TOPSOIL: Newsletter 3

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From helicopter flight to extra freshwater storage

On September 7th, Inagro organised the "From helicopter flight to extra freshwater storage" stakeholder information session and workshop in Diksmuide.

Read more

Pilot in the picture: Elbe-Weser-region (GE1 & GE2)

Due to climate change, the distribution of the salt-/freshwater interface in the aquifers will change in the Elbe-Weser-region. The effects of drainage, irrigation and groundwater storage on the salt-/freshwater

interface should be quantified to get a sustainable exposure to the groundwater system.

Read more

Working together to find a balance

On 23rd October, the regional water authorities of Noordzijlvest and Hunze & Aa's held a workshop to present their different approaches of the projects to colleagues.

Read more

Topsoil in social media

Read our entry for the North Sea Blog

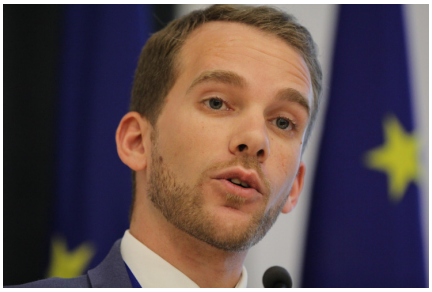
According to meteorological services across Europe, the record-breaking summer of 2018 was one of the hottest ever, raising concerns about the impacts of global warming and climate change. Will water scarcity become the new normal? TOPSOIL addressed this issue with an entry for the North Sea Blog.

Read more

5 questions to Stevie Swenne

As a conclusion to this TOPSOIL newsletter we asked work package leader of communication Stevie Swenne from Flanders Environment Agency some questions about his role in the project and about his expectations for the future.

Read more



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Project Duration: December 2015 - February 2020

Total Project Budget: € 7.34 million

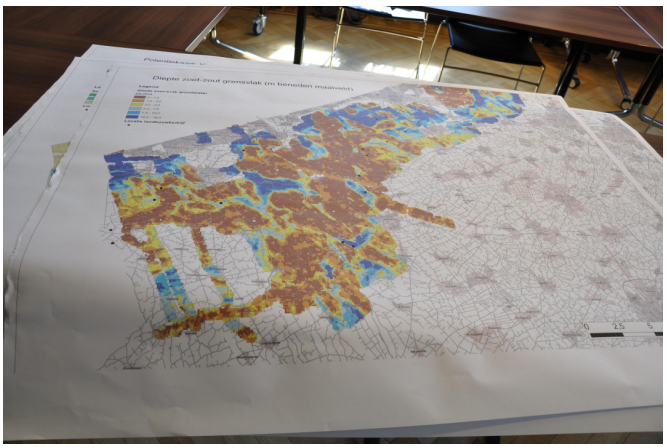
Total ERDF: € 3.67 million

From helicopter flight to extra freshwater storage

On September 7th, Inagro organised the "From helicopter flight to extra freshwater storage" workshop in Diksmuide. This workshop, which was held as part of the Topsoil project, involved presenting initial results from the helicopter flights and discussing potential measures.

The Topsoil partners aim to identify sustainable opportunities for improving water quality and quantity. However, the effects of climate change on the Flemish coast and polder system already became apparent last summer: the (predicted) drier summers will increase the need for fresh water, while decreasing surplus precipitation. On the other hand, rising sea levels will cause the volume of freshwater bubbles in the dunes to decrease and brackish seepage pressure in the polders to increase.

That is why the first phase, which took place in the summer of 2017, involved performing helicopter flights to map the level of salinisation and closely monitor the evolution of freshwater bubbles. The (preliminary) results of these helicopter flights in the West Coast area were linked to soil maps and announced during the workshop. This data will be processed into a new salinisation map over the next few months. Opportunities for additional freshwater storage in the West Coast area were explored in detail during the workshop. For instance, it is possible to work with local or regional creek infiltration systems to increase the size of freshwater bubbles. As a result, potential sites for such a pilot project were immediately examined. Not surprisingly, the participants - mainly farmers and local water operators - showed a great deal of interest in visiting such a project in Zeeland. Most certainly to be continued...



Pilot in the picture: Elbe-Weser-region (GE1 & GE2)

Background

Helga Wiederhold, geophysicist at LIAG, explains how pilots GE-1 and GE-2 (figure 1) have evolved since the start of the project.

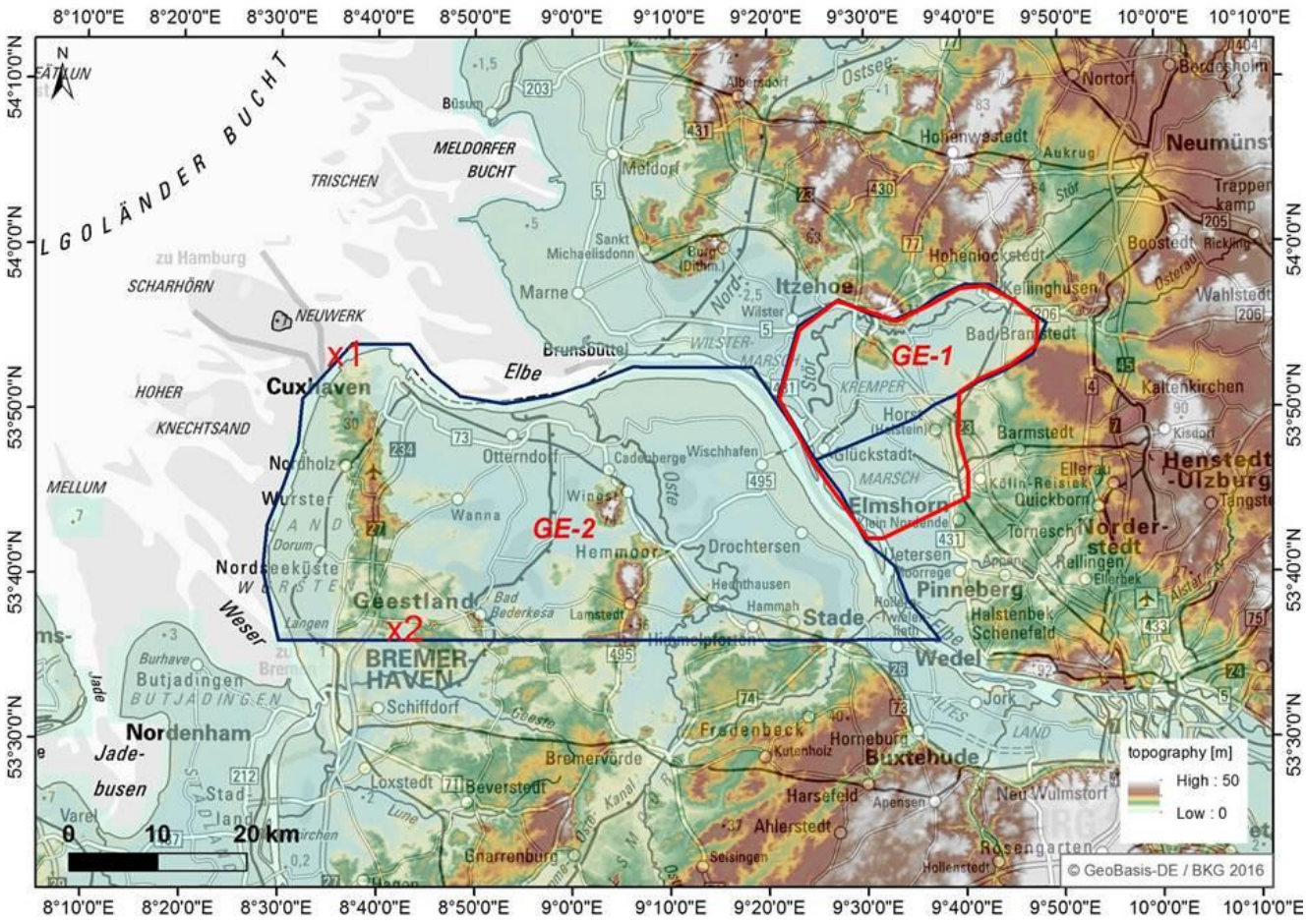
The aim of this project is to understand the salt water dynamics in a coastal region which is important for future availability of fresh groundwater. The study area between the moraine ridges of Altenwalde and Wingst including the Hadelner marsh is widely used for agriculture. It is characterized through low groundwater recharge with saltwater intrusion in the marsh area and high groundwater recharge with a high water table in the moraine ridges.

Saltwater intrusion is a complex and dynamic problem in coastal aquifers. Analysing seasonal- and drainage effects, as well as flood events could show a perspective of how the salt-/freshwater-system react under climate change conditions. This response of the salt-/freshwater-interface will be used as a status quo for modelling climate scenarios in a flow model. Another focus and an alternative to drainage is groundwater storage in the moraine ridges.

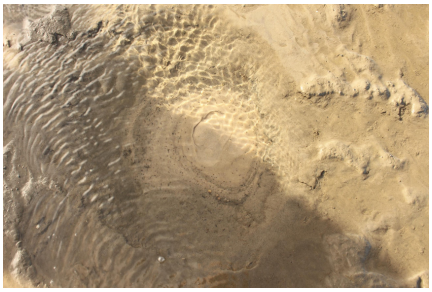
Can you give an example of anticipated climate change effects on the coastal aquifers in the Elbe-Weser-Region?

The year 2018 can be seen as a blueprint of our climate expectations - wet winters and hot dry summers. The average amount of precipitation will in general be unchanged, but most rainfall will occur in the winter season. Hardly no evaporation and water uptake by plants occur at that time, so most of the rainwater can infiltrate into the ground leading to rising groundwater table and, in the lowlands, frequent and longer lasting flooding. Additionally, more extreme weather situations like, e.g., heavy rainstorms must be expected.

Rising sea level and rising groundwater head will result in a new dynamic of the interface freshwater – seawater and freshwater - brackish water near the shorelines of the North Sea and the river Elbe.



What will the groundwater model show exactly?



The groundwater model shows the dynamic response of the groundwater body to changing boundary conditions, e.g. the development of fresh-saline interface related to climate change scenarios, groundwater extraction and drainage. Increased rainfall during the wintertime and rising groundwater head will lead to a demand for an adapted surface- and groundwater management in the Marsch area, required measures (e.g. drainage/pumping) can be quantified by the groundwater model.

Managed aquifer recharge (MAR) in the Geest area can be a choice to meet draughts in the summer season, the prospect of success of this measure can be estimated by the modelling results. Also the question arises about a connection between the Geest area and submarine groundwater discharge in the Sahlenburger Watt (figure 2).

Who will benefit from the groundwater model?

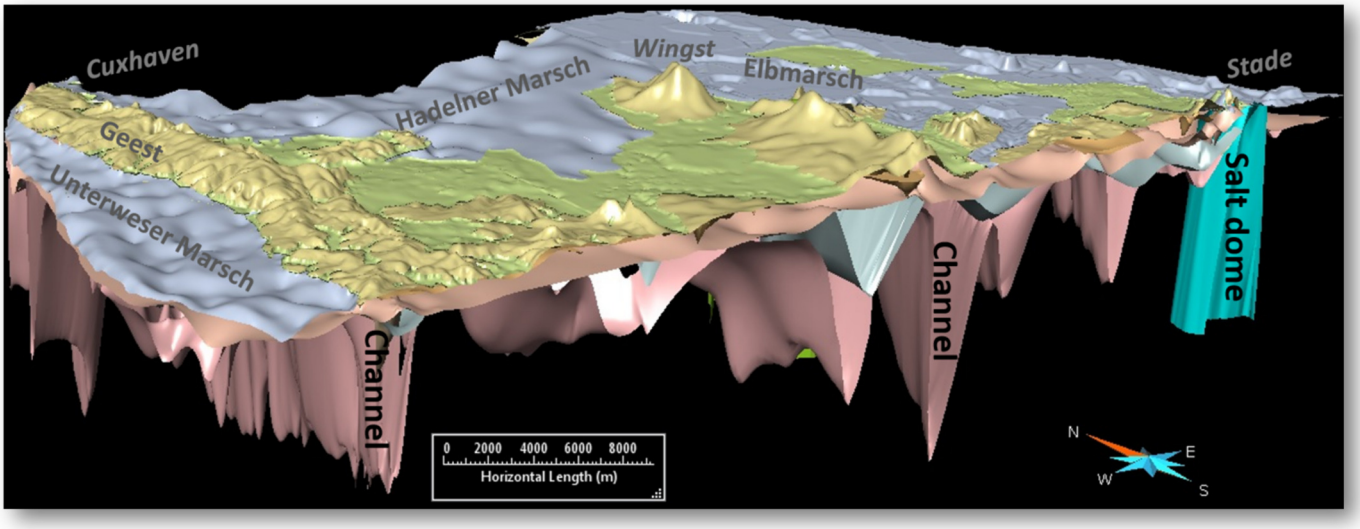
The groundwater model will lead to results for the planning of future sustainable groundwater use and drainage demand. This is important for:
• drainage and soil associations (Wasser- und Bodenverband)
• water and environment authorities like NLWKN (Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, GE-2) and LKN (Landesbetrieb für Küstenschutz und Nationalpark, GE-1)
• waterworks and water supply companies
• local farmers
• communities
• consulting companies.

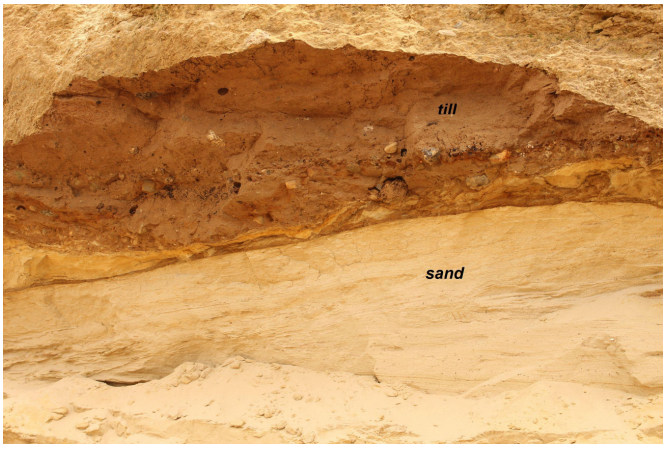
In what phase of development is the model at this point?

The groundwater model will be compiled at the LIAG and is based on geological models to be delivered by LLUR for GE-1 and LBEG for GE-2. The geological model is completed for GE-2 (*figure 3*) and in progress for GE-1. Transfer of the model layer into the groundwater flow model and parameterization of the groundwater model in progress (GE-2). The hydrogeological condition of the subsurface is complex. In general, three main aquifer systems can be considered (f*igure 4)*.

The basic field investigations like direct push measurements (GE2, *figure 5*), groundwater sampling (GE2), resistivity measurements (GE-1, GE-2) and seismic measurements (GE-1) for the geological models are completed, for GE-1 some fieldworks to refine the model (direct push, NMR, SIP) are in progress.

A parameter evaluation (salinity) for the groundwater model is in progress in cooperation with the University of Göttingen (master thesis).





Working together to find a balance

As Dutch partners in TOPSOIL the regional water authorities of Noorderzijlvest and Hunze & Aa's each run their own pilot project in the northern Netherlands. On 23rd October a workshop was held to present the differing approaches of these projects to colleagues from both organizations and from the Province of Drenthe.

Although the approaches might differ to some extent, the aims are similar. In both projects we are looking for measures on a parcel level – while also meeting the goals on catchment level.
One similarity between the pilots is the use of a 1-dimensional model called SWAP and the challenges being faced to upscale this. These challenges include dealing with the conflicting interests of farmers versus regional water authorities on the one hand and finding a balance between water quality versus quantity on the other.
By looking for similarities in the outcomes in terms of potential measures, we continue to learn from each other and multiply the value of our shared experiences.
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5 Questions to Stevie Swenne - International cooperation

You are currently working as head of International Cooperation within Flanders Environment Agency. What are your core activities and how are they linked to this TOPSOIL project?

Being responsible for facilitating the international cooperation of our agency allows me to get a good overview of a variety of environmental challenges, and how our partners across Europe deal with them. By doing so, you frequently realize that many organisations across Europe struggle with the same issues. Which makes sense really: in general, more people can speak different languages now, and we have the internet! So knowledge and best-practices spread a lot quicker amongst experts across the world. My main ambition is to make sure that our experts look for opportunities to solve their environmental challenges outside of their familiar, local network.

And when it comes to the uppermost layers of the underground, it makes absolutely sense to do so. Across the North Sea coastal areas, there is a common understanding that also the water under our feet can play an important role in tackling emerging, climate-related challenges like flooding and saltwater intrusion. For Flanders Environment Agency it is therefore very beneficial to be able to work on this topic together with partner organisations from Denmark, Germany, the Netherlands and the United Kingdom.

Your main role within the TOPSOIL project is that of work package leader of WP 2 communication. Could you describe us what is expected of you in that regard?

As coordinator for the work package communication, I have to make sure that (1) our project activities are communicated, and (2) that our project activities are communicated following a set of EU guidelines and conditions. Now, the good news is that with TOPSOIL, we carry out a number of activities that are rather innovative. So our project partners are rather eager to communicate what they do to their wider network of stakeholders.

When it comes to the conditions, it is sometimes a bit of a challenge to keep track of who's communicating what, how and where. Also, you don't want to interfere too much with the details of every single initiative that is undertaken by individual project beneficiaries. But we try to make sure that at least the official project logo with the EU-flag is always in place. Taking into account the considerable amount of EU-funding this project is receiving, we cannot make this negotiable. In addition, we try to generate additional news items on the great stuff we do by asking our partners regular updates for our TOPSOIL website and newsletters.

What is according to you the added value of working in an Interreg VB North Sea Region project?

Being privileged to work within the framework of Interreg for almost a decade now, I cannot deny the vital importance of these programmes for organisations like Flanders Environment Agency. You can also see the benefits shifting. Back in the days, Interreg was primarily an opportunity to see how your neighbours were dealing with a project that was comparable with yours. But now partnerships are a lot more diverse. Maybe less the same, but more compatible. Project outcomes are now more the result of actually working together, rather than next to each other.

Interreg-programmes also proved to be beneficial for the uptake of innovations developed by SME's across Europe. If we see one of our partners to be extremely satisfied with services or products acquired within the framework of a project, we are most definitely interested in trying to find out if their solution can be beneficial for our own challenges as well. So in a way, it is literally facilitating working in a European market. Also, knowing that certain innovations in one partner country did not deliver the expected result, most definitely

altered investment decisions. But it's hard to quantify 'an avoided bad decision' and translate this benefit into a useful indicator.

Apart from facilitating cooperation between regions that are geographically linked because of the North Sea, the Interreg North Sea Region programme is also bringing together people with a common mindset. Just look at the amount of bicycles you can (only) find in cities like Amsterdam, Copenhagen and London. Climate change matters to us.

What are your expectations for the future of this project?

We're only just over halfway, but it's already great to see the first project results coming in. In Flanders we are currently processing the data that was collected assessing the salinization of the groundwater in the coastal- and polder area. In a next phase, we will be looking into how we can help farmers and local businesses to make better use of this information. The stakeholder involvement-guide, that was developed together with our German and British partners, will definitely be very helpful for this.

Personally, I have the impression we're only starting to understand the potential of groundwater buffering and management, though. There are still some barriers we need to overcome, technical but also legal, before we can develop solutions that will allow a controlled management of groundwater levels. Not only for when there is too much water, but also for when there is not enough. Here in Flanders, at the most southern part of the North Sea region, we had such a drought episode only very recently. And I really hope to get the opportunity to work on a project that can help tackle these emerging issues as well.

Will a future initiative include a British involvement?

I really hope so! Up till now, we worked together more with partners from the UK than with partners from anywhere else. But together with the UK, also an important part of the EU budget is leaving. So policy makers will soon have to take some important decisions on the continuation of EU initiatives such as Interreg. While awaiting a new deal with our British partners, I keep my fingers crossed for a new, strong initiative between all EU-partners across the North Sea.