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Brighton ChaMP for Water

Research opportunities – as of May 2018

Overview of Project:

Brighton ChaMP for Water (ChaMP) was designed in response to rising nitrate trends observed at Southern Water abstraction boreholes in the Brighton Chalk Block. The principal aim of the project is to protect and improve the quality of groundwater in the Brighton Chalk, to ensure it remains a sustainable resource for public water supply.

To achieve this, actions identified and agreed collaboratively in the Environment Agency's Safeguard Zone (SGZ) action plans, the South East River Basin Management Plan, Southern Water's Water Resources Management Plan (Draft) and National Environment Programme, and the Adur and Ouse Catchment Plan (groundwater chapter) will be prioritised and delivered. This puts into practice the concept of integrated catchment management.

The ChaMP partnership is comprised of the SDNPA, Environment Agency, Southern Water, Natural England, University of Brighton, Brighton and Hove City Council and the Brighton and Lewes Downs Biosphere. The primary delivery staff for this project are the Natural England Catchment Sensitive Farming Officer and ChaMP Project Manager hosted by the SDNPA.

Action delivery will employ collaborative techniques such as engagement and consensus building, to influence behaviour and agree specific mitigation/ intervention measures to be put in place.

There are three specific objectives of the project:

1. Provide practical advice and improvements to land management in the urban and rural area
2. Raise public and land-manager awareness of groundwater protection
3. Informing the evidence base & undertaking success monitoring

In the rural setting this includes 1 to 1 advice from a ChaMP Catchment Sensitive Farming Officer, specialist advice visits, land manager events, rural interventions such as cover crops, manure management and precision farming trials. In the urban setting the project will deliver advice to land managers on groundwater protection and pollution prevention interventions, urban stakeholder events and practical measures such as Sustainable Drainage Systems.

The primary concern for the project is groundwater protection, however the various interventions also have potential to improve soil structure, provide erosion and flooding protection, regulate air quality and climate, secure food provision, improve the urban landscape and increase biodiversity.

Research opportunities for further investigation and discussion with potential candidates:

Rural:

1. Monitoring a nitrate precision farming trial for effectiveness in groundwater protection
2. A feasibility study of the use of horse manure on farms as a sustainable business opportunity
3. Analysis of the impact of manure piles on nitrate leaching to the aquifer in particular within safeguard zones
4. Nutrient management consideration of residual nitrogen in organic manures over time

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5. The impact of the 1980's Environmentally Sensitive Areas (ESA) scheme on groundwater nitrate concentrations in the Brighton Chalk block
6. Opportunity mapping for arable conversion to grassland/woodland/biomass cropping to protect groundwater
7. In-soil sampling for specific interventions undertaken by ChaMP
8. Effectiveness of rural landowner engagement methods and barriers to engagement/uptake of interventions
9. Monitoring leaching rates of slow release nitrogen compared with liquid fertiliser on chalk
10. Investigation of nitrate leaching in under-sowing/companion cropping trial
11. Mapping of drainage ditches and assessment of impact of water movement pathways on groundwater vulnerability
12. A comparison study of nitrate leaching associated with a winter cash crop such as winter wheat, a cover crop, a cover crop used for forage and permanent grassland

Urban:

1. Monitoring remediation of road run-off pollutants in rain gardens and rainscapes using multi-level samplers
2. Planning of Sustainable Drainage Systems for groundwater protection and multiple benefits (feasibility studies)
3. Analysis of bacterial action for pollutant remediation in Sustainable Drainage Systems
4. An investigation of nitrates in groundwater due to deposition from NO_x originating from traffic emissions
5. Storage of traffic-derived contaminants in solid phase in the unsaturated zone
6. Is direct input of traffic derived contaminants traceable from the road drainage network to groundwater?
7. Are there reaction mechanisms operating that act to reduce PAH and metal (Zn) concentration in the aquifer?
8. Current input is dominated by rapid bypass flow during winter season/intense rainfall events –is there a significant build-up of traffic derived contaminants in chalk matrix blocks that has yet to reach the water table?

General issues:

1. Investigating public awareness of and behaviours associated with the aquifer and its use as a source for water supply
2. Review of worldwide best practice for groundwater protection in chalk aquifers comparable to Brighton chalk block
3. BGS/university collaboration – new geomorphological/hydrological mapping of the Brighton chalk block, tracer testing and integration into conceptual models