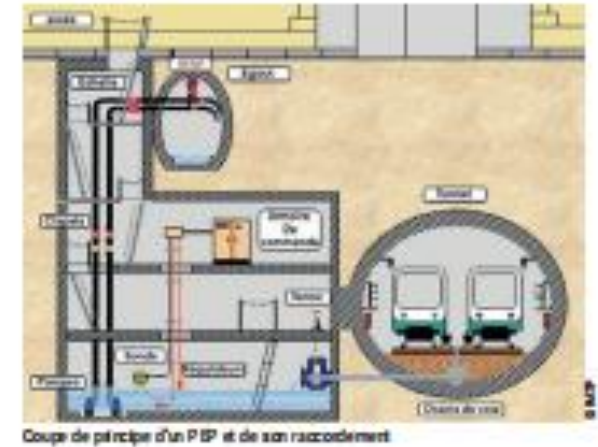
<https://www.eau-seine-normandie.fr/NL30/Quand-l-urine-devient-une-ressource-pour-la-collectivite>

Experimentations in the Ile-de-France Region

- **Others non conventionnal waters valorization /reuse the Île-de-France Region**

✓ **Waste Water Reuse**

- Leaders: SIAAP, Eau de Paris, municipalities & their associations
- Ex: the INNeauVATION program involving SIAAP - SENEIO - LEESU European Institute for Membranes = waste water reuse for irrigation, urban cleaning + multilevers valorization including energy (biogas), fertilizers, landfill), process (digestion, co-digestion, chemical conversion).



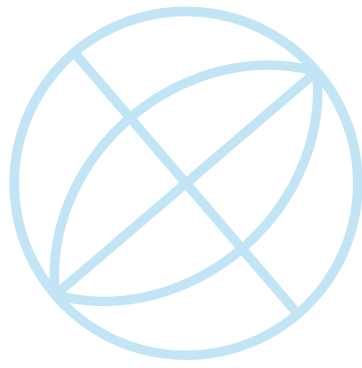
9,75 m. m3 /an collected in the subway network
382885 m3 injected in the non-drinking water network

- ✓ **Process water, mine water, rainwater**

- Leaders: City of Paris, RATP (Paris public transport authority), mainly for watering municipal green spaces, cleaning roads and technical vehicles, and industrial uses (cooling, washing).
- The City of Paris is one of the few megacities to have a dual drinking/non-drinking water network.
- Collection and use of rainwater widespread in the Île-de-France region in many new public buildings, some collective housing, stadiums, schools and other public facilities, mainly for watering, flushing toilets and outdoor cleaning.



documents
source:
APUR, note 262



Remaining barriers / issues

- Health protection and environmental protection framework
- Cost of the infrastructures (funding)
- Lack of structuration of the professional sector(s)
- remaining reluctance in some municipalities,
- Pooling of water resources and uses
- Planning the right combination in between territorial and urban specificities, purification technologies, network specificities



Circular economy in the water sector and re-use of unconventional waters for urban purposes.

JF Deroubaix (j.deroubaix@enpc.fr)

Felicia Marcus (Felicia.Marcus@stanford.edu)

Tom Theis (theist@uic.edu)

David Erdman (derdman@pratt.edu)

Alaina Harkness (aharkness@currentwater.org)

Kuldip Kumar (KumarK@mwr.org)

Mark Gold (mgoldhtb@gmail.com)

Greg Pierce (gpierce@luskin.ucla.edu)

Melissa Pierce (mpierce@currentwater.org)

Joshua Sperling (



Paris, LA, NY, Chicago

Scope of the research project



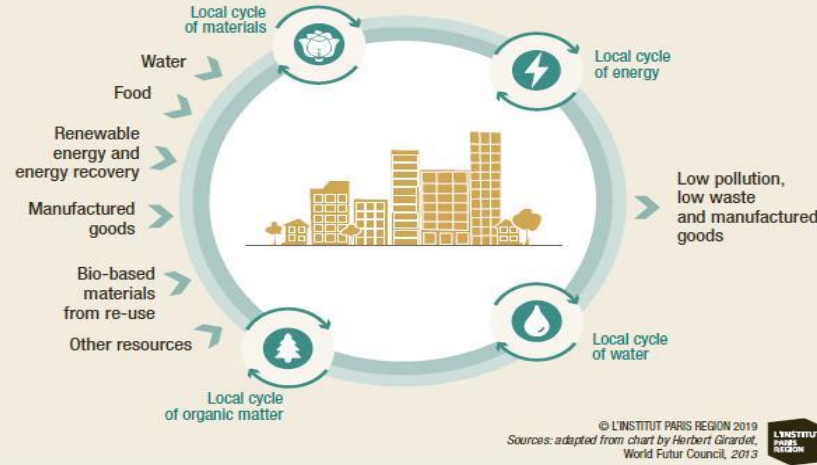
A bit of a caricature, don't you think?

Let's consider the possibilities and ways to hybridise the two socio-technical systems regarding water resource...

FROM THE LINEAR METABOLISM CITY



TO THE CIRCULAR METABOLISM CITY



Considered waters -alternative to drinkable water :

Rainwater, Stormwater, Treated waste water, Greywater, Pumped ground water resulting from urban infrastructures' implementation, Raw waters and process waters, Yellow water, Dark water.

Considered re-uses:

agricultural uses (in the megacities' hinterland), urban uses (irrigation / watering for urban agriculture, for greenspaces / urban refreshment, road network cleaning), domestic uses, aquifer recharge.

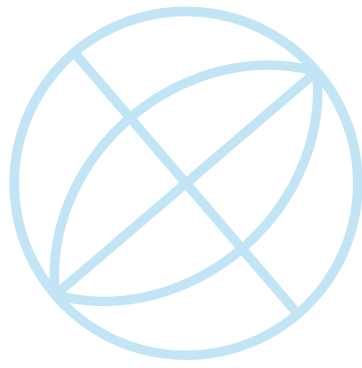
Other considered valorisation:

Energy

Project objective n°1

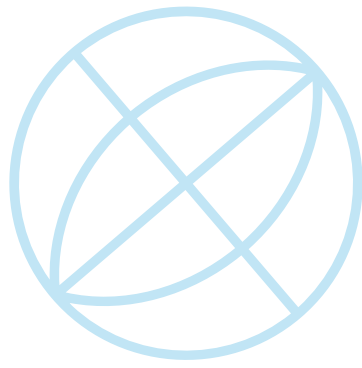


- Inventory and characterization of existing circular economy projects including:
 - Use of unconventional water as an alternative to drinking water;
 - Source separation and recovery of urine and faeces;
 - Recycling of nitrogen, phosphorus and ammonia in wastewater treatment plants
 - Optimisation of energy performance



Project objective n°2 + 3 + 4

- Comparison of regulatory drivers (levers and obstacles) for circular economy;
- Costs/benefits analysis (including side-benefits) of the various technologies of treatment possible (reedbed and other planted filters / membrane filtration / UV radiation...)
- Analysis of the appropriation processes and related changes in the «water cultures» of users.



Project objective n°5

- Identification of opportunities for deploying different types of more or less centralized/decentralized looping systems, according the various urban contexts, e.g. :
 - morphology of waste water and drinkable water infrastructures;
 - urban shapes;
 - ????

Thank you for your attention



NAME : José-Frédéric Deroubaix

MEGACITY : Paris



Métropole
du Grand Paris



service public de l'eau



SEINE
GRANDS
LACS



ARCEAU
Ile-de-France



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FRANÇAISE

Liberté
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AGENCE
eau
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Water Security Management
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