Impacts of Public Water Supply on Macronutrient Cycles Around the World

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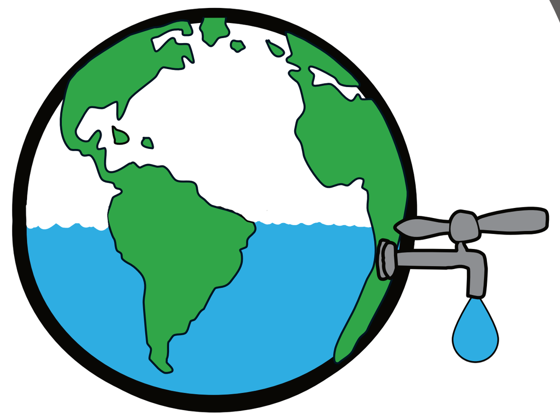
Public Water Supply and its Future Challenges



▶ A changing climate and global population increases mean that **fresh water is becoming an ever increasingly finite resource**.

▶ This increases the need for mass redistribution of fresh water via **public water supply (PWS)** infrastructure**.**

▶ **Leakage** of water from PWS pipes is cause for large volumes of water loss globally, with **significant economic and environmental** consequences.

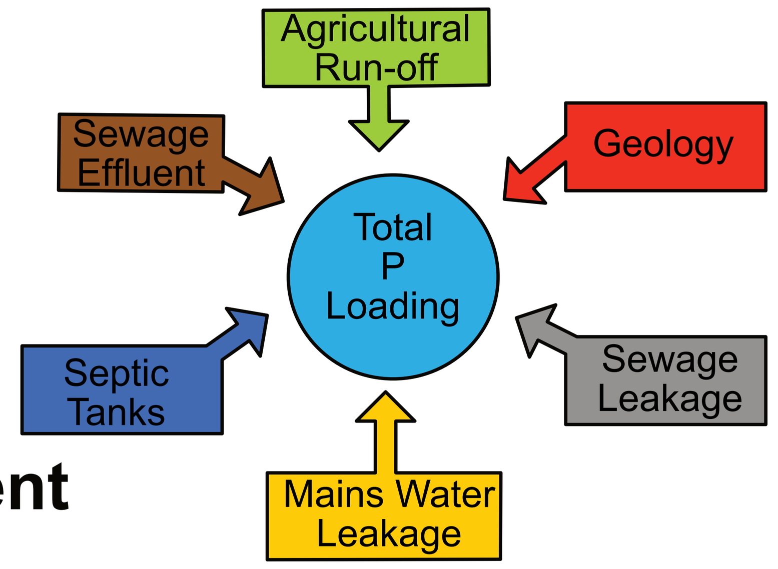
▶ Understanding and minimising these negative consequences is fundemental for the **protection of ecosystems** and for **sustainable development**.

Effect of PWS on the Cycling of Macronutrients

▶ Inorganic nitrogen (N) fluxes associated with PWS (e.g. during abstraction, treatment, distribution and leakage) are thought to be significant.

▶ Globally, water is dosed with phosphorus (P) in order to reduce lead and copper concentrations in drinking water.

▶ **PWS** perturbs nutrient cycles, with environmental and economic implications (e.g. decrease in quality of drinking water and eutrophication of surface waters).



▶ Fluxes of leakied nutrients need to be quantified and included within **macronutrient budgets**.

Current Work

▶ Significant work has been done to assess the impact of anthropogenic perturbations to macronutrient cycles globally (e.g. **NERC's Macronutrient Cycling Programme**; Whitegead and Crossman, 2011).

▶ **Isotopic fingerprinting methods** for determining P concentrations, sourced from leaked drinking water have been developed (Gooddy et al., 2015).

▶ Fluxes of P and N from **PWS leakages** in the U.K. have been estimated and evaluated seasonally (Ascott et al., 2018; Gooddy et al., 2017; Ascott, Gooddy and Surridge, 2018).

Proposed Future Work

▶ **Expand the global dataset** related to macronutrient concentrations in both drinking water and the environment.

▶ Quantify the effect of PWS infrastructure on macronutrient fluxes in China, the U.S.A. and globally (e.g. N-S Water Transfer Project), by developing upon datasets and methodologies used in previous work.

▶ Draw conclusions that contribute to **effective legislation and policy** that will promote sustainable water supply, human health and ecosystem dynamics.

▶ **Generate a dialogue** of the projects findings between scientists, policymakers and the wider public.

References

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