Water reservoirs

A versatile solution

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Introduction

Water reservoirs for collecting drainage water address multiple agricultural challenges. The stored water can be used for irrigation, which is crucial during frequent spring droughts. Also, nitrogen and phosphorous may be retained and recirculated to the fields during irrigation, instead of being discharged into aquatic environments. (Figure)
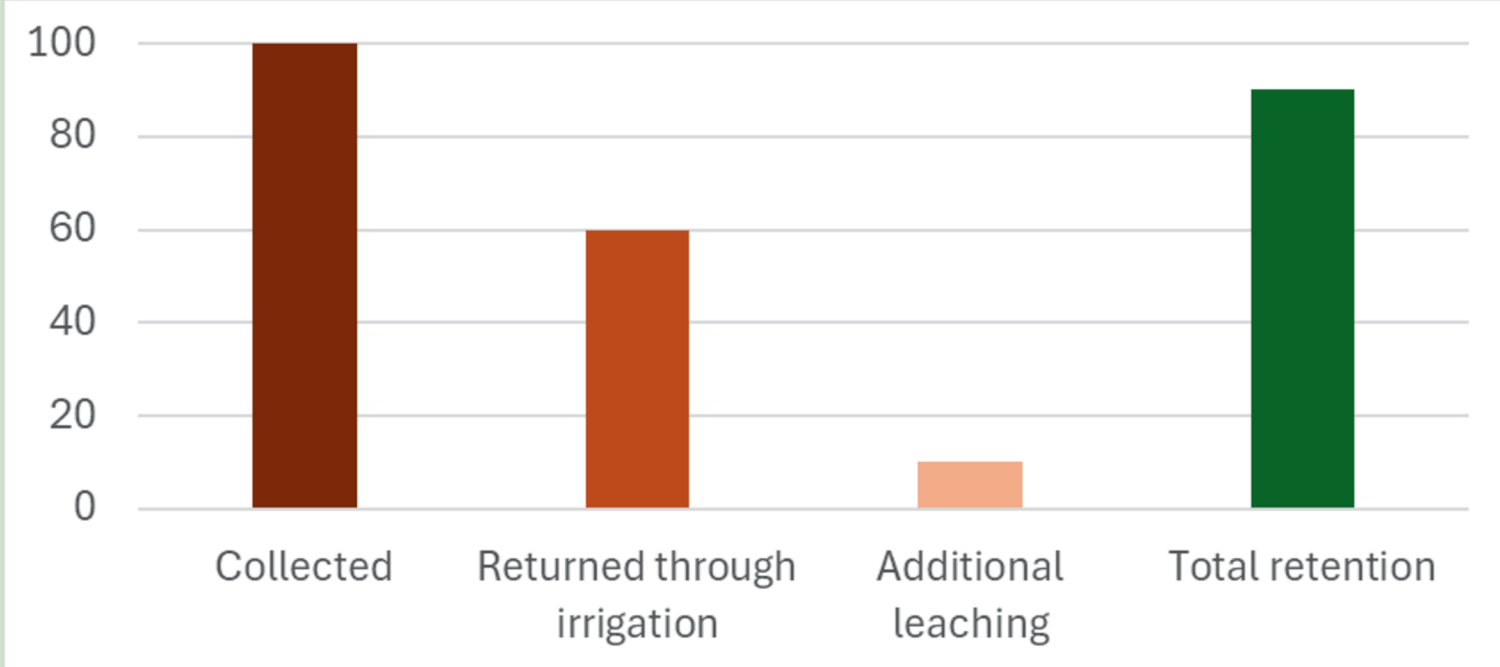
Conceptual potential for N retention when collecting drainage water and returning reservoir water to the crops through irrigation.

Objective

The study aims to investigate the potential of water reservoirs to meet future irrigation needs while simultanously serving as an effective measure for reducing nitrogen discharge into the aquatic environment.

Methodology

This observational study takes place in Samsø, Denmark, where water reservoirs are commonly used to store excess water from cultivated areas during winter, ensuring a water supply for spring irrigation. Measurements will be obtained from a single reservoir with capacity of approx. 113,000 m³. Drainage water is collected from an area exceeding 250 hectares and will be used in 2025 to irrigate >225 hectares.

Data collection

Water samples from incoming drainage water are collected biweekly throughout the period of pumping drainage water into the reservoirs. Weekly water samples from outgoing reservoir water are collected while irrigation is ongoing. Samples will be analyzed for nitrogen and phosphorus content. The results, combined with other data, will provide insights into the development of nutrient levels over the retention period.

Preleminary results
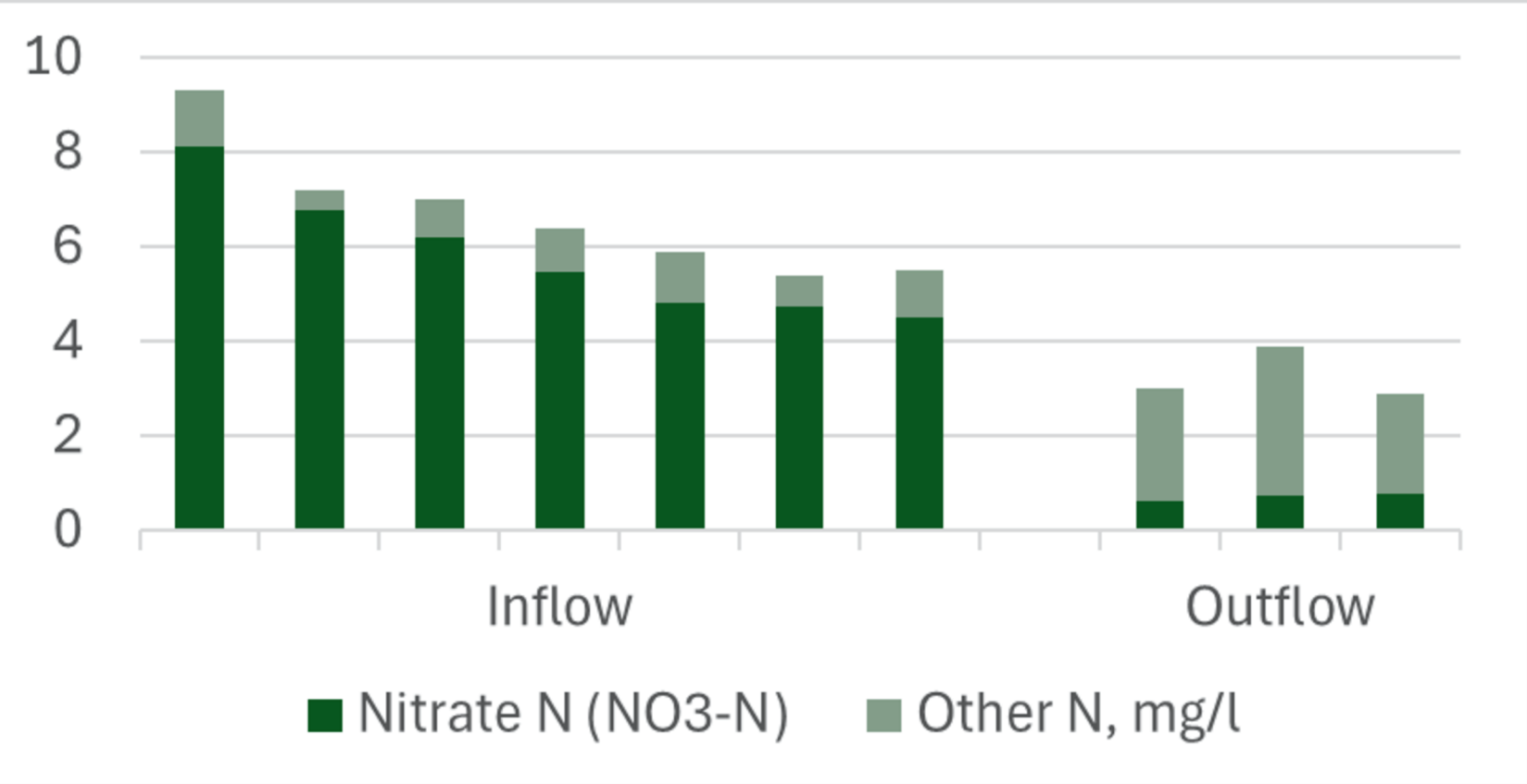
Nitrogen levels (mg/l) in collected water samples. Inflow samples initiated in February 2025 (biweekly). Outflow initiated in April 2025 (weekly).

Estimation of potential for N retention in the reservoir	
Reservoir capacity, m3	113.000
Average total-N inflow, mg/l	6.8
Average total-N inflow, Kg N	771
Average total-N outflow, mg/l	3.3
Average total-N outflow, Kg N	443
Irrigated area, ha	226
Returned via irrigation, kg N/ha	2.0
Additional leaching, kg N/ha	0.4
Additional leaching, kg N total	80
Total retention, kg N	691
Total retention, pct.	**90**

* Adjusted for pre-existing water volume in the reservoir prior to the incoming drainage water.
** Estimated using NLES5 model

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