UK1 TOPSOIL Governance Case Study: Linking agricultural land use to surface and groundwater protection within a multi-agency regulatory framework

1. Facts on case study

This case study focuses on the role of the Wear Rivers Trust (WRT) as host for the Wear Catchment Partnership (WCP) in facilitating communications between various partners on the Wear Magnesian Limestone groundwater body, via the Topsoil UK1 project. Numerous partners are active in this area including the Environment Agency (EA, the Government's environmental regulatory authority), Northumbrian Water (NW, the local water company), Natural England (the Government's advisor for the natural environment), Local Authorities (local county-level control of the built environment), and local land managers and owners (farmers, industry, etc.). Due to prioritisation of work areas (based on limited resources), these organisations can not engage to the same level everywhere in the Wear catchment. Through Topsoil UK1, the WRT have identified methods for improving coordination and communication around environmental issues on the Magnesian Limestone.

The Wear Magnesian Limestone groundwater body is currently at poor Water Framework Directive (WFD) status due to agricultural (livestock and arable) pressures. The EA have assessed the Magnesian Limestone groundwater body as failing due to a single drinking water source having a rising trend and levels of nitrate above the Drinking Water Standard and are confident in this assessment. Other groundwater data show some deterioration and impact from nitrate across the aquifer. These data support the Nitrate Vulnerable Zone (NVZ) designations in the both the groundwater and surface water bodies.

The single failing source of drinking water, as discussed above, shows that there is a localised impact from agricultural practices giving rise to the rising trend in nitrate in the groundwater. The EA are confident that farming practices in this localised area are compliant with the NVZ rules. The area is highly vulnerable with rising nitrate levels due to thin permeable superficial deposits and fractured bedrock above the groundwater table, through which pollutants like nitrate can travel quickly and unretarded to the groundwater. For these reasons the NVZ rules are not considered stringent enough to protect groundwater.

The WRT, via Topsoil UK1, is engaging with the farming community in this local area to raise awareness of the pollution of groundwater, gain buy-in to make voluntary changes in farming practice, and help find funding for mitigation measures over and above those required by regulation. WRT is doing this by facilitating a network of communication within the farming community, providing information and advice sessions, producing StoryMap websites to communicate the issues, and establishing a farming trial with a "champion farmer". This farmer is a well-respected member of the farming community who, by hosting the trial and working collaboratively with the WRT, will help disseminate understanding to a wider network, and convince other farmers of the benefits of engaging with the WRT. This type of working encapsulates the ideals of the Catchment Based Approach (CaBA).

2. Environmental context of case study

The project area, higlighted in Figure 1 below, represents an area of fractured limestone aquifer covered by mainly thin soils and thin superficial deposits. The soils and superficial deposits can provide a protective layer for the underlying aquifer – this protection (or lack of, where soils are both thin (< 5m thick) and generally porous) is represented in Figure 2. Groundwater connectivity can be used as a proxy for, or as another line of evidence to indicate, the vulnerability of groundwater in the area.

The area is largely rural with agricultural diffuse pollution impacting at least locally on groundwater quality. Magnesian Limestone groundwater quality is also 'at risk' of being impacted by rising mine waters from the Coal Measures, which underlie the limestone. These mine waters within the Wear Carboniferous Limestone and Coal Measures groundwater body are also classed as POOR under WFD due to mining impacts. The EA have reported in the Northumbria RBMP that it is technically infeasible to treat the mine water within the Coal Measures; therefore, long-term management of the mine water is required. This long-term management of mine waters is carried out by the Coal Authority, a non-departmental public body of the UK Government with responsibility for pollution associated with legacy mining activities in the UK.

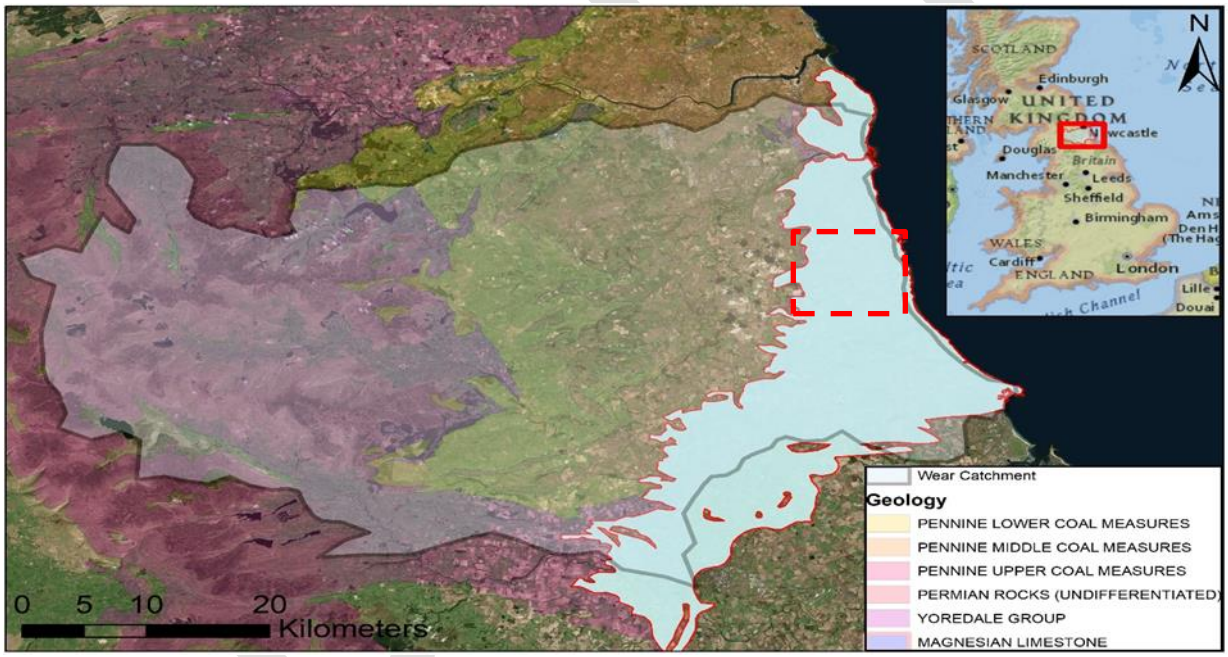

Figure 1: Magnesian limestone location within UK, and Wear Catchment and Topsoil UK1 Study Area (red rectangle).

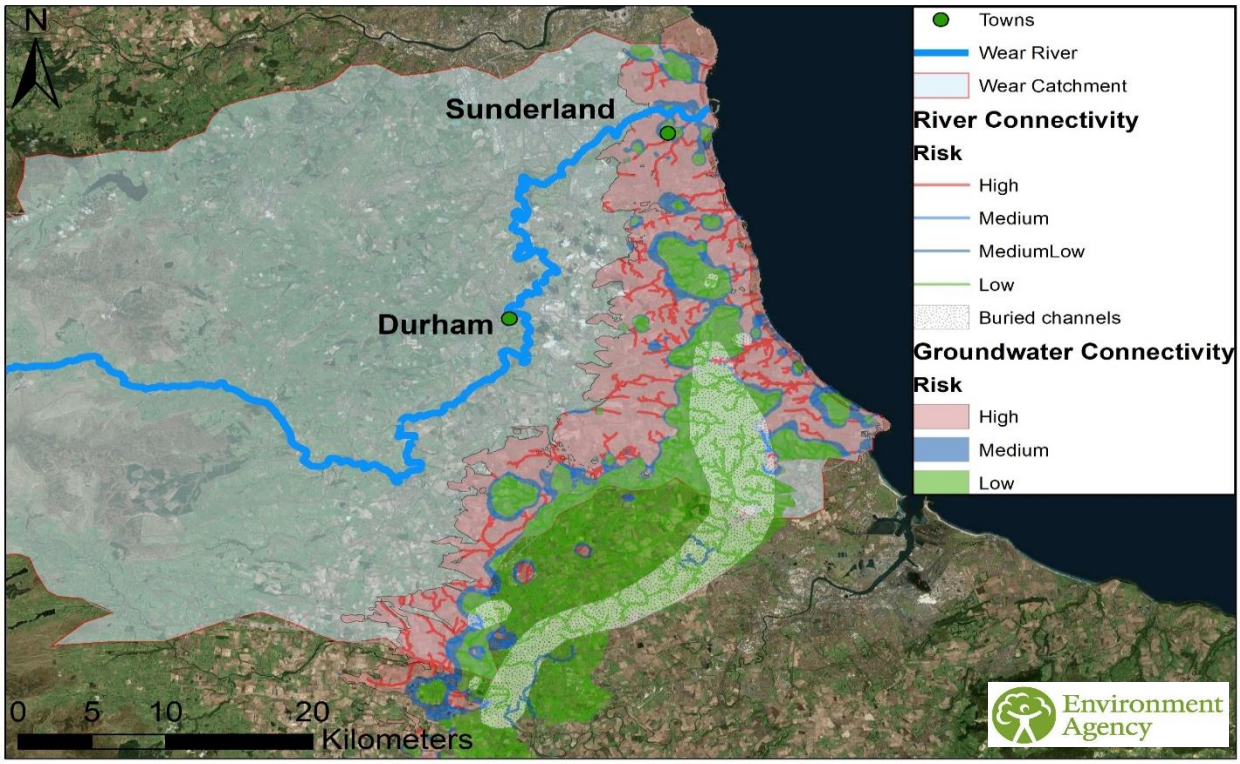

Figure 2: Groundwater Connectivity map for the Magnesian Limestone aquifer, showing areas of higher likely connection between land-surface activities, surface water and the groundwater. (Produced by the EA).

3. Management issue – simplified

Major Challenges

- Groundwater is often "out of sight, out of mind". Awareness of land-use impacts on groundwater needs raising.
- This area has highly complex geology (including superficial deposits), and understanding of how this complex geology influences the hydrogeological processes in the area is currently evolving. This makes it difficult to communicate the issues clearly with stakeholders and decide on actions.
- Limited resources means regulatory authorities must focus their activity where it is most needed. Some areas where groundwater may be highly vulnerable therefore fall outside their prioritisation.
- The existing groundwater monitoring network is not widespread. It was established at a number of locations to monitor background water quality of the aquifer, and is expensive to extend, therefore it is difficult to gather evidence of suspected localised groundwater issues.
- The intensive management of arable land in some areas promoted management practices which exacerbate the loss of nitrates into both surface and groundwater. These farming practices may be culturally deep-set and change may be difficult.
- There is a gap between regulatory powers and the ability of authorities to effectively monitor compliance with Statutory Management Requirements and Good Agricultural and Environmental Conditions of land standards, and measures implemented under Countryside Stewardship agreements.

General approach / Solutions proposed?

- The WRT, via Topsoil UK1, is uniquely positioned to bring partners together to agree a communication strategy for highlighting risks from diffuse agricultural pollution amongst the farming community. Three partners are formally designated as project beneficiaries: WRT, Durham University and NW. The EA and the Heritage Coast partnership are also actively involved, with wider catchment partners, including Local Authorities, involved through engagement at WCP meetings.
- The three partners are actively investigating surface water – groundwater interaction on the ground to increase understanding in three sub-catchments: Hawthorn Dene, Cut Throat Dene and Lumley Park Burn.
- Data capture within Topsoil and wider partner projects, data sharing between partners, and evaluation of current understanding will support improved catchment management for water quality benefits.
- Storymaps – a web-based platform utilising maps and text – will be developed for each sub-catchment to explain environmental issues to a broad audience.
- A farming trial has been established at Seaham Grange Farm to compare the impact of different tillage methods on water quality (http://seahamgrangefarm.com/site/). This trial includes partnership working between Seaham Grange Farm, Frontier Agriculture, WRT and wider farming networks. This trial will promote profitable, commercially viable farming, reducing input costs, whilst directly delivering environmental benefits.

Major Obstacles to Implement Solution

- It is difficult to secure adequate funding and resources to deliver effective partnership working which can tackle these issues.
- Land and surface/ groundwater dynamics and interactions are very complex, and expert understanding of this system is still evolving.
- Data sharing between organisations is difficult and can take time to arrange and agree.
- Risk to groundwater is not fully appreciated by the general public or specialist stakeholders with management responsibilities. There is a need to generate of farmer-credible evidence that there is no conflict in principle between long term business profitability and environmental protection.
- There is a lack of resources available to close the gap between regulatory requirements and ensuring compliance, regarding both maintenance of records and comparison of records to physical conditions. Anecdotal farmer evidence suggests in some cases records may not reflect on the ground management practices. Regulatory authorities can only focus efforts in accordance with resource, e.g. taking an evidence-led and risk-based approach to determine priorities: catchments which are at-risk or failing to meet WFD objectives in areas which are designated as high priority, including Drinking Water Protected Areas (safeguard zones and groundwater source protection zones), Bathing waters, Shellfish waters, Natura 2000 sites, Nitrate Vulnerable Zones (NVZs) and No Deterioration of WFD status. Not all highly-vulnerable areas fall within these designations.
- Although water companies focus resources on groundwater management to protect drinking water, activity focuses on issues in areas where drinking water quality is at risk, not on WFD groundwater failures. Differing objectives and standards can hinder effective partnership working.

4. Management issue – expanded

What has been the main issue you want to solve?

The main issue to resolve is how best to utilise WCP, cross catchment and regional relationships to better facilitate improved understanding and communications between all partners for more effective management of surface and groundwater. More consideration of the anthropogenic impacts on the Magnesian Limestone Aquifer of surface- groundwater interaction is needed.

A supporting issue is to provide farmers and landowners with balanced information on the impact of their farming practices and different managment practices, so that they can consider if making changes will benefit the environment without putting their businesses at risk.

Is the legal framework suitable to solve the issue?

Yes. Through Topsoil UK1, the WRT are helping to proactively provide advice to the farming community about groundwater protection, while at the same time ensuring mitigation measures do not impact on the farmers' yields / profit. The project area is in a naturally high-risk area (hydrogeologically speaking), which is compliant with NVZ rules, but where additional measures that are above and beyond NVZ rules are needed.

Is any approval procedure relevant?

No. Topsoil UK1 builds upon the Catchment Based Approach, which brings partners together to work at a catchment* scale. Approval may be required for different funding streams; however, the overall approach is not subject to approval other than Project Board agreeing the direction of travel for the project. (And maybe Trustees of the WRT?)

Who is responsible for planning, initiating or implementation of (potential) measures?

Statutory regulation for both surface and groundwater bodies is, as discussed above, divided between Government agencies and Local Authorities. The WCP, operating under Defra's Catchment Based Approach, provides an open forum and framework for statutory agencies (including water companies who retain statutory rights and responsibilities), to work with environmental Non-Governmental Organisations (eNGOs), universities and wider business interests. This approach can allow effective sharing of information and challenges which cascades knowledge across and between organisations and raises awareness of issues at catchment scale to which joint solutions can be developed.

Whilst individual organisations are responsible for planning, initiating and implementing their own objectives, coming together collectively through the WCP improves visibility of each other's activities; allows opportunities for joined up thinking, both on regulatory and non-regulatory issues, delivery of existing cross cutting activities and identifies new opportunities through the pooling of information and ideas.

*Note a groundwater catchment would rarely be the same, in terms of physical area, as a surface water catchment

5. Options and solutions

Local activity

The Catchment Based Approach (CaBA) has provided a Catchment Partnership structure within the WCP for WRT to access key land management stakeholders, engaging and utilizing specialist input from the regulatory agencies, water providers and academic research institutions.

In the three years that Topsoil UK1 has been active, farmers have begun participating in activities, and those that have engaged have been receptive to the message around protecting surface and groundwater quality.

Future project objectives will ensure that management interventions for groundwater protection through changes to land management techniques are widely discussed and disseminated amongst those on the ground that can deliver changes with local regulatory support available.

Legislation

The post-Brexit move to a UK-specific agricultural support framework working towards the objectives in the Governments 25 Year Plan is expected to provide more UK-specific measures for agricultural management than those currently available through the EU Common Agricultural Policy (CAP).

A new Agriculture Bill published last month has set out an expectation that public money should be used for public goods, however, the degree to which interventions for water quality protection will be included is still under development.

In the interim new Farming Rules for Water will be implemented which aim to provide a win-win for farmers and the environment. Topsoil UK1 can help raise awareness of these.

Although further additional legislation may be needed, it may be better to consider options to improve and simplify existing legislation and policies, including reviewing funding for agricultural support, looking at robust implementation, and considering how outcomes are monitored, building on the lessons learned from effective partnership working.

6. Questions to TOPSOIL partners

- How do regulatory authorities and those who are involved in environmental/catchment management co-ordinate their activities in other countries?
- Is there a similar governance gap around surface and groundwater management in other countries, and if so how could it be closed?
- Is there any European experience which can be shared illustrating participatory / co-governance management processes in vulnerable areas?
- How could we interest farmers of both large commercial farms and small holdings in protecting and improving the environment? Are the approaches the same or different for all types of farm?
- Which practices would we want farmers to change?
- How could we best achieve those changes/what barriers are in the way and how should they be overcome?
- How can environmental improvements arising from changes best be measured?
- Is there experience of how complex technical issues around groundwater management can be successfully discussed/presented to a non-technical audience?