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Public water supply is responsible for significant fluxes of inorganic nitrogen in the environment

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Understanding anthropogenic disturbance of macronutrient cycles is essential for assessing risks facing ecosystems. For the first time, we quantified inorganic nitrogen (N) fluxes associated with abstraction, mains water leakage and transfers of treated water related to public water supply. In England, the mass of nitrate-N removed from aquatic environments by abstraction (ABS-NO_3-N) was estimated to be 24.2 kt N/yr. This is equal to six times estimates of organic N removal by abstraction, 15 times in-channel storage of organic N and 30 times floodplain storage of organic N. ABS-NO_3-N is also between 3-39% of N removal by denitrification in the hydrosphere. Mains water leakage of nitrate-N (MWL-NO_3-N) returns 3.62 kt N/yr to the environment, equating to approximately 15% of ABS-NO_3-N . In urban areas, MWL-NO_3-N can represent up to 20% of total N inputs. MWL-NO_3-N is predicted to increase by up to 66% by 2020 following implementation of treated water transfers. ABS-NO_3-N and MWL-NO_3-N should be considered in future assessments of N fluxes, in order to accurately quantify anthropogenic disturbances to N cycles. The methodology we developed is transferable, using widely-available datasets and could be used to quantify N fluxes associated with public water supply across the world.