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Non-conventional waste water treatment methods for Greenlandic communities

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ABSTRACT: Wastewater treatment in Greenland is non-existing: Waste water effluents are discharged directly at the coastline to local water recipients. In larger towns (> 500PE) sewerage has been installed and most dwellings are connected, while in smaller settlements, honey bag toilets are collected from the dwellings and discharged to sea, ice or land by the municipality. Apart from a) releasing an organic and nutrient load which may damage the ecosystem in the local recipients - depending on the hydraulic conditions; the effluents may also: b) contain pathogenic microorganisms, parasites and antibiotic resistant bacteria, which pose a health threat for the local population; c) contain visible floating items which pose aesthetic disturbance and may affect e.g. tourism; and d) contain heavy metals and anthropogenic toxins that may further affect the local ecosystem. Conventional treatment, is neither environmentally nor economically sustainable to implement in Greenlandic communities, due to the cold climate, and scattered population. In addition, advanced removal of nutrients may in many cases be overstated due to the low population density and large receiving water bodies. Prior to establishment of new means of handling waste water the objective must thus be evaluated in each individual case, as the main challenges may not be identical at all locations. In this work we investigated possible treatment methods to target organic load, nutrients, pathogens and heavy metals. We have investigated the effect of sanitation of the waste water by chemical-mechanical treatment followed by hygienisation by UV-radiation or acetic acid treatment with encouraging results. We have also investigated the feasibility of treating the sludge of the chemical-mechanical treatment by anaerobic digestions in mixture with industrial waste from the local fishing industry; or by composting, which is a more simple process and might be done in mixture with organic household waste.