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Long-term environmental benefits of the Soil Aquifer Treatment (SAT) scheme in Agon-Coutainville (Normandy, France)

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Environmental benefits, ecosystem support and recreational services are critical aims of the Agon-Coutainville coastal area in Normandy, France. Soil Aquifer Treatment (SAT) scheme is used in addition to the WasteWater Treatment Plant (WWTP, with a 35300inh.eq treatment capacity) as a polishing step before discharge of secondary treated wastewater (STWW) to sea in an area where shellfish are commercially grown and in an estuary known for tourism.

STWW is infiltrated using surface method at a rate of $730.10^3 m^3/y$ into a sandy aquifer through three reed beds. Ecosystem protection was the primary purpose of this SAT system. There is a clear tendency of reclaimed water use being applied in water spreading systems with some level of SAT, in order to take advantage of the natural additional treatment in the subsurface. The difficulty is to assess this level of treatment.

In Agon-Coutainville, a monitoring plan has been in operation since 2005 for nutrients and micro-pollutants in the discharge from the WWTP and in groundwater (five observation wells) near the intermittently operated infiltration basins, and this has been agreed with national and local regulators and representatives of local government. This involves public annual reporting and reporting of any exceptions beyond the standards.

For understanding the interactions which exist among environmental, social, and economic pillars in an effort to better understand the consequences of this SAT scheme, 9 sustainable indicators and 1 levelised cost have been proposed and rated by Zengh et al. (2021). Environmental Sustainability Indicators (water quantity and quality, ecosystem services and stressors) and Social Sustainability Indicators (security human health, communinity-participation-education-justice). Based on careful consideration of the monitored data, the experts rated the SAT scheme of Agon-Coutainville as good in sustainability. The levelised cost of this SAT scheme is around 1.10US$ $/m^3$ to be added to the WWTP which, without SAT scheme, would have discharged directly into rivers and sea.

Increasingly, this SAT scheme is also seen as a solution to enhance environmental goals, and where multiple goals can be achieved with single systems, this appears to be an added advantage as deter saline intrusion and provide freshwater for irrigation in saline environment.