

Alternative management of urban water in large metropolitan areas: comparison between Lyon (France) and Ho Chi Minh City (Vietnam)

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Introduction

In a context of climate change and densification of urban centers, large cities have to face new questions about water management. European cities have followed the classic urban water management scheme of industrialized countries with centralized collection of wastewaters and rainwaters routed to sewage treatment plants. Megacities in emerging countries draw inspiration from this centralized water management models. But this legacy model poses many problems today (storm overflows, concentration of water flows, pollution of the environment). To make cities more resilient to global change, alternative management therefore seems inevitable to meet environmental health (preservation of the resource, flood risk) and socio-economic (network maintenance) challenges.

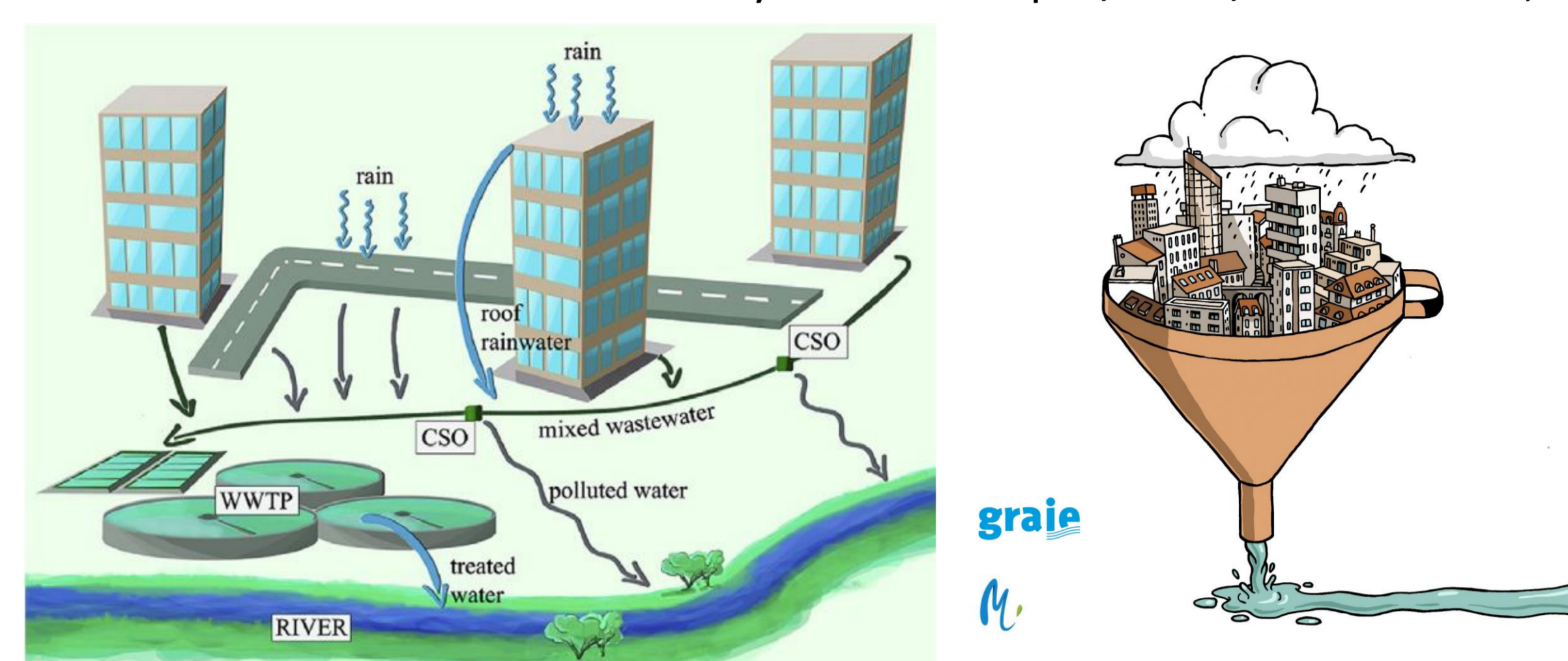


Figure 1 : Centralized management of urban waters (from Masi et al 2018 and GRAIE)

Two contrasted metropolitan areas

The two cities targeted in this study (Lyon City and Ho Chi Minh City) have different socio-economic trajectories. Water management is very contrasted in terms of existing infrastructure and urban planning (figure 2 and figure 3).



Figure 2: Ho Chi Minh City today

Year	2016	2025	2040	2050
Population (M. inh.)	8,4	11	17,2	23
Number of WWTPs	2	4	12	12
Treatment capacity (10 ³ m ³ day ⁻¹)	171	1,253	2,813	2,813
% connected	10%	57%	82%	61%

Table 1 : Present and future urban water management in HCMC (Nguyen et al 2020a)



Figure 3: Lyon City today

Year	2020	2030
Population (M. inh.)	1,4	1,5-1,6
Number of WWTPs	12	12
Treatment capacity (10 ³ m ³ day ⁻¹)	1,005	1,005 + NBS
% connected	99%	disconnexion

Table 2 : Present and future urban water management in Lyon (Source Grand Lyon and Insee for population in 2030)

Ho Chi Minh City : with more than 9 million inhabitants, the economic capital of Vietnam is in full demographic and economic expansion. The deterioration of water quality is extreme due to a lack of wastewater collection. Ho Chi Minh City plans to build ten new wastewater treatment plants within the next 20 years. But the question arises of the relevance of this extremely expensive choice and not necessarily adapted to the particular conditions of this megacity in tropical monsoon zone.

Lyon City : the city of Lyon (1.4 million inhabitants) has followed the model of centralizing urban water via collection in the sewerage network (3193 km) and then treatment in 12 treatment plants. Today, the city of Lyon is invested in the development of alternative urban water management by promoting the infiltration and waterproofing of urban areas through Nature Based Solutions (existing 56 infiltrations basin of rain water).

Objectives of the project: analyse of the effects of Nature Based Solutions

The aim of this new project is to develop analytical tools for alternative management of urban water in large cities and to test scenarios for decentralized management of urban waters using modeling approach (C-GEM model for HCMC and J2000 model for Lyon, Nguyen et al 2020b, Branger and McMillan 2020). The study's purpose is to offer an alternative vision to "sewerage" using Nature Based Solutions (figure 4) in a context of strong urbanization.



Figure 4 : Tool box of Nature Based Solution (exemple in Lyon City)

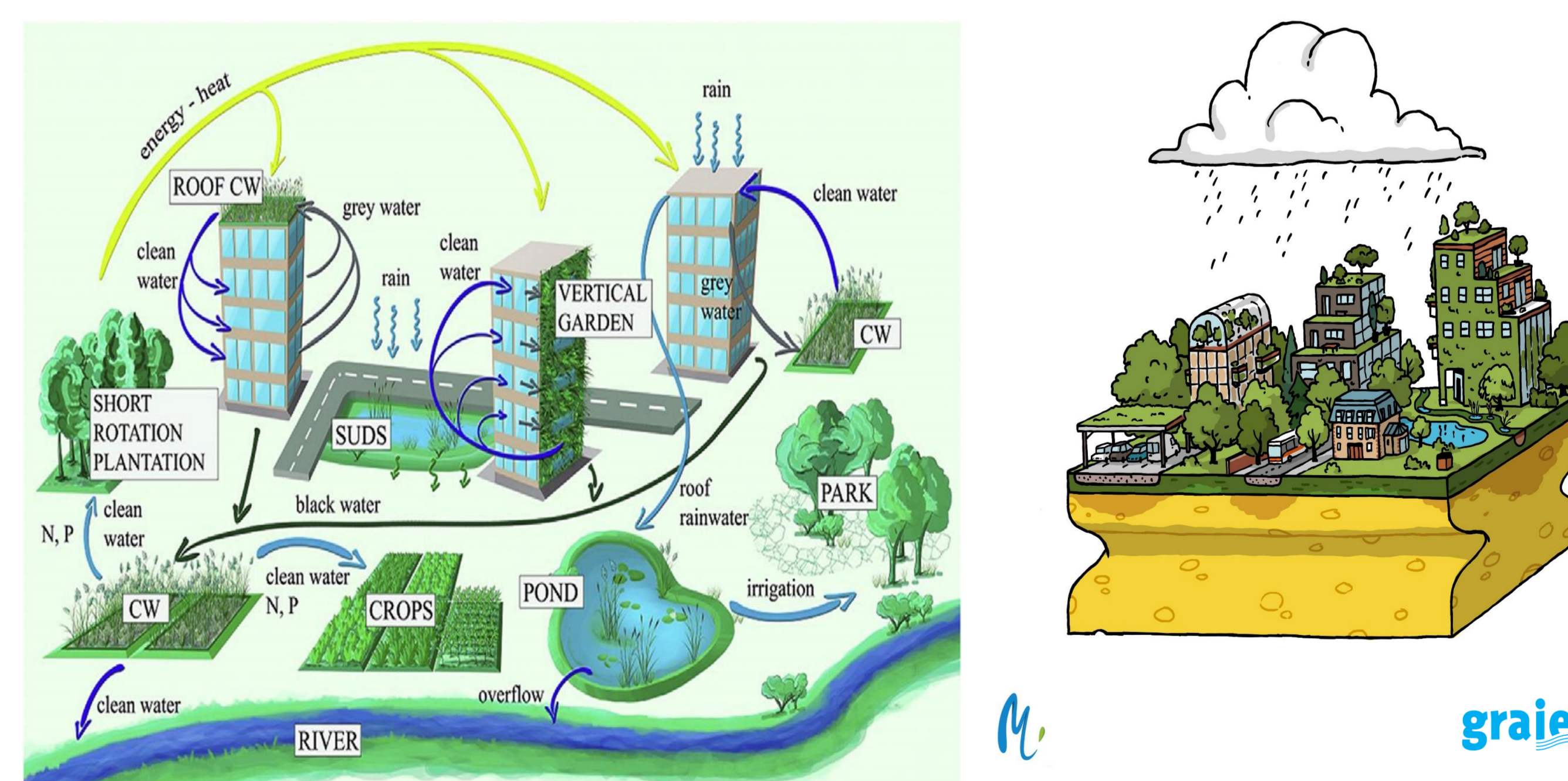


Figure 5 : Rethink the future management of urban waters (illustration Masi et al 2018 and GRAIE)

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Funds acknowledgements: International Joint Laboratory LE CARE and AURA Region Pack Ambition International