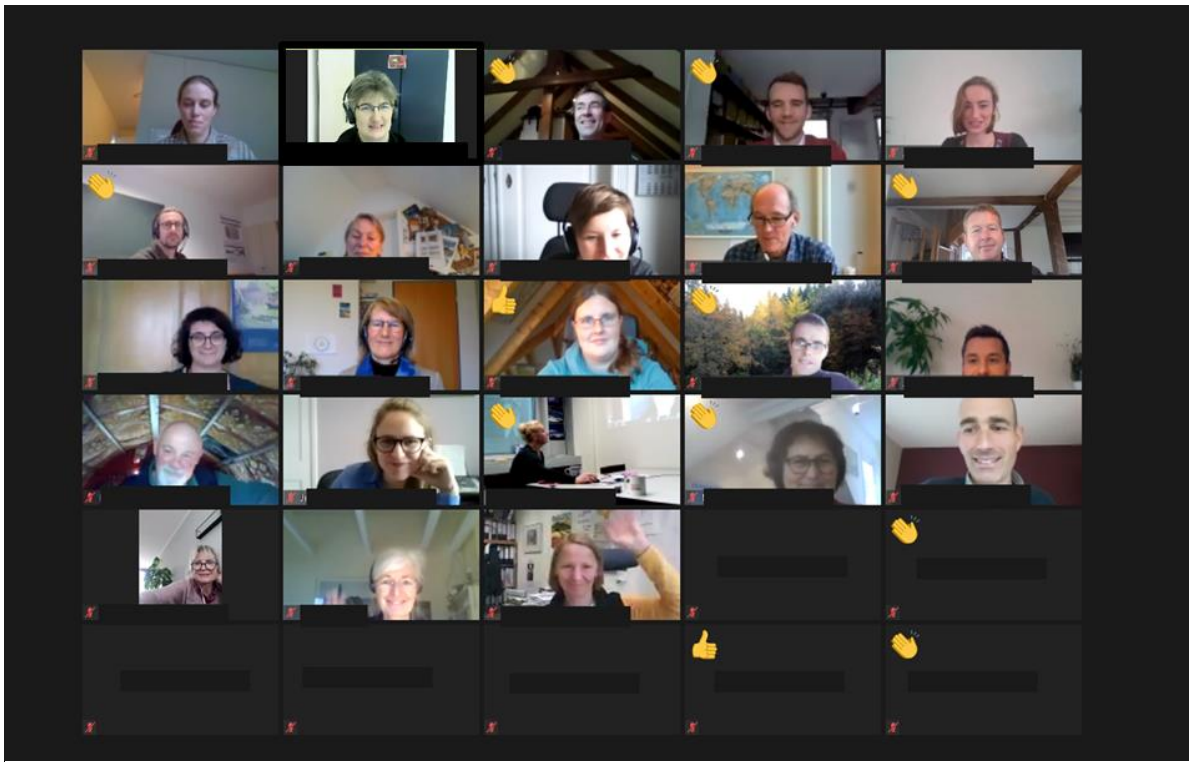
TOPSOIL online partner meeting

17-19th November 2020



Introduction

Focusing on groundwater management and climate change adaption, the TOPSOIL partnership has implemented sixteen local pilots to develop and/or test innovative strategies. Since May 2020, 14 of those pilots have been continued with a stronger focus on how to deal with balancing the seasonal water availiability and demand. At the online partner meeting in November, up to 30 participants exchanged and discussed the current status of their atcitives. The partnership used this opportunity for linking to the C5a cluster.

The continous participation through all three online-days showed, the thematic sessions were welcomed to learn not only about similar pilots but also from all issues related to groundwater management. However, a physical workshop is missed by all.

In this summary, the main issues are presented, linking also to the published presentations on the TOPSOIL webpage. For more details, please contact the presenters.

First results of the tTEM-surveys

Presentation by Jesper Bjergsted Pedersen, Rune Kraghede & Andy Kass, HydroGeophysics Group, Institute for Geoscience, Aarhus University, Denmark

Driven by the need for more effective tools to describe groundwater/surface interaction, raw material, point source pollution and other geotechnical applications, in all TOPSOIL countries, tTEM[1] surveys have been planned. Due to Corona, the implementation of the surveys has been delayed. However, the time has been used to further improve and develop the system.

The TOPSOIL survey results will also complement other tTEM surveys outside NSR, and provide important insights on better understanding e.g. saline / fresh water boundaries or the extent of point source pollution e.g. resulting from former landfills. The discussion addressed the strength of the magnetic field of the tool. It is not strong enough to be applied in areas with train lines or similar areas since noises and vibrations disturb the reflection / data generation. This is one reason why the tool cannot be used in urban environments. Impact on flora and fauna was not observed. Regarding the costs of tTEM, they are considered much less in comparison to other methods.

How to transfer TOPSOIL results beyond the project? – Interactive session

The implementation of a capitalization strategy is one of the central activities in the TOPSOIL extension phase, involving all project partners.

After an introduction, the partners discussed in pairs, and later in small groups on how to ensure that relevant insights and results from the TOPSOIL project are taken up in groundwater management, and / or are further developed e.g. by transferring them to e.g. a new area, how to upscale or further develop them.

[1] tEM = **t**owed **T**ransient **E**lectro **M**agnetic system

Dr. Ilke Borowski-Maaser
30449 Hannover
Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

Building on this discussion, partners are requested to provide more input on related activities and issues in their pilot which they expect after TOPSOIL has ended.

The timescale and budget for such activities varies between the pilots, e.g. depending if there is a need for more scientific follow-up project, or the establishment of further implementation processes. During the discussion, the contributions were visualized using an online "whiteboard" (see annex p. 5)

A project level report which is currently prepared by VMM will synthesize the results from all pilots.

The discussion showed that all partners are going to continue the work in the pilots, some with a stronger focus on model development and implementation, some working on establishing the methodological approach in other areas.

Session: Better integration of agricultural practice and groundwater protection

Three pilot presentations approached agricultural land / soil management as a central driver to groundwater protection:

- Pilot GE5: Christina Aue, OOWV
- Pilot UK: Peter Nailon, Wear Rivers Trust
- Pilot NL: Geertje Enting / Albert Jan Knijp

The partners enquired more details during the discussion, e.g. on the impact of new German regulations, role of pesticides and the farmers' perspective on the management impacts. All presenters confirmed that for improving land management practice you need both awareness raising on the relevance and impact of soil management on groundwater, and economic/financial incentives for the farmers. Still, progress is slow.

While the presentations focused on reducing nitrate leaching, one issue was also that land management practices including more / longer coverage with plants implies often more use of pesticides. For example, in the UK, improved soil structure resulting from reduced tillage will improve infiltration, but currently it is very dependent on glysophate. Some partners confirmed that pesticides are an increasing pressure on groundwater. In the Netherlands pesticides are found above the EU-norm in about 10 % of the monitoring wells (10 meter below surface).

The following resources / studies were recommended:

- "Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study" (Jörg Schullehner, GEUS)
- The METABO TiG project (BGR)
- Digital information of monitoring pesticides in the Netherlands:
- Nitrate findings in Denmark mapped

Session: Dealing with saline groundwater

Three presentations addressed the challenges related to modelling and stabilizing a fresh/saltwater border in coastal and exploited groundwater bodies.

- Pilot GE2: Nico Deus, LBEG
- Pilot BE1/2: First steps towards the implementation of a creekridge infiltration system Dieter Vandenvelde, VMM
- Pilot GE3: Sina Julius, GDfB /Universität Bremen

Partners were interested in more details (e.g. withdrawal quantities, quality of infiltration water, extent of saline seepage. Also, local infiltration systems can be a solution for agriculture to tackle drought

and salinization. Considering the economic feasibility of such systems, one question was also the maximum price per m³ water a farmer is willing to pay in your country for an alternative water supply? However, prices for groundwater abstraction are in general rather low. For example, in the Province of Drenthe, using groundwater for irrigation is free. The well belongs to the farmer. Other numbers ranged from 0,90 to 2,09€/m³ plus a minor monthly fee.

Further resources offered were:

- Video: https://www.focus-wtv.be/nieuws/kreekruginfiltratie-zorgt-voor-extra-zoetwatervoorraad
- NSR Interreg project SalFar: The SalFar project deals with climate change and sea level rise and the challenges this raises for farming and agriculture across the North Sea Region.

Session: Better controlling groundwater pollution

Two Danish presentations emphasized the impact of rising groundwater tables due to climate change on former landfills and point pollution.

- Pilot DK4 : Agnieszka T. Bentzen, Region Syddanmark
- Pilot DK2B: Thomas Ljungberg, Region Midtjyland

During the discussion, although rising groundwater tables are expected also in other countries, Danish partners were most concerned. But so far, this aspect is not considered in planning or climate change adaptation. Only specific remediation projects have been financed so far; no money has been set aside for potential future impacts. Belgian soils include more clay, and as a consequence less risk. In UK, no action is expected before a specific threat is observed.

Session: Seasonal Balancing- How to improve?

In the final thematic session the group enjoyed three presentations dealing with quantity related issues in groundwater management:

- Pilot GE4: Elisabeth Schulz, LWK
- Pilot DK1: Seasonal balancing of terrain-near groundwater in the Sunds' area by Per Rasmussen, GEUS
- Pilot NL: Rinke van Veen, Provincie Drenthe

Partners were interested in more details, and connected to their own investigations on similar issues (e.g. smart drainage as presented in the Provincie Drenthe will be addressed in Belgium as well)

Participants also offered additional resources.

- Climate change adaptation and the North Sea Commission

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

Annex: Participants' notes in session: TOPSOIL- How to transfer TOPSOIL results beyond the project?

The following bullets have been visualized during the small group discussion, using an online white-board tool (padlet). They have been directly copied to this document without further processing.

What results / outcomes would be most valuable beyond the project? What would you like to remain from TOPSOIL?

Next step

(UK) surface/topsoil interaction; soil database, follow-up new management regimes at farms; three demonstration farms; create positive forum on climate change/droughts/floods with farmers (10y horizon); ongoing process becoming more important.

(DK) how to make use of tTEM method & data; very important to have local knowledge to further evaluate impact contaminants (flow); extend to other regions in DK but also make use of it more fully in own region + groundwater modelling (cfr. Sunds) can lead to take measures; other cities interested also rising groundwater levels

(DE-LBEG) detailed model to see where we can store more freshwater (need geophysical data; tTEM, drones etc.); buffering necessary for agriculture (irrigation) after three very dry summers; next logic step: implementation of measures to see how it works (not only modelling, but also on the ground); provide data how it could work - relization together with municipalities

(NL) transfer model results into legislation; example for other areas; improved model used for calculation impact on nature area; new policy agenda on drought; how to get more freshwater? What measures can you take measures groundwater.

NL1B

The farmers are now convinced of the effect of the measures. Catchment based approach.

NL1B: to have less pesticides in surface water (which can serve as drinking water --> link with health)

Better soil leads to better water quantity (more possibilities to hold the water)

GE3:

Large scale ground water model for aquifer recharge . (Extension: more detailed small scale)

UK2: Bringing people together and informing them about the need for an integrated approach

tTEM method

The structural information obtained by Means of the tTEM method is relevant for many different challenges like aquifer mapping, saltwater intrusion, geological mapping, pint-source pollution etc.

- groundwater model for the Elbe-Weser region

- increase acceptance for geophysical methods for groundwater questions (Helga)

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

adaptation from de farmers is very important and the strength. (Geertje)

Farmers work hard on their farms we need to realise that water is important for them, but they don't think about water whole day

developed methodology is valuable

hope to develop methodology that will last and help figure out geology of cities that would be usable in other places

Share the knowledge

We learned monitoring, which can help to avoid damage due to ground water distraction --> should be used by others! chances of developed programme

we developed geophysical methods for the future

These methods can be used further: Pollution in shalllow water, conductivity in pollution

How to investigate these sites --> maybe broader learning curve. This can save a lot of money in future sites and lead to better risk-assessment

relationships with stakeholders

TOPSOIL has helped here a lot!

Droughts

infiltration as a measure- now tested on small parcel but could be scaled up to further parcels. Infiltration legislations is currently only designed for water providers

understanding the extreme

links between groundwater recharge, flooding, precipitation.... needs more input

Climate Change Scenarios

What can we expect? We would like to continue the discussion on a more detailed local scale-

The finding about the different measures about groundwater flooding

and the input into policy discussion on stormwater / flooding issue: How to cope with groundwater flooding?

Make a leaflet with the tTEM results from different countries/pilots, showing how the geological settings were resolved and the specific issues were investigated/addressed. Good cases should be disseminated.

long-term issues take long-term results to share

Also very important integrate area approach with all the stakeholders not only for the time of the projects

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

long-term issues take long-term results to share

Also very important integrate area approach with all the stakeholders not only for the time of the projects

The need for a long term strategy for an integrated approach.

The recommendation that come out of the TOPSOIL project can be a part of the uptake by the North Sea Commission

RESOURCES. What do you need to keep these TOPSOIL results / insights?

- management of agricultural nitrates: talked in general terms on their impact > making it more specific and gathering more field-specific data; interaction with farmers (cfr OOWV) - balance: required for production <> excess - seasonal imbalances are bigger: it can be too dry and too wet in the same year; what will work one year/will not work next year. Field data (local) are very important > more extremes because of climate change. - droughts: big need for more buffering of freshwater because of hot summers (not only irrigation, but also in field itself) - cooperation with local municipalities very important (carry out measures)

Make a leaflet with the tTEM results from different countries/pilots, showing how the geological settings were resolved and the specific issues were investigated/addressed. Good cases should be disseminated.

NL1 B: discussion with larger groups, demonstration of different machines and their impact on the soil

GE2: need for demonstration project (now there's only a simulation) beyond TOPSOIL (idea for a new project)

The knowledge sharing between partners is a huge strength and important to emphasize (very much similar challenges)

GE5: coping with climate change. The need to share our results (how to change agriculture practices ,...)

And also look at multiple perspectives (eg perspective from the farmer --> yields). It takes time to involve farmers (and other stakeholders) (from 1 area to more...). The whole farm is important. (integrated appro

GE2: Coping with drought periods

challenge is saltwater intrusion and developing of groundwater models by those the development of groundwater quality in future can be simulated (Helga)

challenge

my challenge is to keep it an integrate area approach

Spread the message!

We need to show the value of our work and look for other areas where it is applicable

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

Keep working and reduce cost

We need more examination and new new samples and drilling. Developing it further to make it more affordable.

mapping as well as modelling

at the start of the catchments areas- to better understand wider catchment picture

more focus on uncertainites on the different climate models

better communication to stakeholder and to see how the different **measures** would work under different climate conditions adjust the time and spatial resolution. because it is an urban issue

raising awareness with stakeholder

farmers...

infiltration measures

investigate the relevant parcels to get more detailed information on underground and the quality of the surface water

INITIATIVE.: Who needs to be involved? What is your role in transferring results?

GE2: In the future: water managers.

Targeted dissimination of results to stakeholders

Show connection and think about interaction between other problems and our projects - climate change, surface water!

Risk assessment: We need the results to start working on problems

Find platforms to share and keep the results alive

Conferences and meetings to share knowledge, involve political actors. Spread the word to use our methods everywhere they are needed.

Positive Communication

be happy about the project! Show heart, work hard. Share our success.

Communicate results and connect with other institutes etc.

need good relation to university and other geophysic-expertise. We need to develope our tools further to then make others use our method.

Keep the people who are stakeholders

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

stakeholder round table --> quite successfull already, should stay alive! Find good multiplicators, find the rights people to use it

community members

maybe also more by way of citizen science
other river trusts, farmers, water companies,... specifically working in the area and other water managers

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de

Annex: Agenda

Tuesday, November 17th	
8.30	Online arrival and chatting – ensuring all technology is working
9.00	Welcome and Agenda Intro (extension,-pilots, indicators, status of project / Covid-19 impact) Question / Discussion
	First results of tTem surveys (Jesper Bjergsted Pedersen, Hydrogeophysics Group, Aarhus University) Question / Discussion
10.15	*Break*
11.00- 13.00	**How to transfer TOPSOIL results beyond the project? – Interactive session** We will guide you through small group discussions to identify how to transfer your pilot results to e.g. a new area, how to upscale or further develop them. The implementation of a capitalization strategy is one of the central activities in the TOPSOIL extension phase, involving all project partners. With TOPSOIL coming to an end, this session also helps to identify new project ideas for future funding structures.
Wednesday, November 18th	
8.30	Online arrival and chatting – ensuring all technology is working
9.00- 10.30	**Session: Better integration of agricultural practice and groundwater protection** Pilot GE5: Christina Aue, OOWV Pilot UK: Peter Nailon, Wear Rivers Trust Pilot NL: Geertje Enting / Albert Jan Knijp Discussion. The following questions have already been sent in: • The catchment based approach is carried out in a small area. How to upscale the method to bigger areas and still have the same commitment with farmers?
30 min	*BREAK*
11.00- 12.30	**Session: Dealing with saline groundwater** Pilot GE2: Nico Deus, LBEG Pilot BE1/2: First steps towards the implementation of a creekridge infiltration system Dieter Vandenvelde, VMM Pilot GE3: Sina Julius, GDfB /Universität Bremen Discussion. The following questions have already been sent in: • Local infiltration systems can be a solution for agriculture to tackle drought and salinization. what is the maximum price per m^3 water a farmer is willing to pay in your country for an alternative water supply?
12.30	C5A: Insights from a cross silo interdisciplinary approach, Egon Baldal, RWS
Thursday, 19th November	
8.30	Online arrival and chatting – ensuring all technology is working

9.00-
10.-30
	Session: Controlling groundwater pollution better
	Pilot DK4 : Agnieszka T. Bentzen, Region Syddanmark
	Pilot DK2B: Thomas Ljungberg, Region Midtjyland
	Discussion. The following questions have already been sent it:
	• Is it important to take future climate change impact into account when assessing the risk for pollution from a polluted site?
	• What are
	  ○ threats to surface waters?
	  ○ threats to groundwater water supply?
	  ○ soil pollution?
	• To what extent is it necessary to re-consult previous risk assessments as a result of the climate change impact?

10.30	BREAK
11.00- 12.30	**Welcome message by Péter Rácz, Project Advisor. North Sea Region Programme** **Session: Seasonal Balancing- How to improve?** Pilot GE4: Elisabeth Schulz, LWK Pilot DK1: Seasonal balancing of terrain-near groundwater in the Sunds area by Per Rasmussen, GEUS Pilot NL: Rinke van Veen, Provincie Drenthe Discussion. The following questions have already been sent in: • What are temporarily effective water retention strategies and buffering / stocking approaches for groundwater in the different regions? • How to make farming less dependable of irrigation?

Dr. Ilke Borowski-Maaser
30449 Hannover

Tel.: 0511/21 24 16 88
Mobil: 0176/41 12 72 81
E-Mail: bm@interessen-im-fluss.de