

Research collaboration opportunities

March 2020

Project background

The Aquifer Partnership (TAP) was set up to address rising nitrate trends 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.

Partners include the South Downs National Park Authority, the Environment Agency, Southern Water and Brighton & Hove City Council, working together with other organisations including universities, the Brighton and Lewes Downs Biosphere and Lewes District Council.

Our work involves:

- Promoting best practice in sustainable land management to protect the aquifer, providing good advice to landowners and managers, informed by sound science
 - Rural: testing new approaches to reducing chemical inputs and improving soil health, while maintaining environmental and economic sustainability for land managers.
 - Urban: promoting better delivery of solutions to protect groundwater, including rainscapes (Sustainable Drainage or SuDS), and encouraging best practice in amenity land and industrial site management.
- Raising awareness, building understanding and stimulating improvement of groundwater protection in the rural and urban environment.
- Contributing to, and undertaking robust research; drawing on recognised sources to inform our work in promoting groundwater protection, and increasing knowledge and skills

In the rural setting this includes 1 to 1 advice from TAP's rural liaison, 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, and we are keen to quantify and promote additional benefits to improve soil structure, provide erosion and flood 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. Peer review and evaluation of Cover Crop trials undertaken (nationwide/international) and provide conclusions on the results.

2. Explore current options for off-mains sewage storage and treatment, their implications for groundwater and suggestions of best practice.
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
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. Effectiveness of rural landowner engagement methods and barriers to engagement/ uptake of interventions
8. Investigation of nitrate leaching in under-sowing/companion cropping trial
9. Mapping of drainage ditches and assessment of impact of water movement pathways on groundwater vulnerability
10. 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. An investigation of nitrates in groundwater from NOx deposition originating from traffic emissions
2. Establish risk to aquifer and promote best practice in equine facilities site management.
3. Evaluate the potential to offset carbon by investing in soil health (with soil as a key natural capital asset)
4. Study into the flood risk attenuation potential of street tree planting, including considerations of groundwater protection, taking account of whole life costing and natural flood management and other benefits (climate resilience)
5. Monitoring remediation of road run-off pollutants in rain gardens and rainscapes using multi-level samplers
6. Analysis of bacterial action for pollutant remediation in Sustainable Drainage Systems
7. Storage of traffic-derived contaminants in solid phase in the unsaturated zone
8. Investigation into direct input of traffic derived contaminants traceable from the road drainage network to groundwater
9. Investigation into potential reaction mechanisms operating that act to reduce PAH and metal (Zn) concentration in the aquifer
10. Current input is dominated by rapid bypass flow during winter season/intense rainfall events – investigation into build-up of traffic derived contaminants in chalk matrix blocks that has yet to reach the water table
11. Development of best practice pollution prevention in the Wider Urban Area (EIA, environmental audit, industrial sites and premises, construction sites)
12. Overcoming barriers to implementing Sustainable Urban Drainage schemes in new developments, retrofitting and road upgrade schemes

General issues:

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