



Diffuse Water Pollution Investigation in the Broads National Park, Norfolk, UK

Introduction

The Upper Thurne Broads and Marshes and Shallam Dyke Marshes Sites of Special Scientific Interest (SSSIs) are currently under unfavourable phosphorus (P) status breaching Water Framework Directive threshold (0.03 mg/L).

Aims

To understand the potential contribution of point and diffuse sources and internal P cycling to poor water status. Subsequently, to provide recommendations for future catchment management, taking into consideration current management methods.

Methods

18 soil, 55 sediment and 78 water samples were collected and analysed for Orthophosphate, Total Phosphorus (TP) and Iron. The analysis incorporates Environment Agency and Internal Drainage Boards data for temporal patterns. The sampling strategy identifies potential sources through capturing the P sources, pathways and receptors in the catchment.

Domestic Wastewater Treatment Systems

Potential dwellings unconnected to Anglian Water's main sewerage network may cause point source pollution.

TP (water) = 0.5 mg/L

Soil Erosion

Pathways for P runoff to nearby watercourses become vulnerable via degraded, highly eroded and low vegetation density soil.

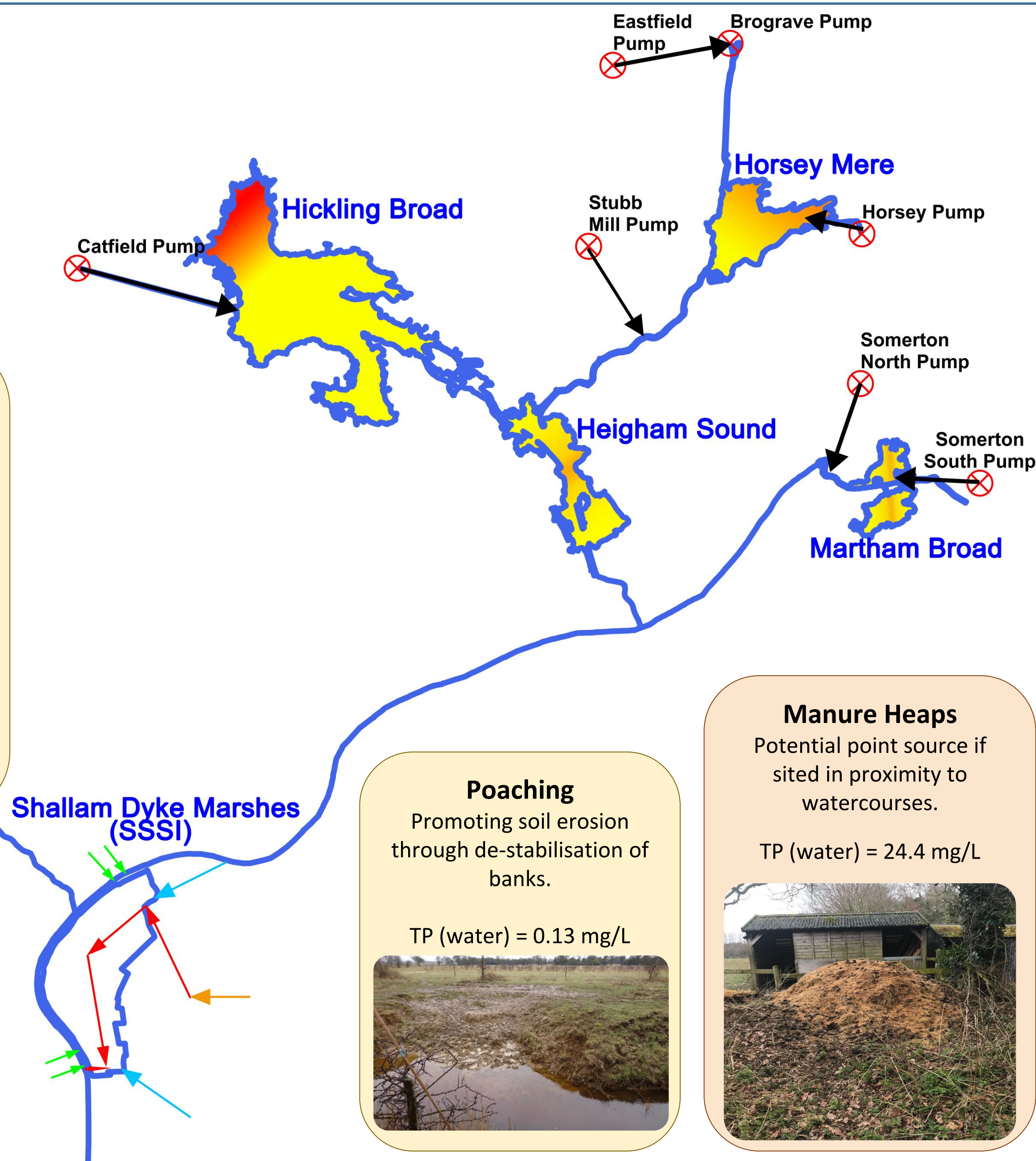
TP (water) = 0.17 mg/L



Shallam Dyke Marshes SSSI

Pressures:

- River Thurne (tidal influence)
- The Shallam Dyke drains
- Potential unconnected properties and urban runoff
- Upland catchment input



TP Concentration

- 0.18 mg/L
- 0.11 mg/L
- 0.06 mg/L

Good Practices

Buffer strips (≥ 2 m) and constructed wetlands.



Manure Heaps

Potential point source if sited in proximity to watercourses.

TP (water) = 24.4 mg/L



Mud on the Road

Mud accumulation on roads enhance soil movement entering drains and thereby facilitates P inputs.

TP (soil) = 636 mg/kg



Recommendations

Urban Pollution: Installation of small reed beds or constructed wetlands as secondary treatment in households with domestic treatment systems, which can potentially attenuate 20% of the TP (Natural England, 2015). Launching a public campaign to raise awareness regarding the importance of regular domestic wastewater treatment maintenance.

Agricultural Land Management: Building fences along rivers and streams to reduce bank disturbance, thereby prevent poaching. Offering constructed troughs with a concrete base as an alternative for livestock to drink from. Maintaining adequate crop cover during periods of high intensity rainfall to minimise soil erosion. Establishing hard-standing entrances for temporary sugar beet storage.

Road Verges: Restoration of large areas of exposed soil and strengthening low vegetation density road verges through revegetation and reducing mowing frequency. Other measures include continued usage of signs, such as 'Do not disturb banks', to encourage long-term awareness for road users.

Cyndi Lou, Jodie Evans, Laura Manteau, Clara Villaró Morros, Grace Harland, Róbert Bača, Ese Iyere and Zhihao Mo

Supervised by: Ian Holman and Robert Grabowski

Reference: Natural England. 2015. A review of the effectiveness of different on-site wastewater treatment systems and their management to reduce phosphorus pollution. UK: Natural England.

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