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Outdoor education

SCIENCE REPORT

Water project – 23.03.2021

1 About the project

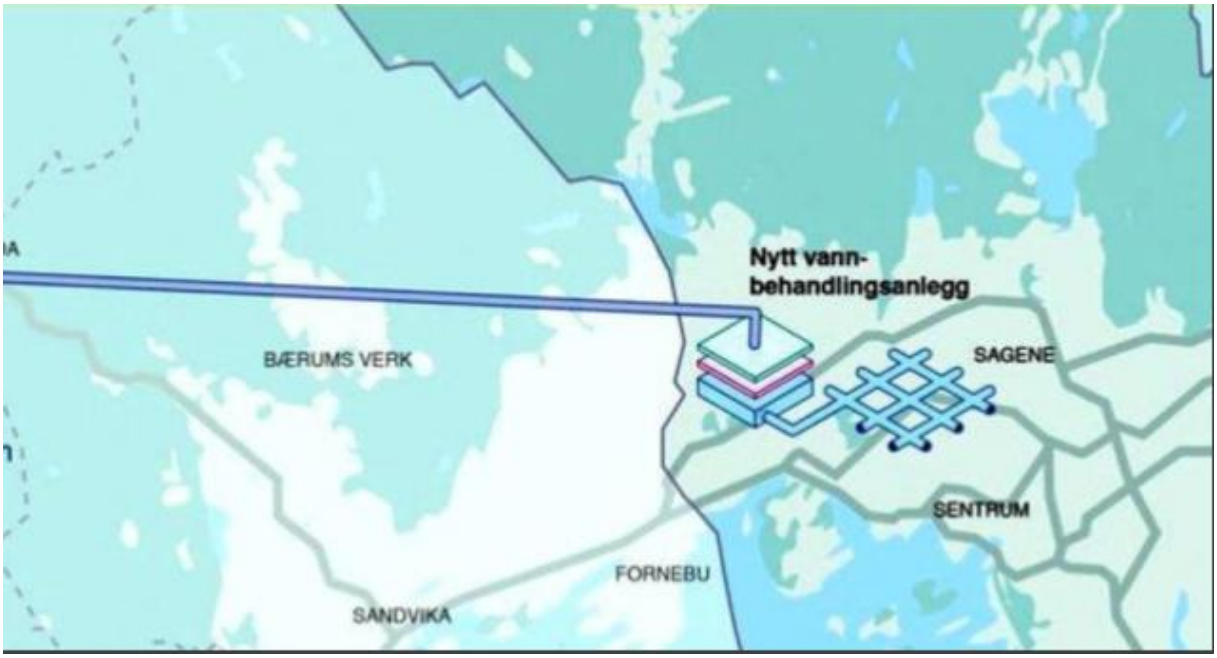
The Norwegian global engineering, architecture and consultancy company *Ramboll* is known worldwide. It is present in 35 countries with 300 offices and 16000 employees who generate sustainable solutions across Water, Transport, Environment and Health, Landscape and Urbanism, Buildings and much more. Their overall aim is to create a sustainable society and an appealing environment for people through undertaking local and global challenges.

Right now, Ramboll is working on a special mission, their biggest and most expensive project so far: the monitoring project Oslo Smestad. The city of Oslo is constructing a large second water reservoir for the town and Ramboll is developing a plan for water supply and is undertaking the associated risk analysis. This work is intended to identify of improvements required to ensure a stable and reliable water supply for Oslo.

Water is essential for everyone and everything living on earth. Due to that it is important to teach and learn in authentic areas and to bring school-science and science used in the real world together. Furthermore, monitoring water is a way of working directly towards the sustainable goal and a part of the UN SDG Acceleration program. Especially the work with pollution is of particular importance, which the company Ramboll, with whom we are cooperating in this project, is pursuing.
The focus of our fieldwork project are various outdoor teaching methods, learning from experts, learning by doing and the responsibility that the samples we take are important for a sustainable water project for 1 Million people.

2 Place and dates/ map

Oslo, Makrellbekken Skøyen, 10.03.2021



3 Purpose of Fieldwork

Because the water that gets transferred into the new water reservoir comes from around 80km outside of Oslo, it is necessary to build an additional tunnel alongside the project.

Under the theme water week, we got the possibility to work alongside Tom Øyvind Jahren, who is the Head of the Department of Marine Environment, Ecology and Sediments and Susanna, another co-worker of the company Ramboll. Together we

observed the water and took samples near the place where they plan to build the new water reservoir. By that we can make sure that it´s quality is fine and not endangered of the vibrations caused by the construction work that comes along with the project. For the past year, Ramboll has been testing the water to determine the baseline. This helps to find out whether the sediments have an impact on the creek and the groundwater.

4 Field equipment

In order to be able to examine and work with water, some equipment is needed, which Tom and Susanna have brought with them.
The following is a list of the materials needed:

- One yellow safety waistcoat to see better where each group is working
- Two hard hats with goggles to protect the eyes from the acid
- One life jacket
- A bottle attached to a stick to sample the water
- Two black boxes with several glass bottles to fill the water, labels for marking and an acid to determine the mercury of the water.
- A table where all the observations are entered

5 Methods + Description of methods

To start the monitoring Susanna, who works for the company Ramboll, informed us on how to test and investigate the quality of the water. We students were divided into three groups. In each group, two persons had to work next to the stream and take account of the measuring. Due

to precautionary reasons they had to wear the life jacket and yellow warn vest, the person responsible for holding the bottles and putting the etiquette on it also had to wear a hard hat with goggles.

Before using every bottle to fill it with the water of the stream, it had to be rinsed out three times in a row. Then the monitoring process could start. Susanna emphasized the importance of the spot the water gets taken from. To prevent little sand and stone particles of the water ground getting into the bottle and falsify the results about the water quality, it is necessary to find a spot where the stream is deeper and rising faster. By that it is ensured that water from the top of the streams gets contaminated in the sample as well.

Every time one bottle was full, the person with the helmet had to label it with the etiquette about the station number and the name. Another person had to be responsible for the protocol. The colour, time and date when the water sample got taken as well as additional comments about optics, smell and special observations of the water had been taken into consideration.

After repeating this process four times, a little phial with acid had to be filled with water at last. This is a method to test the amount of mercury in the water sample.

6 Results

Name of the station: MAE-EKST-ELEV

Colour of water: Clear but with particles

Time, date: 11:00, 10.03.2021

Comments:
- Smelly air and water
- Sampling point is behind a tunnel
- Normal amount of algae in the water

7 Discussion

In what ways may monitoring of water contribute towards reaching the sustainable development goal (clean water)?

First of all, monitoring the water is a precautionary measure. It is the only way to ensure that no pollutants enter the water as a result of such a large project that would contaminate and pollute it. Since water is essential for life on earth for everyone and everything, it is of particular importance to take care of it. Monitoring water makes it possible to react to possible pollution, to get to the bottom of it and to prevent its effects and consequences in the long term.
Each of us should realize that although more than 2/3 of the earth is covered by water, only about 2.5% of the world's water is available for drinking. In order to provide our children and grandchildren with a carefree life, at least in this aspect, so that they do not have to go hungry or thirsty, we have to deal with water resources in a sustainable way. For this purpose, monitoring by taking water samples is essential.

How may teacher-training at the university help achieving this goal on a longitudinal time scale?

To achieve the goal of a development in sustainability it is important to point out the importance the students play with their role as young teachers to be. Sustainability should not be considered as one outstanding topic alone, much more it can be transferred in many parts of our environment and everyday life.

As young teachers they have the responsibility to educate tomorrows children about their understanding of science and how it applies in the real world. Children take them as important role models. The teacher´s attitude towards the goal of working on a greener world through a more sustainable living will mostly be reflected by them. To reach this goal, they must adapt their role in this huge project and as a role model of this next generation in heart. It is about the little things they do and their will to make this world more sustainable and how they take care for it. And this main project can be a part in every subject they teach, it affects all parts of life. Above all, it supports young people to empower themselves.

8 Description of the nature on the field location

The area the field investigation takes place can be described as quite calm and natural. We could only observe a few people walking by on the small track next to the stream.

The water of the upstreaming river, that is limited due to a row of houses by a fence on the right side, is not frozen right now. Even though it´s snowing and the temperature has been under zero degrees (-2 degrees), only a thin layer of two centimeters of snow covered the surface of the track. The warm and sunny weather of the last week had prevented the water from freezing.

Overall, the place is surrounded by many trees, mainly spruce and beech. The air in the natural area is fresh and odorless. 100 meters next to it there is an old unused ski jump and a big grey house that's part of the company.

Around 500 meters away there is a big street that might be a factor for dangerous particles and dust in the stream. Non-visible but recognized by its sound there must also be a tram or train rail next to the street near the field location.

9 Film

https://youtu.be/pDi4EdGwLv4