

TOPSOIL Roadmap: How to improve regional governance on groundwater flooding

Introduction

TOPSOIL has committed to provide roadmaps related to TOPSOIL challenges, in order to make the lessons learnt from the project available to a larger audience. This document provides a draft for a “roadmap on groundwater flooding”. It aims to serve as guidance to groundwater experts who see the need for stronger addressing governance issues regarding flooding. It wants to share the challenges as experienced among TOPSOIL partners and provides recommendations to the European policy level on how to support better sustainability of groundwater management in times of climate change. This roadmap was developed by members of the TOPSOIL Transnational Governance Group, with contributions from Barry Bendall, Ilke Borowski-Maaser, Silke Mollenhauer, Anette Specht, Dieter Vandeveldel (alphabetical order).

The roadmap is based on the results of the workshop on groundwater flooding (TOPSOIL partner meeting on 29th September 2017, Bruges). The workshop was set up by the Transnational Governance Team (TGT) in TOPSOIL to provide a platform for transnational learning and exchange on governance issues linked to excess water and flooding. Starting point of the workshop was a case study presented by Herning Municipality, Denmark. Based on this, responders from all partner countries were asked: What are the experiences in your country in dealing with a situation like in the Danish case? Responders received the case in advance in order to prepare their presentation. After listening to answers from all responders, next step in the workshop was a plenum discussion on presented challenges and solutions. The discussion aimed for knowledge exchange as well as a contribution to a conceptual TOPSOIL roadmap and this flooding roadmap in particular.¹ This first TGT workshop in Bruges was a trial, and it is expected to be repeated and form the basis for more roadmaps.

In TOPSOIL *governance* is the way of getting things done. The roadmap allows groundwater managers in different countries to navigate some central governance themes in a sustainable management approach. Themes covered are:

- Responsibility
- Monitoring
- Measures

In each section the theme is introduced, and then different steps are addressed with guiding questions. The questions are – if available – answered with examples from the different countries. The questions / steps don't need to be worked on in a particular order. The governance themes will need different amount of attention in different management situations because in some countries they are completely predefined while in others they have to be adapted to the local context.

¹ For more information on the workshop and the set up, please consult the workshop summary (available at https://northsearegion.eu/media/6610/v20171213_workshop_wp6_sundscase_summary.pdf).

Themes in Groundwater Flooding

Responsibility

In constitutional states, the authorities are only entitled to do what the law allows them to do. For an effective management approach, legal responsibility has to be clear, and in the best case comprehensive: the same institution (authority, NGO, water provider, other stakeholder) would be responsible and (financially) capable for identifying the risk and the extent, the impact, the (potentially) damaged stakeholders, and the planning and implementation of the solution.

With climate change adaptation, new management challenges may arise which cannot be easily linked to the traditional division of tasks in water management. They may require either an adaptation of the legal basis or a good use of the inherent flexibility of some regulations. In case of groundwater flooding, the challenges are linked to the division of responsibilities for different water types: groundwater, surface water, drainage water. A second challenge is the spatial and time difference between the cause of groundwater flooding, and its impact. This can result in measures impacting the groundwater table leading to impact in house or other areas in different responsibilities.

Questions framing responsibility:

Who is responsible for dealing with groundwater flooding? Can raising groundwater managed by the same responsibilities as other (ground)water or is it the responsibility of those dealing with surface water?

Is a direct responsibility for management of flooding groundwater defined? If not, can an indirect responsibility and opportunity to deal with it, be linked to cross-cutting issues such as climate change adaptation?

A *Danish* municipality or wastewater company cannot manage raising groundwater because it is legally different from rainwater and draining water. In urban areas the house owner is responsible of all water on his property but only allowed to pump surface water to the public pipes, not rising groundwater. In practice this boundary is not respected. Outside sewage areas landowners are obliged to drain.

In *Dutch* context, climate change adaptation crosses sectoral competences and sometimes widens responsibilities and opens new possibilities. This way other responsible organisation and also new funds become available. In The Netherlands, a multi-purpose solution would be looked for, e.g. combining nature protection, storm water management, drainage water management and recreation.

Is responsibility linked with the access to financial and planning resources?

In *the United Kingdom* and *Germany*, house owners are responsible for solving their wet cellar problems. Still, the authorities would be allowed to find support for them, if the extend of the problem may be of importance for a larger area or due to their own changes in managing the groundwater table.

In *The Netherlands*, since 2008 house owners are responsible for excess water on their own ground. The municipality has to manage it in public space. The municipality is also responsible for analysing the problem and setting up monitoring.

In *Belgium* groundwater and drainage water is legally not distinguished. A special grant was set up in a similar case. House owners could apply for this grant to get their cellars restored /sealed. As mentioned above in *Denmark* no one but the house owner has the responsibility. No extra public funds are linked to this responsibility.

Are there other stakeholders (also authorities) who are not legally responsible but, like the house owners, may be interested in finding a solution to groundwater flooding and (financially) supporting it?

Stakeholders can be impacted by groundwater flooding, and may or may not be able to deal with the impacts. Identification of stakeholders is a prerequisite to the decision on how to involve them. Stakeholder involvement in groundwater flooding would be crucial in *Belgium, The Netherlands and the United Kingdom* even if it is not legally required. Many TOPSOIL partners considered broadening the number of responsible persons / organisations and involving stakeholders very important: This may help to deal with the uncertainty linked to climate change or other causes for raising groundwater.

In *The Netherlands*, there have been good experiences with sharing the responsibility. This means that not only the municipality is in charge and responsible for identification and managing solutions. In addition, other central stakeholders (regional government, water associations, house owners, industry, NGOs...) are involved to identify good solutions, and maybe also find a good combination of solutions. The stakeholders may be not only involved during the identification process but partly also for funding them.

In *the United Kingdom*, in one case a “Problem Steering Group” was set up, involving national and local level as well as all relevant departments.

In *Denmark* the wastewater companies have a big interest in avoiding excess water in their pipes due to high treatment prices (0,75 Euro/m³). Also farmers, industries and infrastructure authorities have an interest. Thus still no authorities can legally support/finance monitoring or new technical solutions.

Monitoring

Already addressed in the context of responsibility, monitoring and the development of a knowledge base remains a central aspect in the context of climate change adaptation. For groundwater flooding, the area which is impacted may be large but potential damage may be local with the individual house owners only. An assessment of the precise extent of the raising groundwater table e.g. by establishing a monitoring system could be one approach. The challenge for groundwater flooding is that setting up a monitoring system may be connected with different responsibilities, and that the potential data requires a lot of data for timely assessing them.

Questions framing monitoring

How can the damage potential / the vulnerability be assessed?

In *Belgium* they would combine this with a model approach to get a better understanding on the risk. A good monitoring network would be set up for building a sound knowledge assessing the extent and the severeness of the problem.

There is no *Danish* national tool, but Central Denmark Region is within the LIFE project C2CCC working on a Machine Learning based model with a relatively high resolution. (The model has been pitched on TOPSOIL partner meeting in November 2018).

Which level is responsible for setting up a monitoring system? Does the monitoring reflect concerns relevant for the stakeholders? Can monitoring be used for further developing the laws and regulations?

Monitoring is often in the hands of the national level but for local hotspots, local networks are added. In *The Netherlands*, a dense monitoring network in the area of Groningen (with more than 150 monitoring points and also targeted to specific projects (e.g. new ring road) was set up and paid by municipality (with costs about 100.000 Euro/year). Other monitoring activities are in the hand of the Dutch national level.

In *Denmark* there is a need for a subsurface groundwater monitoring system. No one is responsible of this, which is a main issue to be solved in the years to come. Thus currently the possibilities of a national model based warning system are explored.

Measures

Technical are often developed with a centralized approach, and taking advantage of the high competences and financial resources linked to water management, and often tailored to solve one challenge . However, in times of climate change adaptation technical solutions with one main purpose (e.g. lowering the water table) run the risks of being obsolete. The challenge with groundwater flooding is, in particular in times of climate change, that extreme weather periods may ask for adaptable approaches. For example, raising groundwater may be welcomed in a year of droughts.

Questions framing technical, financial and planning measures:

Are there different – centralized or decentralized - technical approaches?

In *Denmark* there might be a window of opportunity for a) third string solution due to ongoing sewerage restoring works in the street. Legislation does not allow utilities to establish a third string. House owners are allowed to establish it on their own common initiative, and they will then need a permission from municipality in order to discharge the excess water to a water course. A more local technical solution considered in *Denmark* is to implement sandpits when building in areas with high groundwater level.

In the *German* example, a large storage was implemented, including a filter system for cleaning water.

In *Belgium*, in case of groundwater flooding, a solution was expected to be more house owner oriented, offering groundwater barriers such as impermeable cellars to house owners. Belgium has also developed a blue spot map which shows sensitive areas for flooding. It can be complemented with real time / monitoring observations.

A *Dutch* solution would try to apply a multi-use solution, creating ponds or infiltration areas for both storage and recreation. Sometimes roads are turned into storage ditches. Also good experiences with combined pipes for storm water and drain water was mentioned.

How can technical solutions create additional benefits (e.g. create wetlands, transfer water to water scarce areas, and attract water intensive industry and jobs)?

There will be a TOPSOIL workshop on this topic in Herning in March 2019. The aim is to discover the possibilities of recreational areas, nature areas, lakes etc. in the Sunds area and to prepare business cases for use of excess water.

Are there different planning approaches?

When making district plans the *Danish* Municipalities are increasingly forbidding houses with basements and also making restrictions on building in areas with high groundwater level. For the planning purpose also mapping of seepage possibilities are completed.

Are there any financial incentives for implementing (decentralized) approaches or do they have to be set up?

In *Belgium*, house owner oriented, are supported by “renovation grants” to implement groundwater barriers such as impermeable cellars to house owners.

The UK example showed that they pumped the excess water to a controlled and temporarily flooded highway.

New house builders in *NL and UK* are also obliged in some areas to get advice on the groundwater situation.

In *Denmark* the house owner can partly get their wastewater utility fee refunded, if rainwater can be decoupled from the sewer and instead handled by seepage on own property. The scheme covers only rainwater, not groundwater. The wastewater companies are working on permission to establish a system to receive groundwater against payment from the house owners.

Conclusions

Countries which have been dealing with high groundwater levels for generations (The Netherlands, Belgium), have more mature solutions that other countries can benefit from. This roadmap provides some of the example from countries and hopes to inspire the readers when dealing with groundwater flooding in their area.

The following messages summarize the issues above:

- **Responsibilities:** Summarizing, groundwater flooding is in most cases an issue cross-cutting different responsibilities sectors, and interests, with an impact on “the public” such as private house owners. While one authority needs to take up the lead and guide through the process, cooperation with other stakeholders, including other authorities, helps to find support and financial resources. It may also facilitate that responsibility is taken over by the private stakeholders. In practical terms, it needs to be possible for an authority such as a municipality to initiate such a process even though it is not legally responsible for managing raising groundwater.
- **Monitoring:** Raising groundwater needs a combined knowledge base from modelling and monitoring. As monitoring data is often available from different sources, again a close cooperation is necessary. The knowledge base interacts with the development of regulations.
- **Measures:** Summarizing, climate change adaptation with extreme droughts and extreme floods may require careful planning to ensure that large scale / centralized technical solutions are not creating new problems. More local and smaller scale measure may be more adaptable here. Again, they may also need more stakeholder involvement.